

С. А. Шаншьева

**АНГЛИЙСКИЙ
ЯЗЫК
ДЛЯ
МАТЕМАТИКОВ**

С. А. Шанишева

АНГЛИЙСКИЙ ЯЗЫК ДЛЯ МАТЕМАТИКОВ

ДОПУЩЕНО МИНИСТЕРСТВОМ ВЫСШЕГО И
СРЕДНЕГО СПЕЦИАЛЬНОГО ОБРАЗОВАНИЯ
СССР В КАЧЕСТВЕ УЧЕБНИКА ДЛЯ СТУДЕНТОВ
НЕЯЗЫКОВЫХ ФАКУЛЬТЕТОВ УНИВЕРСИТЕТОВ

*Издательство
Московского университета
1976*

Рецензенты:

доцент НАВАЛЬНАЯ С. Т.,
доцент МИХАЛКОВА Е. С.

Предисловие

Настоящий учебник предназначен для аспирантов и студентов математических специальностей, которым предстоит в ограниченные сроки* овладеть новым для них, английским языком в мере, необходимой для его практического использования в профессиональной деятельности. Это означает, что аспиранты и студенты должны, во-первых, научиться читать математическую литературу, извлекая при этом научную информацию с нужной степенью полноты и точности, и во-вторых, достичь определенного уровня владения устной речью, который позволил бы им беседовать по специальности и делать устные научные сообщения. Они должны также приобрести некоторые навыки оформления полученной научной информации в виде переводов, аннотаций, кратких обзоров.

Реальный путь достижения начинающими названных целей обучения при данных условиях автор видит в максимальной интенсификации обучения. В предлагаемом учебнике интенсификация осуществляется за счет ограничения изучаемого языка подязыком математики в рамках функционального стиля науки; отбора и включения в учебник только текстов, представляющих собой фрагменты оригинальной научной прозы на английском языке**, тематика которых характерна для школьного и университетского курсов математики, а язык отражает специфику подязыка математики; установления минимального объема лексики и грамматики, необходимого и достаточного для овладения чтением математической литературы и устной речью на базе специальности; параллельного и взаимосвязанного обучения устной и письменной речи на одном и том же языковом и текстовом материале. Интенсификации обучения способствует организация учебного материала в учебнике и действий с ним обучающихся в системе взаимо-

© Издательство Московского университета, 1976 г.

Ш $\frac{70104-075}{077(02)-76}$ БЗ № 27—69—1976

* На изучение иностранного языка (как продолжающими, так и начинающими) в аспирантуре отводится 140—150 уч. часов, а в вузе — 210—240 уч. час.

** Исключение составляют несколько текстов начальных уроков, содержание которых связано с жизнью обучающихся, их занятиями в вузе и аспирантуре.

связанных и взаимообусловленных аудиторных домашних и лабораторных занятий, наличие в учебнике специального раздела лабораторных заданий для самостоятельных занятий в лаборатории устной речи (ЛУР) и раздела для преподавателей, содержащего методические рекомендации и упражнения для устной работы в аудитории.

Эффективность избранного подхода к решению проблемы интенсификации и оптимизации обучения английскому языку начинающих была подтверждена результатами опытного обучения в группах аспирантов и студентов механико-математического факультета МГУ.

Структура учебника

При построении учебника автор исходил из того, что оно должно обеспечить как учащихся, так и преподавателя учебным и справочным материалом, необходимым и достаточным для реализации в данных условиях поставленных целей*. Сосредоточение всего учебного и справочного материала, подлежащего усвоению, в одной книге продиктовано соображениями методической целесообразности, экономичности и удобства пользования. В книге представлен материал как для работы обучаемых в аудитории под руководством преподавателя, так и материал, подлежащий самостоятельной отработке дома и в ЛУРе.

В содержание 30 уроков входит учебный материал — тексты и упражнения — для работы в аудитории и дома.

Содержание самостоятельных лабораторных занятий представлено в разделе лабораторных заданий. Самостоятельные лабораторные занятия рассматриваются не как дополнительный вид учебной деятельности, а как неотъемлемая часть общего процесса обучения по учебнику, органически связанная с аудиторными и домашними занятиями. Материал лабораторных занятий и тексты должны быть записаны на магнитную пленку**.

В учебнике также имеется специальный раздел для преподавателя, содержащий:

- методические рекомендации преподавателю;
- упражнения для устной работы в аудитории и тексты для аудирования в ЛУРе;

* Курсом обучения аспирантов предусмотрено также обязательное чтение научной литературы по узкому профилю специальности — научной периодики (статей, обзоров), монографии и пр.

** В зависимости от характера задания тексты должны быть записаны на пленку с интервалами или без интервалов, с постепенным увеличением скорости чтения текстов диктором. Упражнения в ЛУРе в основном рассчитаны на трехфазную работу (выполнение задания с опорой на печатный текст — ключ для самоконтроля — самокоррекция) или четырехфазную работу (голос диктора — реакция учащегося — ключ для самоконтроля — самокоррекция).

— списки производных и интернациональных слов (об этом подробнее в разделе для преподавателя).

В грамматическом справочнике кратко изложены сведения о базисных явлениях грамматики и явлениях, типичных для языка английской научной прозы. Изложение, иллюстрируемое примерами, носит сугубо практический характер, что соответствует задачам обучения. Расположение материала в справочнике осуществлено в соответствии с последовательностью введения грамматических тем в уроках.

Англо-русский алфавитный словарь содержит 1900 лексических единиц. Словарь полностью отражает лексический состав текстов учебника и представляет собой минимум лексики, подлежащей усвоению.

Структурные элементы учебника расположены в следующей последовательности:

- основная часть — 30 уроков;
- раздел лабораторных заданий;
- грамматический справочник;
- англо-русский алфавитный словарь;
- раздел для преподавателя.

Структура основной части отлична от традиционной. Это позволило распределить учебный материал и действия с ним с учетом функционального назначения текстов и упражнений. Членение учебного материала по месту выполнения (в аудитории, лаборатории, дома), по форме (устно, письменно, с опорой на печатный текст или без нее) и по конкретной цели в плане формирования определенных навыков и умений методически целесообразно: оно позволило учесть специфику тех или иных действий с учебным материалом, рациональнее и эффективнее использовать их в целях интенсификации всего процесса обучения.

Аудиторные, домашние и лабораторные занятия оформлены в виде самостоятельных структурных единиц, связанных общностью тематики, учебного материала и конкретной цели. Определенное число занятий, объединенных таким образом, образуют относительно завершенную структурную единицу учебного процесса — цикл. Структура отдельного цикла (взаиморасположение в нем занятий трех видов) и распределение учебного материала в системе циклов занятий по учебнику отражают попытку направить и организовать всю учебную деятельность обучаемого и обучающего и позволяющую наметить своего рода программу формирования требуемых умений в различных видах речевой деятельности.

Количество циклов занятий по учебнику совпадает с числом уроков.

На каждый из 30 уроков отводится 4 часа аудиторной работы. Исключение составляют три первых урока, которые должны быть проработаны за шесть часов. Таким образом, обучение рассчитано на 120—130 аудиторных часов. Овладение учебным материалом урока предполагает и обязательную самостоятельную работу учащихся

ся дома (4—5 часов) и в ЛУРе (1—2 часа). Такой режим, как показало опытное обучение в группах аспирантов, вполне реален. В группах студентов, для которых подобный темп прохождения материала может оказаться слишком напряженным, следует увеличить количество учебных аудиторных часов на урок до 6. В этом случае на весь курс потребуется 160—180 часов аудиторных занятий, что повлечет за собой естественное уменьшение единовременной нагрузки студентов во время аудиторных и самостоятельных занятий. Изменение режима прохождения курса ни в коем случае не должно отразиться на последовательности и тщательности овладения учебным материалом. Речь может идти лишь об изменении его «дозирования» на единицу времени, а не о сокращении, в ущерб успешности обучения, числа упражнений и видов работы над текстами.

Более подробно вопросы организации учебного материала в уроке и в системе циклов занятий по учебнику изложены в разделе циклов для преподавателя.

* *
*

Автор глубоко признателен кандидату математических наук доценту А. Б. Сосинскому за внимание, проявленное им при рецензировании рукописи учебника, и ценные замечания.

Автор приносит сердечную благодарность заведующей кафедрой английского языка мехмата МГУ М. М. Глушко за большую поддержку и помощь, оказанные ею в период создания учебника, а также преподавателям кафедры И. С. Гаркуш, Г. И. Ахмановой, М. К. Быстровой, Н. Е. Плигиной и М. А. Казачук за участие в опытном обучении по учебнику, проводившемся в группах студентов и аспирантов. Их критические замечания и советы были учтены при подготовке настоящей рукописи к изданию.

Автор благодарит И. Д. Лепешову за тщательность и творческий подход, проявленные ею при редактировании рукописи.

Все замечания, советы и пожелания, направленные на улучшение учебника, будут приняты автором с благодарностью.

PART I
LESSON ONE
Аудиторное занятие I
Английский алфавит и знаки транскрипции

Печатные буквы	Написание букв	Название букв	Печатные буквы	Написание букв	Название букв
A a	<i>A a</i>	[ei]	N n	<i>N n</i>	[en]
B b	<i>B b</i>	[bi:]	O o	<i>O o</i>	[ou]
C c	<i>C c</i>	[si:]	P p	<i>P p</i>	[pi:]
D d	<i>D d</i>	[di:]	Q q	<i>Q q</i>	[kju:]
E e	<i>E e</i>	[i:]	R r	<i>R r</i>	[ɑ:]
F f	<i>F f</i>	[ef]	S s	<i>S s</i>	[es]
G g	<i>G g</i>	[dʒi:]	T t	<i>T t</i>	[ti:]
H h	<i>H h</i>	[etʃ]	U u	<i>U u</i>	[ju:]
I i	<i>I i</i>	[ai]	V v	<i>V v</i>	[vi:]
J j	<i>J j</i>	[dʒei]	W w	<i>W w</i>	[ˈdʌblju:]
K k	<i>K k</i>	[kei]	X x	<i>X x</i>	[eks]
L l	<i>L l</i>	[el]	Y y	<i>Y y</i>	[wai]
M m	<i>M m</i>	[em]	Z z	<i>Z z</i>	[zed]

ГРАММАТИКА:

Существительное. Понятие об артикле. Прилагательное

БУКВЫ И ЗВУКИ. ПРАВИЛА ЧТЕНИЯ

Согласные буквы, передающие один звук

b d f h k l m n p r t v w z

[b] [d] [f] [h] [k] [l] [m] [n] [p] [r] [t] [v] [w] [z]

Согласные, передающие два звука

c g s
[s] [k] [dʒ] [g] [s] [z]

Сочетания согласных

sh [ʃ] ch [tʃ] th { [θ]
[ð]

Гласные

e [i:] a [ei] i [ai] y [wai]

Буквы	Звуки	Примеры	Примечания	Прочтите вслед за преподавателем
Ee	[i:]	me, bee, eve	В открытом слоге	leg, be, seen, melt, tell
	[e]	met, sell, settle	В закрытом слоге	see, we, best
Aa	[ei]	ale, take, table	В открытом слоге. Перед согласной + le	tale, at, lass, fable, battle, 'data, map- le, 'beta
	[æ]	hat, rattle	В закрытом слоге	
	[ə]	'delta	В безударном положении	
Ii	[ai]	mine, tie, bible, kind	В открытом слоге, Перед согласной + le, Перед ld, nd	file, mind, kid, ride, lie, little, title, win
	[i]	did, min, middle	В закрытом слоге	

Yu	[ai]	my, tyre, try	В открытом ударном слоге	by, icy, tyke, style, 'dandy, yell, 'pygmy, 'baby, 'symmetry
	[i]	'system, 'lady	В закрытом, ударном слоге и в безударном положении на конце слова	
	[ij]	yet, yak	В начале слова	
Cc	[s]	cent, cite, 'fancy	Перед: e, i, y	cycle, lick, cat, cake, ice, can, 'icy, lack
	[k]	cable, black, click	У остальных случаях	
Gg	[dʒ]	gent, age, gym, gipsy	Перед: e, i, y	page, gin, glee, stage, bridge, gas, gyps
	[g]	glad, bad	В остальных случаях и словах get, give	
ch	[tʃ]	chess, catch	Ho: machine [ʃ]	chat, chop, mechanic, bench, inch
	[k]	chemist, mechanics		
sh	[ʃ]	shelf, fish		sham, shame, fresh
th	[θ]	thank		thin, theft, bathe, than
	[ð]	then		

УПРАЖНЕНИЯ

1. Прочтите вслед за преподавателем и затем самостоятельно.

[i:] → he, Pete, these, be, mete, see
[e] → hen, fetch, chest, shed, kettle, mess, them, well, cent, scent, rent
[aɪ] → wide, rise, rice, slide, kind, find, bind, child, idle, tie, die
[ɪ] → bit, dig, till, wit, little, ribbon, lit, Dick, kill, hit
[aɪ] → type, by, dry, glyde, cycle, dye, style
[ɪ] → icy, entity, gym, hobby, pity, baby, lady
[jɪ] → yet, yes, yoke, yell, Yale, yam
[eɪ] → bade, cable, fable, race, same, stable, lace, wage, stage
[æ] → sham, rat, ham, cash, catch, flat, battle, cattle, saddle
[s] → mice, cats, ice, rice, scent, cent, sent, dress
[z] → has, rise, bags, pens, his, styles, tables, ribbons, dies
[k] → cable, click, crest, scant, clad, crack, kick, lack, cyclist
[gɪ] → gift, gab, gap, grave, grind, get, give, begin, grim
[dʒɪ] → page, cage, gent, hindge, bridge, range, badge, gin, change,

[θ] → theft, thank, think, smith, thick, theme, tenth
 [ð] → them, then, bathe, that, the, this, these, with, within
 [ʃ] → she, shabby, shame, wish, fresh, flash, shade
 [tʃ] → catch, chin, chime, change, check, chat, chicken, drench, French

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

plan [plæn] *n, v*
 effect [i'fekt] *n*
 lamp [læmp] *n*
 type [taip] *n*
 fact [fækt] *n*
 ellips [i'lips] *n*
 test [test] *n, v*
 idea [ai'diə] *n*
 planet ['plænit] *n*
 film [film] *n*

2. Прочтите вслед за преподавателем.

this [ðis] это (этот, эта)
 these [ði:z] эти
 pen [pen] ручка
 pencil ['pensil] карандаш
 place [pleis] 1. *n* место; 2. *v* помещать
 side [said] сторона
 length [leŋθ] длина
 help [help]. 1. *n*. помощь; 2. *v*. помогать
 and [ænd] и (союз)
 time [taim] время
 same [seim] тот же
 best [best] наилучший
 black [blæk] черный
 child [tʃaɪld] ребенок
 children [tʃɪldrən] дети
 man [mæn] человек, мужчина;
 men [men] (мн. ч.)
 table [teɪbl] 1. стол; 2. таблица

big [big] большой
 bag [bæg] сумка, портфель
 hand [hænd] рука
 little [lɪtl] мало, маленький
 red [red] красный
 simple [sɪmpl] простой
 name [neɪm] 1. *n*. имя; 2. *v*. называть
 thin [θɪn] тонкий
 nice [naɪs] приятный, хороший
 size [saɪz] размер
 plane [pleɪn] плоскость
 wide [waɪd] широкий
 width [wɪdθ] ширина
 fine [faɪn] прекрасный, тонкий
 map [mæp] карта
 set [set] множество, набор
 data ['deɪtə] данные (ед. ч. datum)
 type [taɪp] 1. *v*. печатать на машинке; 2. *n*. тип, вид

2. Прочтите вслед за преподавателем. Обратите внимание на интонацию.

a big → lamp, a red pen, a simple plan, a nice place, a little child;
 the best → test, the same effect, the thin film, the same idea, the red planet;

the → man and the → child, a pen and a pencil, the plan and the data, the length and the width;
 this thin → pen, this big man, this little fact, this simple test.

3. Прочтите вслед за преподавателем, обращая внимание на произношение указательных местоимений и окончаний множественного числа.

this → plan — these → plans	this lamp — these lamps
this side — these sides	this size — these sizes
this fact — these facts	this place — these places

4. Сравните данные группы слов.

The child's → name — The name of the → child
 The man's help — The help of this man
 These tests' effect — The effect of these tests
 These pens' length — The length of these pens
 This planet's size — The size of the planet

Задание: 1. Лабораторные упражнения I—VI. 2. Домашние упражнения 5, 6

5. Напишите во множественном числе.

a big table, a thin pencil, a fine test, a nice place, a wide plane,
 a simple fact, a big map, a fine set, a big ellips, a little hand;
 the best time, the same planet, the best effect, the same type.

6. Напишите по-английски.

а) этот простой план; те же данные; длина и ширина; тонкая пленка; те же самые идеи; красная планета; черный портфель;
 б) планы этих людей; данные этого теста; карты этих планет; тип эллипса; длина пленки; ширина черного стола; длина этой таблицы; размер этой большой плоскости; имена этих маленьких детей; размер лампы; влияние этого факта; идея этого текста.

Аудиторное занятие II

7. Прочтите контрольное упражнение в чтении.

→ else, swim, hidden, able, mice, pipe, list, hell, mete, mate, mat, we, wet, made, vane, fine, fate, fat, tab, tackle, five, wide, fame, frick, risk, rise, wise, west, wist, them, web, bells, chime, shine, ship, pitch, pike, kite, hill, catch, chest, dyne, pygmy, gym, with, thin, these, then, tyke, sell, mass, sat, sad, set, scent, cent, scan, lynch, yet, mystic, by, try, trifle, stifle, tittle, title, stable, stipple, edge, egg, gentle, gladly, glimps, bathe, fifth, with, snatch, china, match, ass, apple, idle, crash, sham, shame, theme, prime, prim, cattle, wet, dive, vend, legs, spend, spent.

8. Выслушайте преподавателя, выразите иначе ту же мысль, например: *

T.: — These boys' plans.
St.: — The plans of these boys.

9. Выслушайте преподавателя и дайте русский эквивалент услышанного.

10. Выслушайте преподавателя и скажите то же самое во множественном числе.

11. Скажите по-английски.

небольшой красный портфель; большой, черный стол; простое, милое имя; прекрасная, большая карта; тонкая, широкая пленка; набор (множество) карандашей; испытание идеи; типы и размеры планет; те же самые факты; лучшие идеи этого времени; милый (приятный) человек; набор карт; то же самое действие; лучший размер; тот же самый тип пленки; руки человека; идеи этих людей; факты и планы; размер эллипса.

* Текст упражнений 8, 9, 10 данного аудиторного занятия содержится в разделе для преподавателя. Аналогичные задания имеются во всех последующих аудиторных занятиях на протяжении пособия. Они предназначены для формирования умения устной речи (в частности, аудирования) и помещены в этот раздел в целях исключения зрительной опоры.

LESSON TWO

Аудиторное занятие I

ГРАММАТИКА:

Местоимение. Глагол. Повелительное наклонение

БУКВЫ И ЗВУКИ.

ПРАВИЛА ЧТЕНИЯ

Сочетания согласных *ng* [ŋ], *nk* [ŋk]

Гласные: *o* [ou], *u* [ju:]

Сочетания: *ar*, *or*, *ir*, *er*, *ur*

Буквы	Звуки	Примеры	Примечания	Прочтите вслед за преподавателем
Oo	[ou]	so, bone, cold, noble	В открытом слоге. Перед <i>ld</i> , перед согласной + <i>le</i>	rope, bottle, got, done, note, hot, home, hop, hope, oft, old, sold, tone, no
	[ɔ]	hot	В закрытом слоге	
	[ʌ]	some, love, brother	Перед <i>m</i> , <i>n</i> , <i>v</i> , <i>th</i> (ð)	
Uu	[ju:]	tune, huge	В открытом слоге	music, due, huge, use, tunic, rude, blue, must, true, pupil, mule, tub
	[ʌ]	hut, duck	В закрытом слоге	
	[u:]	rule, blue	В открытом слоге после <i>l</i> , <i>r</i> , <i>j</i>	
ar	[a:]	arm, car		farm, card, sharp, charm
or	[ɔ:]	or, corn		fork, borne, lord, cork, north
er ir ur	[ə:]	term, firm, turn		her, dirt, first, nerve, burn, learn, urn, fir, earn, earth, mercy, circle
ng	[ŋ]	long, hang	На конце слова	bring, song, lung, hang
nk	[ŋk]	ink, link		drink, brink

УПРАЖНЕНИЯ

1. Прочтите вслед за преподавателем.

[ou] hope, sold, stone, rode, home, note, noble, golden, so
 [ɒ] hop, sock, on, bottle, cost, clock, cot, lost, bond
 [ʌ] above, month, other, some, come, done, love, son
 [ʌ] nut, cut, cub, study, us, up, fuss, tunnel
 [ju:] use, student, huge, due, tunic, fuse, duty, union
 [ŋ] long, spring, thing, strong, lung, ring
 [ŋk] link, brink, think, thank, tank, bank, drink, sink
 [a:] march, mark, sharp, harsh, charm, barn, part, hard
 [ɔ:] fort, north, orbit, port, cord, horse, formal, report
 [ə:] her, burn, turn, germ, first, pearl, thirst, stir
 hurt, firmly, serve, nurse, early, curve, third, turn
 heard, curbs, burst, verse, fur, search

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

stop [stɒp] *n*
 student ['stju:dənt] *n*
 method ['methəd] *n*

result [ri'zʌlt] *n, v*
 college ['kɒlɪdʒ] *n*
 problem ['prɒbləm] *n*

2. Прочтите вслед за преподавателем и затем самостоятельно.

hold [hould] (held) [held] эд.
 держать
 make [meik] (made) 1. делать;
 2. заставлять
 cut [kʌt] (cut) резать, пересе-
 кать
 give [gɪv] (gave, given) [geɪv],
 [gɪvn] давать
 show [ʃəʊ] (shown *pp*) [ʃəʊn]
 показывать
 go [gəʊ] (went, gone) [gɒn]
 идти
 study ['stʌdi] 1. *n* занятие, ис-
 следование; 2. *v* изучать,
 учиться
 find [faɪnd] (found) [faʊnd]
 находить
 note [nəʊt] 1. *n* записка, заме-
 чание; 2. *v* замечать
 send [send] (sent) посылать

try [traɪ] пытаться, пробовать,
 испытывать
 family ['fæmɪli] семья
 take [teɪk] (took, taken) [tuk],
 ['teɪkən] брать, взять
 line [laɪn] линия, полоса
 curve [kə:v] кривая
 short [ʃɔ:t] короткий
 open ['əʊpən] 1. *v* открывать;
 2. *adj.* открытый
 long [lɒŋ] длинный
 girl [gɜ:l] девушка, девочка
 boy [bɔɪ] юноша, мальчик
 home [həʊm] дом
 close [klaʊz] 1. *v* закрывать,
 замыкать; 2. [klaʊs] *adj*
 близкий, закрытый
 please [pli:z] пожалуйста
 to [tə] 1. предлог направления,
 2. частица-признак инфинитива
 глагола

2. Прочтите вслед за преподавателем, имитируя интонацию и ритм.

a) this fact — these facts
 that plan — those plans
 this place — these places
 that student — those students

b) Help the child. Name the man. Plan your time. Study this fact. Stop that boy. Find the girl. Open the bag. Hold that pen. Find the result. Study their data. Make a short plan. Find that name. Try this method. Take that line.

c) Try to find it. Try to open it. Try to study it. Try to stop him. Try to close the bag.

d) Give me my map. Show him his place. Give her her plan. Show them their data. Give us your results.

e) Do not hold the place. Do not open the note. Do not stop him. Do not give her that idea.

f) Let me open it. Let him go to college. Let her study those data. Let them take her home. Let her go home. Let us take this curve.

g) Do not let her go. Do not let him take it. Do not let them study those data. Do not let her help him.

3. Прочтите вслед за преподавателем. Обратите внимание на перемещение косвенного и прямого дополнения.

Show us your method.

— Show your method to us.

Give them that map.

— Give that map to them.

Show him your result.

— Show your result to him.

Send her that note.

— Send that note to her.

Задание: 1. Лабораторные упражнения I—VIII. 2. Домашние упражнения 4, 5.

4. Заполните пропуски соответствующими притяжательными местоимениями.

T.: Give me ... pen.

St.: Give me *my* pen, please.

Show him ... place. Send her ... film. Give them ... data. Show me ... note. Show him ... result. Give he ... plan. Send us ... map.

T.: Give me ... pen (he).

St.: Give he *his* pen, please.

Show us ... film. (you) Send them ... data. (we) Give us ... result. (they) Show her ... method. (he) Send him ... note. (she)

5. Напишите по-английски следующие предложения.

1. Попробуйте изучить эти данные. 2. Пусть мальчик поможет вам. 3. Найдите семью этого ребенка. 4. Испытайте метод этого студента. 5. Давайте попробуем остановить его. 6. Пусть он не помогает мне. 7. Покажите мне дом этой девушки. 8. Дайте ему результаты вашего исследования. 9. Прочтите ему ее записку. 10. Возьмем эту плоскость и проведем кривую. 11. Найдём длину. 12. Давай я закрою портфель. 12. Отправьте (пошлите) ребенка домой.

Аудиторное занятие II

6. Прочтите контрольное упражнение в чтении.

lost, depth, bird, on, drunk, drank, spur, lot, lone, nerve, serve, hue, true, rude, shirt, short, hurt, horse. curb, cort, firm, form, must, dull, hut, space, rifle, witty, cake, stuff, nod, cope, serf, shirt, scorn, some, love, front, among, wage, edge, change, pure, eve, pine, glad, sale, hang, link, thirty, duty, along, sole, sock, catch, chest, saddle, lable, rattle, fable, mind, mild, gypsy, cycle, scent, cat, face, file, farm

7. Попросите соседа выполнить просьбу преподавателя.

T.: Let (do not let) Nick open the bag.

St.: Nick, open (do not open) the bag, please.

8. Выслушайте преподавателя и измените сказанное им в соответствии с образцом.

T.: Send *these* boys home.

St.: Do not send *those* boys home.

9. Выслушайте преподавателя и скажите услышанное по-английски.

LESSON THREE

Аудиторное занятие I

ГРАММАТИКА:

Модальные глаголы

БУКВЫ И ЗВУКИ. ПРАВИЛА ЧТЕНИЯ

Согласные *j* [dʒ], *x* $\begin{cases} [ks] \\ [gz] \end{cases}$

Сочетания *a + st, sk, ss; a + ll, lk, lt; wa + n, s, t; wh, wa + r, wo + r, wr.*

Буквы	Звук	Примеры	Примечания	Прочитайте вслед за преподавателем
<i>a + st, sk, ss</i>	[a:]	fast, mask, class		last, glass, grasp, task, ask
<i>a + ll, lk, lt</i>	[ɔ:]	all, salt, talk	Буква <i>l</i> перед <i>k</i> не произносится	call, wall, fall, ball, halt, walk
<i>wa + n, s, t</i>	[ɔ]	was, want		Watt, watch, wash
<i>wh</i>	[w]	when, why	Буква <i>h</i> не произносится Но: who [hu:]	whim, white, while, whom
<i>wa + r</i>	[wɔ:]	war		warm
<i>wo + r</i>	[wɔ:]	work		world, worm
<i>wr</i>	[r]	write	Буква <i>w</i> не произносится	wrist, wrong, wrap
<i>j</i>	[dʒ]	just, object		joke, jar, jungle, jury
<i>x</i>	[gz]	exam, exact	Перед ударной гласной	exact, exclude, exile, box, text
	[ks]	fox, expect	В остальных случаях	

УПРАЖНЕНИЯ

1. Прочтите вслед за преподавателем и затем самостоятельно.

[a:] → brass, glass, ask, cast, grass, basket, grasp, dance, glance
 [ɔ:] → all, call, halt, small, false, salt, chalk
 [wɔ] → want, what, wander, wash, watch
 [wɔ:] → warble, ward, warm, warn, warp, wart, wharf, war
 [wə:] → work, worst, worse, worth, world, worthy
 [r] → write, wrap, wrong, wrist, wrack
 [hu:] → whose, who, whom
 [dʒ] → just, July, June, joy, jungle, object, subject, jump
 [ks] → excite, axis, excuse, expel, complex, exchange, expect,
 ax, extract
 [gz] → exam, exist, exact, examine, example

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

text [tekst] *n*, real ['riəl] *adj*, segment ['segment] *n*

2. Прочтите вслед за преподавателем.

call [kɔ:l] звать, называть
 change [tʃeɪndʒ] *n* изменение;
v менять, изменять
 paper ['peɪpə] 1. статья, науч-
 ная работа; 2. бумага
 cross [krɒs] *n* перекрещива-
 ние; *v* пересекать
 every ['evri] каждый
 well [wel] хорошо
 tell [tel] (told) [tould] рас-
 сказывать, сказать
 word [wɜ:d] слово
 some [sʌm] 1. несколько; 2. не-
 кий, некоторый
 other ['ʌðə] другой
 another [ə'nʌðə] еще один, ка-
 кой-то другой
 work [wɜ:k] *n* работа; *v* рабо-
 тать
 next [nekst] следующий; со-
 седний; будущий
 do [du:] (did, done) [did],
 [dʌn] делать
 rise [raɪz] (rose, risen) [rouz],
 [rɪzn] подниматься, вставать
 early [ə:li] рано

really ['riəli] в самом деле,
 действительно
 box [bɒks] ящик, коробка
 write [raɪt] (wrote, written)
 [raʊt], [ritn] писать
 yesterday ['jestədi] вчера
 ask [ɑ:sk] спрашивать, просить
 end [end] *n* конец; *v* заканчи-
 вать
 in [ɪn] в (*предлог*)
 now [naʊ] теперь, сейчас
 at [æt] в, у (*предлог*)
 for [fɔ:] 1. для (*предлог*);
 2. так как (*союз*)
 from [frɒm] от, из (*предлог*)
 can [kæn] (could) [kud]
 уметь
 must [mʌst] быть должным
 need [ni:d] нуждаться
 may [meɪ] (might) [maɪt]
 мочь
 what [wɒt] что
 who [hu:] кто
 when [wen] когда
 yes [jes] да
 no [nəʊ] нет
 today [tə'deɪ] сегодня
 about [ə'baʊt] о, об (*предлог*)

2. Прочтите вслед за преподавателем, имитируя интонацию и ритм.

a) 1. You can → help them. They can plan it. We can find the man. He can hold the box.

2. You must → stop them. I must go. They must study it. She must name him.

3. They may take it. He may send it. You may try this pen. She may note it.

4. I could help the child. He could try to study it. They could give her the data. He could show this method to them.

5. He might give them the best places. We might try to find the data.

6. Can you really make her → go? Must I help that family? Can he study these problems? May I really take the short pencil? Can you show me the thin film? Could he find them? Must the students really study these data?

7. I cannot show you that place. He could not give them those pencils. You need not show them these results. He must not take the boy's bag. You need not go. He need not try it.

Can you really give me the
 → text?

{ → Yes, I → can.
 { → No, I → cannot.
 { Yes, they could.
 { No, they could not.
 { Yes, he must.
 { No, he need not.
 { Yes, you may.
 { No, you must not.

Could they study at home?

Must he really show them the
 plan?

May I ask her?

c) Who can tell me → about it? — → I can.

Who must make it? — He must.

Who may come? — They may.

d) What can you → show them? — Our → method.

When must he → go? — → Now.

What may she take? — Their → data.

When must they come? — Early.

What could he try? — Your method.

Задание: 1. Лабораторные упражнения I—VI. 2. Домашние упражнения 3—5.

3. Переспросите, выразив сомнение в возможности или необходимости совершения действия, употребив в вопросе really?

T.: I must ask him every word.

St.: Must you really ask him every word?

You may try to do it. He can do this work for you. She must be at home now. He could find this result yesterday. She may work at home today. They must rise early. They might help you. You

may take that box from him. They can work well. You must study their method. They can send the student home. She could do it at home yesterday.

4. *Задайте вопрос, используя для этого вопросительное слово в скобках.*

T.: They can tell us his name. (who, what)

St.: Who can tell us his name?

What can they tell us?

They could not find the boy's book yesterday (when). You may give us an idea (who). He cannot help them (who). You must cross that segment (what). She may take another pencil (what). He must rise early today (when). You need not write this paper (who). He need not change this method (what).

5. *Напишите по-английски.*

а) Вы должны найти свое место. Ей не нужно делать этого. Ему нельзя идти домой сейчас. Вы могли (бы) изменить план своей работы. Она не могла написать эту статью вчера. Вы должны найти эти слова в тексте. Мальчик не может найти свою семью. Они могут дать вам свои данные.

б) Кто может найти длину этого отрезка? Когда вы должны напечатать результат вашей работы? Нужно ли нам изменять длину и ширину ящика? Можете ли вы сказать нам его имя? Можно мне взять еще одну (другую) ручку? Что вы должны делать сегодня? Кто должен написать эти слова? Можно мне спросить их об их методе работы?

Аудиторное занятие II

6. *Прочтите контрольное упражнение в чтении.*

Write, cycle, cink, mash, ax, mask, class, mother, clash, chest, want, war, warm, object, tune, dug, who, wrap, exact, jam, all, verb, word, cast, call, want, except, gipsy, smoke, kin, kid, kite, fall, whim, mild, mill, kind, work, small, Watt, joke, wrist, turn, ring, jungle, text, whom, cold, off, bond, wry, halt, expect, exist, ink, depth, bathe, former, farmer, yet, jazz, love, thank, yes, above, exite, along, glass, darling, some, car, talk, see, age, human.

7. *Переспросите преподавателя, уточняя, кто должен (может) совершить указанное действие или что может (должно) совершить указанное лицо.*

T.: He can study it. (who, what).

1st st.: Who can study it?

2nd st.: What can he study?

8. *Выслушайте преподавателя и выразите иначе идею принадлежности.*

T.: The needs of the family.

St.: The family's needs.

9. *Прослушайте и скажите по-английски.*

10. *Измените в соответствии с образцом.*

T.: Do not give him the short pencil. (long).

St.: Give him the long pencil.

Do not close the bag. (open). Do not take the black pen. (red). Do not send the girl to college. (the boy). Do not make a curve. (a line). Do not place the lamp on the table. (that box). Do not give them the same text. (another).

LESSON FOUR

Аудиторное занятие I

ГРАММАТИКА:

Глагол *to be* (во временах *Present, Past, Future Indefinite*)

БУКВЫ И ЗВУКИ. ПРАВИЛА ЧТЕНИЯ

Сочетания: *ee, ea, oo, ou, ow, oa, ai, au, aw, qu*

Буквы	Звуки	Примеры	Примечания	Прочтите вслед за преподавателем
<i>ee</i> <i>ea</i>	[i:]	street, need beam, lean	Иногда <i>ea</i> = [e] перед d, th head, breath; <i>ea</i> + r + согл. = [ə:] learn	heat, bread, head, sea, steady, health, earn
<i>oo</i>	[u]	book, look	Перед k	hoof, took, soot hool, mood, cook, shook
	[u:]	moon, pool	В остальных случаях	
<i>ou</i>	[au]	out, stout	Иногда <i>ou</i> = [ʌ] doub- le, enough [i'naɪ]	amount, out, about, couple [ʌ], house, young [ʌ], doub- le [ʌ], cloud
<i>ow</i>	[ou]	low, slow	В конце слова	flow, 'arrow, down 'follow, brown, 'flo- wer, how, allow, fellow
	[au]	brown, town	В середине слова Исключения: <i>ow</i> = [au] how, now, allow	
<i>oa</i>	[ou]	boat, load		soap, road, coast
<i>ai</i> } <i>ay</i> }	[ei]	chain, ail, day, bay		aim, stay, faint, lay, brain, ray
<i>au</i> } <i>aw</i> }	[ɔ:]	pause, fault dawn, law		August, cause, raw, saw, because
<i>qu</i>	[kw]	quit, quote		quite, quick, quality, quest

Примечание: В буквосочетаниях: *ee, ea, ae, au, oa*, когда они являются ударными, читается лишь первая гласная (алфавитное звучание).

УПРАЖНЕНИЯ

1. Прочтите вслед за преподавателем.

[i:] → seem, deem, queen, beam, seat, seen, heat, keep, clean, eat
[e] → bread, spread, health, wealth, ready, breakfast, pleasant,
instead
[u:] → moon, hoof, soot, room, gloom, proof
[u] → took, look, cook, shook
[ei] → ray, say, main, way, fail, pay, clay, they, vein, grey
[au] → town, flower, house, without, amount, now, how, brown, about
[ou] → load, row, slow, boat, blow, foam, flow, elbow, coat, loan,
own
ɔ:] → draw, shawl, awful, launch, auther, lawn, automatic, auto-
mobile
[ʌ] → enough, country, couple, young, double, trouble
[kw] → quench, liquid, equal, request, frequent, quote, quarter

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

class [kla:s] *n* university [ju:ni'və:siti] *n* manner ['mænə] *n*

2. Прочтите вслед за преподавателем и затем самостоятельно.
be (was, were, been) [bi:] wɔz [wə:], [bi:n] быть, являться

desk [desk] письменный стол
small [smɔ:l] небольшой, ма-
ленький
large [la:dʒ] большой
teacher ['ti:tʃə] преподаватель
teach [ti:tʃ] (taught) [tɔ:t]
учить, обучать
post-graduate [poust'grædʒuit]
аспирант
book [buk] книга
note-book ['noutbuk] блокнот
speak [spi:k] (spoke, spoken)
[spouk] ['spoukən] говорить,
разговаривать
also ['ɔ:lsou] тоже
room [ru:m] 1. комната; 2. мес-
то
house [haus] дом

old [ould] старый
young [jʌŋ] молодой
good [gud] хороший
late [leit] поздний, be late
опаздывать
easy [i:si] легкий
translate [tra:ns'leit] перево-
дить
ready ['redi] готовый, be ready
быть готовым
too [tu:] 1. тоже, также; 2.
слишком
here [hiə] здесь, сюда
there [ðeə] там, туда
last [la:st]. 1. *v* длиться; 2.
adj последний
tomorrow [tə'mrəu] завтра
year [jæ:] год

next [nekst] следующий
 over [ouvə] *adj* законченный,
v be over заканчиваться
 read [ri:d] (read) [red] чи-
 тать
 task [ta:sk] задание, задача
 week [wi:k] неделя

begin [bi'gin] (began, begun)
 [bi'gæn] [bi'gʌn] начинать
 English ['ɪŋɡliʃ] английский
 soon [su:n] вскоре
 where [wɛə] где, куда
 or [ɔ:] или

2. Прочтите следующие предложения вслед за преподавателем, обращая внимание на изменение глагола *to be* в зависимости от лица, числа и времени.

- a) This is a note. That is also a note. They are notes.
 This is a table. That is also a table. These are tables.
- b) This was a note. That was also a note. They were notes.
 This was a table. That was also a table. These were tables.
- c) This will be a plan. That will be a plan too. These will be plans.
 This will be a curve. That will be a curve too. They will be curves.
- d) This is a boy. His name is Pete. He is Pete.
 That is a girl. Her name is Nina. She is Nina.
 This is a child. His name is Bob. It is Bob. It's Bob.
 These are students. Their names are Pete and Nina. They are Pete and Nina.
- e) I am a teacher now. I am in this room. I am at my table.
 You are a student. You are in the room. You are at your desk.
 Nina is a student too. She is in this room. She is at her desk.
 Pete is also a student. He is in this room too. He is at his desk.
 Pete and Nina are students. They are in the room now. They are at their desks.
 You are students. You are at the lesson. You are at an English lesson.
- f) I was a teacher last year. Nina and Pete were students last year. You were a student too. These students were at home yesterday. Bob was at home too. They were at home. We were at the lesson yesterday.
- g) I shall be a teacher next year. You will also be a teacher. We shall be teachers next year. Bob will be a student. Nina will be a student. They will be students next week.
- h) I am a teacher. I am not a student. He was a student. He was not a teacher. They are at home today. They are not here. We were at the University yesterday. We were not at home. Nina was here at that time. She was not in her room. I shall be ready soon. I shall not be late. He will be a student next year. He will not be a past-graduate.

3. Прочтите вопрос и краткие ответы. Обратите внимание на порядок слов в вопросительном предложении.

- | | |
|--------------------------------|---------------------------------------|
| 1. Am I your teacher? | Yes, you are.
No, you are not. |
| 2. Are you my student? | Yes, I am.
No, I am not. |
| 3. Is she here? | Yes, she is.
No, she is not. |
| 4. Are they at the University? | Yes, they are.
No, they are not. |
| 5. Was it an English lesson? | Yes, it was.
No, it was not. |
| 6. Were they late? | Yes, they were.
No, they were not. |
| 7. Shall I be a post-graduate? | Yes, you will.
No, you will not. |
| 8. Will you be ready? | Yes, I shall.
No, I shall not. |

4. Прочтите, обращая внимание на структуру предложения, содержащего общий вопрос и начинающегося с вопросительного слова.

- | | |
|-------|--|
| | He is at his desk.
Is he at his desk?
Who is at his desk? |
| Where | is he?
These girls are students.
Are these girls students?
Who are students? |
| What | are these girls?
They will be at home tomorrow.
Will they be at home tomorrow?
Who will be at home tomorrow? |
| Where | will they be tomorrow? |
| When | will they be at home?
We were at the University yesterday.
Were you at the University yesterday?
Who was at the University yesterday? |
| Where | were you yesterday? |
| When | were you at the University?
Her room is in this house.
Is her room in this house?
What is in this house? |
| Where | is her room? |

Задание I: 1. Лабораторные упражнения I—V. 2. Домашние упражнения 5, 6.

5. Поставьте предложения упр. 2 (e, f, g) в вопросительную и отрицательную формы (письменно).

6. Заполните пропуски соответствующей формой глагола.

1. I ... at home now. I ... in my room. My room ... small. I ... at the desk. The desk ... large. It ... black. I ... ready to begin my work. The work ... not easy. 2. He ... at the University yesterday. He ... at an English lesson. She ... also at the same English lesson. They ... in the classroom. The lesson ... not over. 3. They ... not ready now. Their work ... not easy. Soon they ... ready. 4. The teacher ... at the University today. She ... in the classroom. Yesterday she ... not at the University. She ... at home. 5. We ... in the man's house last week. The man ... not at home. His children ... at home. 6. Our task ... over tomorrow. We ... not be late. 7. The boy ... in the next room. The girls ... also in the next room. They ... at their desks. 8. She ... a good girl. Her manners ... nice. She ... young. Next year she ... a teacher of English.

Аудиторное занятие II

7. Прочтите контрольное упражнение в чтении.

act, cash, walk, always, shape, law, paint, almost, wait, sharp, date, stay, melt, effect, space, because, has, scale, rain, metric, learn, already, weapon, hen, nerve, even, grey, ax, cause, wave, earn, chalk, hall, wage, dark, inert, dance, play, arrange, draw, artist, may, fix, farm, who, former, condense, head, certain, heavy, did, proceed, search, speed, increase, mix, depth, convert, oxygen, why, example, war, exact, element, breadth, mercury, with, first, surprise, still, birth, tall, use, cycle, yet, write, when, worm, switch, shame, job, heard.

8. В каждом предложении упр. 2 (e, f, g, h) дайте недостающие временные формы Indefinite, соответственно относя действие к настоящему, прошедшему или будущему времени и производя нужные замены.

T.: I *am* a teacher now.

St.: I *was* a teacher last year.

I *shall be* a teacher next year.

9. Ответьте на вопрос отрицательно и уточните.

T.: Is it a curve? (a line).

St.: No, it is not. It's a line.

1. Are they lines? (curves) 2. Was he a teacher last year? (a student) 3. Were their rooms large? (small) 4. Is this the length? (width) 5. Are you at the lesson now? (at home) 6. Is this text

short? (long) 7. Was the man old? (young) 8. Is he ready to read? (to write) 9. Are these boxes? (bags) 10. Were they at the University yesterday? (at home)

T.: Is that a boy or a man?

St.: That is a boy.

1. Was he a teacher or a post-graduate? 2. Will their plan be long or short? 3. Is her bag red or black? 4. Are the students at home or at the University? 5. Is the man young or old? 6. Are these desks or tables? 7. Is this the width or the length? 8. Are these lines or segments? 9. Were the girls here or at home? 10. Is their family small or large?

10. Выслушайте сказанное преподавателем и переспросите его, используя при этом слово 'really'.

T.: She is a post-graduate.

St.: Is she really a post-graduate?

11. Переспросите, используя вопросительное слово, предложенное преподавателем.

T.: He is at the University today.

1. St.: Is he at the University today?

T.: Who?

2. St.: Who is at the University today?

T.: Where?

3. St.: Where is he today?

Прежде чем приступить к тексту, прочтите вслух за преподавателем слова урока. Прослушайте чтение текста преподавателем, внимательно следя за ударением и интонацией, стараясь понять его.

AT THE LESSON

We are at the University. We are in the classroom. This is our classroom. It is large. We are at the lesson.

Is it an English lesson? Yes, it is. We must study English at the University.

Is your teacher in the classroom? No, she is not.

Is she late? No, she is not. She will soon be here.

Are you a student or a post-graduate? I am a post-graduate student. This girl is also a post-graduate. Last year we were University students. This young man was also a student last year.

Are you ready for the lesson? Yes, we are.

Now the teacher is in the room. She is at her table. We are at our desks. We may begin our lesson. We must read and translate our texts and write the new words. The teacher's books and note-books are on her table. The students' books and note-books are on their desks. They are open.

Can you read English? Yes, | we can.
Must you write English? Yes, | we must. We must write | in our
note-books.

Could you read English | last year? No, | we could not.

Could you write it | last year? No, | we could not.

Can you read this text now? Yes, | I can.

Read it, please.

Can you speak English? Yes, | we can.

Now, let comrade Sokolov | write the new words. They are easy.
Can he write them? No, he cannot. He is not ready. He was not at
his English lesson yesterday.

When was he at the University last? He was here last week.

Is your lesson over? No, it is not. It will soon be over. When
the lesson is over | we may go home.

Задание II: 1. Лабораторные упражнения VI—XII. 2. До-
машние упражнения 12, 13.

12. *Задать вопрос, ответом на который служит данное пред-
ложение.*

1. The books are on the table. 2. The lesson will be over soon.
3. This book is in the girl's bag. 4. We must translate these texts to-
morrow. 5. They could read and write their homework yesterday.
6. Their method is simple. 7. The post-graduates were at their Eng-
lish lesson last week. 8. The student was late. 9. They can change
their plans now. 10. This is a good idea.

13. а) *Напишите по-английски.*

1. Мы дома. 2. Нам нужно идти в университет сегодня. 3. Наши
занятия окончены. 4. Эти аспиранты умеют хорошо говорить по-
английски. 5. В прошлом году они были студентами университета.
6. Они могут рассказать вам о методе своей работы. 7. Дайте нам
другие факты. Возьмите эти данные. 8. Пусть он прочтет их
статью. 9. Назовите их.

б) *Спросите по-английски.*

1. Где мы можем найти этого человека? 2. Нужно ли нам пе-
реводить эти тексты? 3. Кто должен начинать урок? 4. Что в этих
коробках? 5. Где были вчера эти студенты? 6. Когда вы будете го-
товы? 7. Вы опоздали? 8. Где я могу найти статью этого аспи-
ранта?

Аудиторное занятие III

14. *Прочтите контрольное упражнение.*

quench, law, because, flow, please, took, Spain, loud, sleepy, qua-
ke, yellow, peat, quits, veil, round, meat, quota, daddy, cause, faith,
gown, food, how, saw, plain, plane, sail, look, mean, slow, enough,
zoo, saucer, down, deem, look, shook.

15. *Ответьте на вопрос преподавателя.*

16. а) *Скажите по-английски.*

б) *Спросите вашего соседа.*

LESSON FIVE

Аудиторное занятие I

ГРАММАТИКА:

Оборот *there is (there are)*

Наречия *much, many, few, a few, little, a little*

БУКВЫ И ЗВУКИ. ПРАВИЛА ЧТЕНИЯ

Сочетания: *ai+r, ei+r, a+re, ea+r, e+re, i+re, u+re, ew, ue*

Буквы	Звуки	Примеры	Примечания	Прочтите вслед за преподавателем
<i>ai</i> <i>ei</i> + r	[эə]	chair their		fair, air, lair
<i>a</i> + re	[eə]	care	В конце слова	fare, dare, mare, share
<i>ea</i> + r	[iə]	clear	Вспомните: <i>ea + r</i> + согл. = [ə:] learn	shear, hear, beard, pear
<i>e</i> + re	[iə]	mere	Но: [eə] there, where	sere, here
<i>i</i> + re	[aɪə]	fire		hire, wire, dire
<i>u</i> + re	[juə]	pure		lure, endure, cure
<i>ew</i> <i>eu</i> }	[ju:]	new neutral		mew, few, Euclid

УПРАЖНЕНИЯ

1. Прочтите вслед за преподавателем и затем самостоятельно.

- snare, fair, fare, air, square, stair, stare, area, vary, wary, share, pare
 → ear, fear, sere, queer, beard, near, here, jear, weary, shear, leer, cere, dear, hear
 → wire, fire, 'tired, de'sire, type, re'quire, a'cquire, shire
 → dure, 'during, se'cure, im'pure, obs'cure, 'Europe, fury, lure, pure
 → dew, few, new, 'Euclid, view, 'Newton, re'view, yew, pew, 'neutral, 'eulogy

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

Soviet [ˈsouviət] <i>adj</i>	discuss [disˈkʌs] <i>v</i>
union [ˈjuːnjən] <i>n</i>	mechanics [miˈkæniks] <i>n</i>
department [diˈpɑːtmənt] <i>n</i>	German [ˈdʒɜːmən] <i>adj</i>
cybernetics [ˌsaɪbəˈnetiks] <i>n</i>	interesting [ˈɪntrɪstɪŋ] <i>adj</i>
mathematics [ˌmæθiˈmætiks] <i>n</i>	lecture [ˈlektʃə] <i>n</i>
seminar [ˈseminɑː] <i>n</i>	

2. Прочтите вслед за преподавателем.

fifteen [ˈfɪfˈtiːn] пятнадцать	outstanding [aʊtˈstændɪŋ] вы- дающийся
eight [eɪt] восемь	with [wɪð] с, со (предлог)
seven [sevn] семь	branch [brɑːntʃ] ветвь, область
humanities [hjuːˈmænɪtiz] гу- манитарные науки	any [eni] любой, какой-нибудь
science [ˈsaɪəns] 1. наука; 2. естественные науки (мн.)	only [ounli] только
scientist [ˈsaɪəntɪst] ученый, научный работник	one [wʌn] один
quite [kwaɪt] вполне, совсем	attend [əˈtend] посещать
scientific [saɪnˈtɪfɪk] научный	such [sʌtʃ] такой, подобный
ago [əˈɡoʊ] тому назад	solve [sɒlv] решать
new [njuː] новый	whose [huːz] чей
important [ɪmˈpɔːtənt] важный, значительный	few [fjuː] мало (исчисл.)
very [ˈveri] очень	many [meni] много (исчисл.)
	much [mʌtʃ] много (неисчисл.)
	French [frentʃ] французский

Пояснения к тексту

- * a few years ago — несколько лет назад
 * one of — один из
 * with the help of — с помощью
 * some of — некоторые из
 * attend lectures — посещать лекции
 * quite a few — довольно много

2. Прочтите вслед за преподавателем.

a) There is a book on my table. There is an easy text in this note-book. There is a small note-book on the desk. There are nice rooms in this house. There are young men at the teacher's desk. There are many Universities in the Soviet Union.

b) There was a seminar on mechanics yesterday. There was a lecture on mathematics last week. There was a young boy in the room. There were small houses here last year. There were a few new words in this text.

c) There will be another seminar on cybernetics tomorrow. There will be few students at this seminar. There will be an English lesson tomorrow. There will be little time for this work.

d) Is there a lecture on mechanics today? Was there a seminar yesterday? Will there be a lecture on mathematics tomorrow? Were there a few books on the student's desk? Will there be time for that interesting seminar? Was there a department for cybernetics here last year?

e) There is no (not any) time for this lecture now. There will be no (not be any) seminar today. There is no (not much) paper in your bag. There are no (nor many) large rooms in this house. There was no (not any) English lesson yesterday. There will be no (not be any) short texts in this text book.

3. Прочтите, обращая внимание на порядок слов в предложении, содержащем общий вопрос и начинающемся с вопросительного слова.

There is a lecture at the University today.

Is there a lecture at the University today?

What is there at the University today?

When is there a lecture at the University?

There was a seminar on cybernetics here yesterday.

Was there a seminar on cybernetics here yesterday?

What was there yesterday?

When was there a seminar on cybernetics?

There will be an English lesson tomorrow.

Will there be an English lesson tomorrow?

What will there be tomorrow?

When will there be an English lesson?

Задание I: 1. Лабораторные упражнения I—VI. 2. Домашние упражнения 4—7.

4. Прочтите каждое предложение упр. 2 (a, b, c) и напишите:
 a) — в прошедшем времени; b) — в будущем; c) — в настоящем.

T.: There are students here.

St.: There were students here.

There will be students here.

Не забудьте соответственно заменить обстоятельственные слова.

5. Ответьте отрицательно на все вопросы упр. 2 (d). Ответ должен быть полным (используйте отрицание 'no' или 'not any').

6. Переспросите. Задайте уточняющий вопрос (какой, что).

T.: There was a lecture in this room last week. (what)

1-st. St.: Was there a lecture in this room last week?

2-nd st.: What was there in this room last week?

1. There is a department of mathematics at the University. (what) 2. There was a new book on his table. (what kind of) 3. There are a few children in the room. (how many) 4. There is a teacher at that table. (who) 5. There will be classes every day. (what) 6. There will be a few scientists at their seminar tomorrow. (when)

7. Задайте вопрос, ответ на который заключается в данном предложении, т. е. вопрос по существу предложения.

1. There are eight books on my desk. 2. He can study sciences at the University. 3. They must give us these important data today. 4. There is a very interesting test in this paper. 5. They could attend this scientist's lecture. 6. There were seven departments for humanities a few years ago. 7. I am quite ready. 8. The problems are quite easy. We can solve them now. 9. You may discuss this paper tomorrow. 10. The boy's problem is interesting.

Аудиторное занятие II

8. Прочтите контрольное упражнение.

head, dead, seem, seat, again, tale, relay, boat, field, piece, pool, ury, woke, yard, form, hide, term, spire, pure, rely, stair, toy, avoid, brook, hood, fruit, fire, period, blow, fuse, find, define, apply, letter, later, lable, cycle, spring, rink, hold, eve, fly, rifle, jute, frame, burden, shark, human, shore, cold, saw, power, invite, amount, receive, tower, employ, please use, add, hats, flows, classes, curbs, found, hut, repel, event, happen, city, fishes, boys.

9. Переспросите, используя в вопросе слово «really». Воспользуйтесь упр. 2 (a, b, c).

St.: There will be a new department there.

St.: Will there really be a new department there?

10. Выразите ту же мысль, употребив иную форму отрицания.

T.: There are not any young men here.

St.: There are no young men here.

11. Переспросите, начиная предложение с вопросительного слова, предложенного преподавателем.

T.: There are students at the desk.

T.: Who...

St.: Who is there at the desk?

MOSCOW UNIVERSITY

Moscow University| is the biggest*| and the best University| in the Soviet Union. There are 16 (sixteen) departments there:| 8 (eight) for humanities| and 8 (eight) for sciences. Some of* these departments| are quite new. One of them| is the department of cybernetics. There was no such department at the University| a few years ago*. Cybernetics| is a very important branch of mathematics. There are problems| that we can solve| only with the help of cybernetics.

I am a post-graduate| in this department. The department is not very big|but there work|many outstanding scientists there. We can attend their lectures*| and discuss scientific problems with them.

— Is there a department of mathematics| at the University?

— Well,| there is no department of mathematics| but there is a department of mathematics and mechanics.

— Are there many students| who do mechanics and mathematics| at the University?

— Yes,| there are.

— Are there also post-graduate students there?

— Yes,| quite a few*. They must study| and solve important problems.

Задание II: 1. Лабораторные упражнения VII—X. 2. Домашние упражнения 12, 13.

12. Задайте вопрос, ответом на который является данное предложение.

1. We are at the department of cybernetics. 2. There are sixteen departments at our University. 3. There is a department of mechanics and mathematics. 4. With the help of their teachers students can solve scientific problems. 5. There are many outstanding scientists at our department. 6. I was a student last year. 7. He will be a post-graduate next year. 8. There were three seminars last week. 9. There will be a lecture on mechanics next week. 10. This scientist's paper is in my bag.

13. Напишите по-английски.

a) 1. В университете 16 факультетов. 2. Имеется 8 естественных факультетов. 3. Кибернетика — область математики. 4. В этой области науки существует много важных проблем, и мы должны решить их. 5. В университете много выдающихся ученых. 6. Вы можете посещать лекции этих ученых. 7. Мы должны обсудить одну важную статью. 8. Сегодня три семинара. 9. Завтра не будет лекции по механике. 10. На столе не было книг. 11. В комнате были студенты и преподаватели. 12. В тексте нет новых слов.

* the biggest — самый большой.

б) 1. Сколько молодых людей в комнате? 2. Что в твоём портфеле? 3. Будет ли завтра семинар? 4. Что находится в той большой комнате?

с) мало времени, несколько студентов, небольшая помощь, много работы, много изменений, немного бумаги, несколько лет.

Аудиторное занятие III

14. Прочтите контрольное упражнение.

crystal, vary, wrist, whole, yellow, mix, subject, symbol, yet, furnish, fur, finish, unit, during, school, chemist, mechanics, written, cure, navy, except, exact, inch, fuel, union, return, rule, true, exist, produce, sudden, example, unify, such.

15. Скажите по-английски группы слов, произнесенные преподавателем, используя при этом наречия 'much', 'many', 'few', 'a few', 'little', 'a little'.

16. Ответьте на вопрос преподавателя.

17. Прочтите, заполняя пропуски недостающими словами.

1. There are fifteen ... in Moscow University. 2. One of them is the department of ... 3. Cybernetics is a branch of ... 4. There are eight departments for ... and eight for ... at the University. 5. We can ... these problems only with the help of cybernetics. 6. There are some outstanding ... in the department of mechanics and mathematics. 7. We can discuss ... problems with outstanding scientists. 8. We can ... their lectures.

18. Скажите по-английски предложения, произнесенные преподавателем.

Аудиторное занятие I

ГРАММАТИКА:

Глагол *to have*
Числительные

БУКВЫ И ЗВУКИ.

ПРАВИЛА ЧТЕНИЯ

Сочетания: *kn, ght, gn, lf, s+ure, s+i+гласная*.

Буквы	Звуки	Примеры	Примечания	Прочтите вслед за преподавателем
<i>kn</i>	[n]	know [naʊ]	k не произносится. Вспомните: walk [wɔ:k] write [raɪt] when [wen]	knee, knelt
<i>ght</i>	[t]	night [naɪt]	gh не произносится	light, fight
<i>gn</i>	[n]	sign [saɪn]	Ho: [gn] — signal	'align, gnat
<i>lf</i> <i>lm</i>	[f] [m]	half [ha:f] calm	l не произносится	calf, calm often ['ɔfn]
гласная + s	[s]	'measure ['meʒə]		'treasure
s+ ure i+ гласная	[ʃ]	sure [ʃʊə] 'tension		en'sure, as'sure 'fission, 'session

УПРАЖНЕНИЯ

1. Прочтите вслед за преподавателем и затем самостоятельно.

- know, knew, knee, knight, knife, knelt
- sign, design, align, gnat, gnostic
- night, light, bright, eight, straight, brought, taught, thought
- half, calf, walk, chalk, talk, calm, halves, often, fasten, listen

[ʒ] — usual, occasion, decision, explosion

[ʃ] — ensure, expansion, Russian, emission, fission

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

computer [kəm'pjutə] *n*

atomic [ə'tɒmɪk] *adj*

energy ['enədʒi] *n*

machine [mə'ʃi:n] *n*

modern ['mɒ:dən] *adj*

material [mə'tɪəriəl] *n*

information [ˌɪnfə'meɪʃn] *n*

industrial [ɪn'dʌstriəl] *adj*

revolution [,revə'lju:ʃən] *n*

aspect ['æspekt] *n*

automatic [ɔ:tə'mætɪk] *adj*

control [kən'trəʊl] *n, v*

operation [ɒpə'reɪʃn] *n*

logical ['lɒdʒɪkəl] *adj*

program ['prəʊgræm] *n, v*

conference ['kɒnfərəns] *n*

2. Прочтите вслед за преподавателем.

century ['sentʃəri] *век, столетие*

development [dɪ'veləpmənt] *развитие*

developments *события*

famous ['feɪməs] *знаменитый*

great [greɪt] *великий*

capture ['kæptʃə] *захват, обуздание*

handle ['hændl] *v* *обрабатывать, обращаться (с)*

reasonable ['rɪ:zənəbl] *adj* *разумный, целесообразный*

way *n* [wei] *способ, путь*

like *adj* [laɪk] *подобный*

be like *быть подобным, похожим*

England ['ɪŋɡlənd] *Англия*

various ['vɛəriəs] *различный, разнообразный*

processing [prə'sesiŋ] *обработка*

perform [prə'fɔ:m] *осуществлять, совершать*

put [put] (out), (put) *1. класть, положить; 2. выдавать*

answer ['ɑ:nsə] *1. n* *ответ; 2. v* *отвечать*

set [set] *множество*

itself [ɪ'tself] *сам (сама, само)*

mark [ma:k] *1. n* *отметка; 2. v* *отмечать*

meaning *значение*

record *1. n* *запись, перечень, регистрация; 2. v* *записывать, регистрировать*

store *накапливать*

kind *тип, вид*

make *заставлять*

which *который (из), какой*

Пояснения к тексту

The second ... was making machines handle information — второе ... состояло в том, чтобы заставить машины обрабатывать информацию...

We might well call — Мы могли бы с успехом называть...

...by itself — сама

What kind of books (work)? — Какого рода книги (работу)?

2. Прочтите вслед за преподавателем, обратите внимание на изменение глагола 'to have' в зависимости от лица, числа и времени.

a) We have little time. They have a few lectures this week. He has much work. You have an interesting seminar today. He has good ideas. She has a small child.

b) You had a good teacher of English. They had two lessons a week. He had little time yesterday. She had a few long pencils. He had a large family. I had a new plan.

c) I shall have a few days for this work. They will have all the data next week. He will have a large room.

d) I have no (not any) lectures today. He has no (not any) time for you. We had no (not any) room in this big house. They had no (not any) children. He will have no (not have any) place. They will have no (not have any) data tomorrow.

e) Have you a little time for me? Has he notes of the lecture? Will you have a seminar on mathematics next week? Had they an important problem to discuss? Shall we have their information?

3. Прочтите числительные вслед за преподавателем.

Количественные

1 One [wʌn]

2 Two [tu:]

3 Three [θri:]

4 Four [fɔ:]

5 Five [faɪv]

6 Six [sɪks]

7 Seven [sevn]

8 Eight [eɪt]

9 Nine [naɪn]

10 Ten [ten]

11 Eleven [ɪ'levn]

12 Twelve [twelv]

13 Thirteen [θɜ:'ti:n]

14 Fourteen [fɔ:'ti:n]

15 Fifteen [fɪf'ti:n]

16 Sixteen [sɪks'ti:n]

17 Seventeen [sevn'ti:n]

18 Eighteen [eɪ'ti:n]

19 Nineteen [naɪn'ti:n]

20 Twenty ['twenti]

21 Twenty one

Порядковые

(the) first [fɜ:st]

(the) second [sekənd]

(the) third [θɜ:d]

(the) fourth [fɔ:θ]

(the) fifth [fɪfθ]

(the) sixth [sɪksθ]

(the) seventh

(the) eighth

(the) ninth

(the) tenth

(the) eleventh

(the) twelfth

(the) thirteenth

(the) fourteenth

(the) fifteenth

(the) sixteenth

(the) seventeenth

(the) eighteenth

(the) nineteenth

(the) twentieth

(the) twenty first 21st

30 Thirty ['θæ:ti]	(the) thirtieth
40 Forty ['fɔ:ti]	(the) fortieth
50 Fifty ['fifti]	(the) fiftieth
60 Sixty ['siksɪ]	(the) sixtieth
70 Seventy ['sevntɪ]	(the) seventieth
80 Eighty ['eɪtɪ]	(the) eightieth
90 Ninety ['naintɪ]	(the) ninetieth
100 Hundred ['hʌndrɪd]	(the) hundredth
1000 Thousand ['θauzənd]	(the) thousandth
Million ['mɪljən]	(the) millionth

23 twenty three — the twenty third
46 forty six — the forty sixth

587 five hundred (and) eighty seven
801 eight hundred and one
3578 three thousand five hundred (and) seventy eight
7.425.629 seven million four hundred twenty five thousand six hundred and twenty nine

Обратите внимание:

One hundred, two hundred, six hundred	но: hundreds of books
five thousand	но: thousands of men
twenty eight million	но: millions of children

Даты читаются так:

1698 — sixteen ninety eight	1970 — nineteen seventy
1881 — eighteen eighty one	1705 — seventeen o five
1919 — nineteen nineteen	1900 — nineteen hundred

Задание I: 1. Лабораторные упражнения I—VI. 2. Домашние упражнения 4—7.

4. Прочтите каждое предложение упражнения 2 (b, c) и напишите (b) в настоящем и будущем времени, (c) в настоящем и прошедшем.

5. Ответьте на вопросы упражнения 2(a) сначала утвердительно, а затем отрицательно. В полном отрицательном ответе используйте отрицание 'no' или 'not any'.

6. Задайте вопрос относительно лица, указанного в скобках.

T.: I have interesting data (he).

St.: Has *he* interesting data too?

1. She has a child. (he). 2. They have a good teacher. (she).
3. We had a nice, small house. (they). 4. You will have three days for this work. (he). 5. He has a logical answer. (you). 6. We shall

have a modern computer. (they). 7. They have control of the operation. (she). 8. I have important information. (he).

7. *Переспросите, выразив сомнение.*

T.: These are automatic machines.

St.: Are these *really* automatic machines?

1. There are various aspects of this problem. 2. They can handle such machines now. 3. This machine must use atomic energy. 4. He is a famous scientist. 5. There was an industrial revolution in England. 6. He can make them work well. 7. The computer can perform various operations. 8. This was a logical answer. 9. There were many ways to control the operation 10. The word has many meanings. 11. Such a machine could record information. 12. Man can capture atomic energy now. 13. This was an important development. 14. Their material is very interesting. 15. This conference is important.

Аудиторное занятие II

8. Прочтите контрольное упражнение.

right, written, eight, which, bought, wreck, design, castle, calm, chalk, knight, talk, know, why, fasten, write, knelt. chalk, sign, walk, align, knife, half, often, ought, knew, enough, straight, taught, bought, thought, light, wrong, writer, where.

9. *Переспросите преподавателя. Уточните интересующую вас подробность.*

T.: They have important information. (who).

1st st.: Who has important information?

2nd st.: They have.

10. Ответьте отрицательно на вопрос преподавателя.

T.: Have you German books?

St.: No, I haven't. I have no (not any) German books.

11. Составьте короткие фразы, используя в них слова, данные ниже.

An important development, important information, atomic energy, energy control, a reasonable answer, various machines, many aspects, various operations, a logical way, a famous man, the famous Industrial Revolution, an interesting aspect, automatic control, an automatic operation, to record information, to handle this machine, the twentieth century, an important conference, to store information, the meaning of these words, like modern computers, interesting material, methods of control, to control processing, the capture of energy, to capture energy, an automatic program, to program work.

12. Прочтите каждое предложение упражнения 7 и задайте вопрос, ответ на который содержится в данном предложении.

13. Прежде чем приступить к тексту, прочитайте вслеп за преподавателем слова урока.

Прослушайте чтение текста преподавателем, внимательно следя за ударением и интонацией.

Прочтите текст про себя и скажите (по-русски), о чем он.

COMPUTERS

The twentieth century| is famous for two| great developments. One of these| was the capture of atomic energy. The second of these developments| was making machines| handle information| in reasonable ways. We might well call this development the Second Industrial Revolution. Like the First Industrial Revolution| of the eighteenth century| in England| it has many various aspects:| automatic control;| automatic handling of materials;| robots;| automatic processing of data;| automatic computers.

What is a computer? A computer is a machine| (or a man) that can take in information| (problems and data),| perform reasonable operations| and put out answers.

What is a reasonable operation? Reasonable operations| are logical| and mathematical operations.

What is information? Information is a set of marks| that have meaning.

There are modern machines| that can take in,| record,| and store information. A machine that can perform these operations by itself| is an automatic computer. Such a machine| must have an automatic program.

Задание II: 1. Лабораторные упражнения VII—XII. 2. Домашние упражнения 13—15.

14. В данных ниже предложениях замените глагол 'to have' оборотом 'there+be' в соответствующем времени и числе.

1. The department of physics will have some new laboratories next year. 2. They have various automatic machines at their institute. 3. The Industrial Revolution in the eighteenth century had various aspects. 4. We have machines that can store information. 5. The new computer will have automatic recording of data.

15. Напишите по-английски.

а) важные события; обработка информации; разумный способ; подобно счетной машине; различные аспекты одной проблемы; автоматическая обработка; логический ответ; набор знаков; значение этой записи; развитие науки.

б) 1. Вы должны рассказать нам об этом знаменитом ученом. 2. Машина может осуществлять контроль операций. 3. Существует

только один разумный способ сделать это. 4. Мы должны изучить различные стороны проблемы. 5. Автоматическая обработка данных очень важна. 6. Мы не можем контролировать подобные процессы сейчас. Счетная машина может принять информацию, хранить ее и выдать разумный логический ответ. 7. Развитие этого метода важно.

с) 1. Вы умеете обращаться с этой машиной? 2. Существует ли разумный способ решить эту проблему? 3. Чему подобен этот метод? 4. Может ли он дать логичный ответ? 5. Какого рода машина может принимать и хранить информацию? 6. Вы должны выступить на конференции на следующей неделе?

Аудиторное занятие III

16. Прочтите контрольное упражнение.

while, try, oxygen, logic, sunny, symbol, visit, branch, love, mechanics, medal, tunic, music, true, during, cut, explain, wave, own, brown, water, worm, able, neat, means, come, mother, even, moon, took, planet, duty, funny, exact, union, say, lay, lie.

17. Переспросите преподавателя. Уточните интересующую вас подробность.

T.: Alexandrov is a famous scientist. (who)

1st st.: Who is a famous scientist?

2nd st.: Alexandrov is.

18. Дополните начатые предложения. Заполните пропуски недостающими словами.

1. The twentieth century is famous for two 2. One of these developments was the capture of 3. These machines can handle information in 4. The Second Industrial Revolution has many 5. A computer is a machine that can 6. Reasonable operations are ... and ... operations. 7. Information is a ... that have meaning. 8. A machine that can take in, ... and ... this information is an automatic computer.

Аудиторное занятие I

ГРАММАТИКА:

Основные способы словообразования.

Времена группы Indefinite (Active). Понятие о нестандартных глаголах.

Словообразование с помощью суффиксов: *ion, ssion, ation, or, er, ment, ful, less, al, ly*.

a) Суффиксы существительного:

ion — to express — *expression* — выражение

ssion — to transmit — *transmission* — трансмиссия, передача

ation — to inform — *information* — информация

or — to operat(e) * — *operator* — оператор

er — to work — *worker* — рабочий

ment — to develop — *development* — развитие

b) Суффиксы прилагательного:

ful — help — *helpful* — полезный

less — help — *helpless* — беспомощный

al — form — *formal* — формальный

c) Суффикс наречия:

ly — eas(y) — *easily* — легко

УПРАЖНЕНИЯ

1. Прочтите вслед за преподавателем и затем самостоятельно.

to inform — *information*, to demonstrat(e) — *demonstration*; to not(e) — *notation*, to translat(e) — *translation*, emi(t) — *emission*;

* В скобки взяты буквы, выпадающие при прибавлении суффикса или переходящие в другую букву.

to inform — *informer*, to teach — *teacher*, to write — *writer*,
to read — *reader*, to speak — *speaker*;
to argu(e) — *argument*, to place — *placement*;
use — *useful* — *useless*, meaning — *meaningful* — *meaningless*,
work — *workless*, home — *homeless*, child — *childless*;
industr(y) — *industrial*, physic(s) — *physical*, mathematic(s) —
mathematical, mechanic(s) — *mechanical*, operation — *operational*;
eas(y) — *easily*, logical — *logically*, simpl(e) — *simply*, acti-
ve — *actively*.

2. Прочтите слова вслед за преподавателем, обращая внимание на произношение окончаний прошедшего времени правильных (стандартных) глаголов.

[t]	[d]	[id]
work — worked	change — changed	want — wanted
pass — passed	show — showed	note — noted
stop — stopped	try — tried	end — ended
place — placed	answer — answered	select — selected
finish — finished	solve — solved	study — studied

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

physicist ['fɪzɪsɪst] *n*

physics ['fɪzɪks] *n*

to finish ['fɪnɪʃ] *v*

school [sku:l] *n*

Academy [ə'kædəmi] *n*

academic [ækə'demɪk] *adj*

vacation [və'keɪʃn] *n*

institute ['ɪnstɪtju:t] *n*

minute ['mɪnɪt] *n*

algebra ['ældʒɪbrə] *n*

examination [ɪg'zæmɪ'neɪʃn] *n*

laboratory [lə'bɒrətəri] *n*

2. Прочтите вслед за преподавателем.

live [lɪv] жить

rather ['rɑ:ðə] довольно-таки

mother ['mʌðə] мать

father ['fa:ðə] отец

brother ['brʌðə] брат

research [ri'sə:tʃ] исследова-

тельская работа

want [wɒnt] хотеть

pass [pa:s] 1. *v* проходить; 2. *n* пропуск

fail [feɪl] 1. не смочь; 2. провалиться (на экзамене)

enter ['entə] 1. поступать; 2. входить

field [fi:ld] 1. поле; 2. область деятельности

again [ə'geɪn] снова, опять

following ['fɒləʊɪŋ] следующий

successful [sək'sesful] успеш-
ный

certainly ['sə:tənli] разумеется,
конечно

till [tɪl] до, вплоть до

each [i:tʃ] каждый

term [tɜ:m] семестр

for [fɔ:] в течение, на протя-
жении

month [mʌnθ] месяц

autumn ['ɔ:təm] осень

winter [wɪntə] зима

spring [sprɪŋ] весна

summer ['sʌmə] лето

during [djuəriŋ] во время, в течение
 o'clock [ə'klɒk] время (на часах)
 morning ['mɔ:niŋ] утро
 right [raɪt] 1. правый; 2. правильный; 3. прямой
 since [sɪns] 1. с тех пор как (предл.); 2. так как (союз)
 after ['ɑ:ftə] после (того как)
 library ['laɪbrəri] библиотека
 get [get] got [gɒt] получать, добывать
 hope [haʊp] 1. надежда; 2. надеяться
 besides [bi'saɪdз] кроме того
 language ['læŋɡwɪdʒ] язык
 Monday ['mʌndi] понедельник
 Sunday ['sʌndi] воскресенье
 half [ha:f] половина
 past [pa:st] 1. после; 2. прошедший, прошлый

then [ðen] затем, тогда
 see [si:] saw, seen [sɔ:] [si:n] видеть
 question ['kwɛstʃən] 1. вопрос; 2. спрашивать
 why [wai] 1. почему; 2. междометие (выражение удивления)
 whom [hu:m] кому, кого
 January ['dʒænjuəri] январь
 February ['februəri] февраль
 March [ma:tʃ] март
 April ['eɪprɪl] апрель
 May [meɪ] май
 June [dʒu:n] июнь
 July [dʒu'lai] июль
 August ['ɔ:gəst] август
 September [sep'tembə] сентябрь
 October [ɒk'təʊbə] октябрь
 November [nə'vembə] ноябрь
 December [di'sembə] декабрь

Пояснения к тексту

- *pass exams — сдать экзамены
- *failed to enter — не поступила, провалилась
- *This time I was successful — на этот раз мне удалось
- *I have not got — у меня нет
- *to get ready for — готовиться к
- *ten minutes to seven — без десяти семь
- *half past nine — половина десятого
- *I see — понимаю, понятно
- *That's right — правильно

3. Прочтите следующие предложения. Обратите внимание на изменение глагола-сказуемого в зависимости от лица, числа и времени действия и на структуру вопросительных и отрицательных предложений.

a) I study at this department. Comrade Sokolov studies at the same department. You do research. She also does research. They attend lectures. We also attend lectures. I do mathematics. He does physics.

b) He helped me do it. They discussed various aspects of the problem. We performed many operations on the machine. She answered my question. We did our work.

c) I shall find a way to do it. He will solve this important problem. We shall get some information. This work will take much time.

d) I do not speak English well. You do not work much. He does not do physics. You do not often come here. She does not live in this town. They do not attend conferences.

e) He did not go yesterday. She did not find that paper on your desk. They did not begin the lesson at 9. We did not ask him any questions. You did not do your homework.

f) I shall not give them a lecture on the subject. He will not pass his exam. She will not perform these operations. We shall not work in the old laboratory.

g) Do you do research? Do they study various aspects of this operation? Does his teacher help him? Does she hope to pass her exams in time?

h) Did she begin her work? Did they plan this conference? Did you see her at the lecture? Did they hold the seminar?

i) Will you attend the lesson? Will they control the operation? Shall I do it for you? Shall we go?

4. Сравните структуру вопросительных предложений различного типа.

He works at the University now.
 Who works at the University now?

→ Yes, he does.

Does he work at the University now?

→ No, he does not.

Where does he work now?
 When does he work at the University?

My sister helped him yesterday.
 Who helped him yesterday?
 Whose sister helped him yesterday?

→ Yes, she did.

Did my sister help him yesterday?

→ No, she did not.

Whom did my sister help yesterday?
 When did my sister help him?
 They will come here soon.

Who will come here soon?

→ Yes, they will.

Will they come here soon?

→ No, they will not.

Where will they come soon?
 When will they come here?

Задание I: 1. Лабораторные упражнения I—VIII, 2. Домашние упражнения 5—8.

5. Прочтите каждое предложение упражнения 3 (a, b, c) и напишите. (a) — в прошедшем времени; (b) — в настоящем и будущем; (c) — в настоящем и прошедшем; (e, d) — в утвердительной форме. Помните о неправильных глаголах.

6. Ответьте на вопрос, используя в ответе выделенное слово.

T.: Does he live in *Moscow* or in *Kiev*?

St.: He lives in *Moscow*.

a) 1. Does the academic year begin in *September* or in *October*? 2. Does his mother teach English or *French*? 3. Does the term last three or *four* months? 4. Does he work till *six* or seven o'clock? 5. Does his father work at the University or at the *Academy of Sciences*?

b) 1. Do you speak English or *French*? 2. Do they do research in the field of physics or *mechanics*? 3. Do you expect to pass your exam in winter or in *spring*? 4. Do you want to speak to *her* brother or to her father? 5. Do they go home or to the library after their classes?

c) 1. Did you see *his* father or his mother? 2. Did they come early or *late*? 3. Did she pass her exam or did she *fail*? 4. Did they go there in spring or in *winter*? 5. Did you begin the lesson at half past one or at *half past two*?

7. Задайте вопрос, используя вопросительное слово в скобках.

1. This physicist lives in Novosibirsk. (who) 2. The academic year begins in September. (what) 3. She finished school last July. (when) 4. He came at 20 minutes to eight. (when) 5. The students will take the exam on Monday. (who) 6. His father, mother and brother went home. (where) 7. I must go to the library in the morning. (when) 8. The girl wanted to pass her exam on the second of June. (when) 9. She teaches algebra. (what) 10. Each term lasts for four months. (for how long) 11. I like winter. (who) 12. They hoped to finish their work at half past three. (when) 13. He passed his exam successfully. (how) 14. He entered the University the following year. (when) 15. Their research lasted till spring. (whose) 16. I must go since I must get ready for my lesson. (why)

8. Подтвердите или возразите, внося исправление.

T.: January is the first month of the year.

St.: Yes, it is.

T.: January is the third month of the year.

St.: No, it is not. The third month of the year is March.

1. April is the third month of the year. 2. May is the eleventh month of the year. 3. February is the second month of the year. 4. September is the fourth month of the year. 5. August is the tenth month of the year. 6. November is the twelfth month of the year. 7. October is the tenth month of the year. 8. June is the seventh month of the year.

Аудиторное занятие II

9. Прочтите контрольное упражнение.

has, plant, mask, male, bath, half, arm, play, aim, bare, hair, raw, chair, chain, tall, because, August, air, dare, bake, wage, scale, way, chalk, cause, gas, sharp, branch, call, care, bay, large, say, card, lad, all, fail, again, last, language, rather, father, pass.

10. Переспросите, выразив сомнение, и затем возразите. Воспользуйтесь упр. 7.

T.: He works much.

1st st.: Does he really work much?

2nd st.: He does not work much.

11. Переспросите, воспользовавшись вопросительным словом, подсказанным преподавателем. Другой студент должен дать краткий уточняющий ответ.

T.: I live in Minsk (where).

1st st.: Where do you live?

2nd st.: In Minsk.

12. Услышав вопрос, ответьте отрицательно.

T.: Did he pass his exam last week?

St.: No, he did not pass his exam last week.

13. Прежде чем приступить к тексту, прочтите вслед за преподавателем слова урока.

Прослушайте чтение текста преподавателем, внимательно следя за ударением и интонацией, стараясь понять его. Прочтите текст про себя и скажите, о чем он.

I am a Student

My name is Lena Kuzmenko. I am a student. I live with my family| in Moscow. Our family is rather small:| my mother,| father, my little brother| and I (me). My mother is a school teacher. She teaches French. My father is a physicist. He does research| in the field of atomic physics. He works at one of the Institutes| of the Academy of Sciences. My brother is a school boy. He is 12 years old. I am 22. A few years ago| I finished high school| and wanted to go to the University. But I did not pass my exams well enough that year| and failed to enter the University. I tried again| the following year. This time| I was successful. Now| I am a third year student| in the department of cybernetics.

The academic year begins| on the first of September| and lasts till the end of June. Each term lasts| for four months. We have our winter examinations in January. We also have exams in spring.

During the term| we attend lectures| and seminars. We also have English classes.

Students must come to the University| every day of the week. Our classes begin| at 9 o'clock in the morning.

Today we have a lecture on algebra,| a seminar in philosophy| and an English class. I shall not go home after my classes today| since I must go to the library. I hope to get some books there| which I have not got at home. Besides| I want to go to the English language lab| to get ready| for my lesson on Monday. The lab is open| only till ten minutes to seven| and the library is open| till half past nine. So I shall first go to the lab| and then to the library.

Задание II. 1. Лабораторные упражнения IX—XVI. 2. Домашние упражнения 14—18.

14. *Задайте вопрос, заменив действующее лицо.*

a) T.: I live in Moscow. (you).

St.: Do *you* also live in Moscow?

1. I study English. (she). 2. We live in a large house. (he). 3. You attend lectures on physics. (they). 4. I translate easy texts. (you). 5. You give lessons. (she). 6. We change our plans (she). 7. She asks a lot of questions. (he). 8. They begin their work at 10. (you).

b) T.: She will ask him to help you. (I)

St.: *Shall* I ask him to help you?

1. She will study atomic physics. (they). 2. I shall enter the University. (he). 3. We shall be at the Academy. (she). 4. He will finish school. (you).

c) T.: He studied interesting problems. (they)

St.: *Did they* also *study* interesting problems?

1. She spoke to her teacher. (you). 2. I attended the conference. (she). 3. He came in time for the lesson. (they). 4. We gave them the information. (you).

15. *Ответьте на вопрос. Помните о неправильных глаголах.*

T.: When did he *do* it? (last week)

St.: He *did* it last week.

1. When did you *go* there? (yesterday). 2. What did he *get*? (the information). 3. How did I *write* the paper? (very well). 4. Where did she *find* her book? (on her desk). 5. What did she *tell* him? (about her exams). 6. What did he *read*? (her thesis). 7. Whom did you *speak* to at the conference? (those scientists). 8. What did he *take* from them? (the book). 9. What did they *speak* about? (their research). 10. When did he *give* you the paper? (yesterday). 11. Where did they *hold* the conference? (at the Institute). 12. When did he *rise*? (early).

16. *Задайте (письменно) вопрос по существу каждого предложения первых двух абзацев текста "I am a Student".*

17. a) *Прочтите внимательно диалог.*

A.: May I ask you a few questions?

Are you a student| or a post-graduate?

Where do you study?

And what do you do?

When did you enter the University?

Then you must be a second year student.

Oh, I see. How old are you?

Does the academic year begin in September?

Must you take any exams| during the academic year?

And what about your vacation? Have you got any vacation?

Do you come to the University| every day?

B.: Why,| certainly.

I am a student.

I study at the University.

I do math.

I entered it| two years ago.

No, I am not. I am a third year student.

I am nineteen.

On the first of September. And it lasts till July.

Yes, we must. In January| and in June.

Why,| certainly. In winter| and in summer| after our examinations are over.

Well,| every week day. I do not come here on Sunday,| certainly.

a) *Теперь закройте правый столбик диалога, прочтите вопрос и постарайтесь ответить на него, не глядя в книгу.*

b) *Закройте левый столбик. На какие вопросы отвечают предложения правого столбика? Задайте эти предполагаемые вопросы.*

18. *Вы должны уметь рассказать на следующем уроке о себе, своей семье и о своей учебе. Подготовьтесь к этому.*

Аудиторное занятие III

19. *Прочтите данные слова и попытайтесь догадаться о значении выделенных слов на основании знания другого слова того же корня и знания суффиксов:*

simple — *simply*, easy — *easily*, nice — *nicely*, open — *openly*, week — *weekly*, month — *monthly*, active — *actively*, to translate — *translator*, to give — *giver*, to work — *worker*, begin — *beginner*; *demonstration*, *constructions*, *dissertation*, *segmentation*; *roomless*, *workless*, *fatherless*, *motherless*, *helpful*, *helpless*, *changeless*, *mechanical*, *physical*, *mathematical*, *special*; *argument*, *placement*.

20. Задайте вопрос, используя в каждом случае все соответствующие вопросительные слова: ('what', 'where', 'why', 'who', 'whom', 'when', 'how', 'what kind of', 'whose').

1. ... does this computer work? 2. ... do you speak French? 3. ... will you write your homework? 4. ... does this famous man live? 5. ... does atomic energy come from? 6. ... did this machine stop to work? 7. ... showed you the way to the Institute? 8. ... operations does this machine perform? 9. ... will answer my question? 10. ... did they come from England? 11. ... did she do research? 12. ... will they control the processing? 13. ... do you mean? 14. ... shall I tell them about it? 15. ... did they record the information?

21. Заполните пропуски соответствующей формой глаголов 'to be', 'to have', 'to do'.

to be: 1. This ... an interesting question. 2. These books ... rather old. 3. There ... various aspects of this problem. 4. There ... a new research laboratory here next year. 5. I ... a student now. 6. You ... a post-graduate last year.

to have: 1. I ... some new data. 2. He ... an exam in the History of the Communist Party yesterday. 3. We ... important information tomorrow. 4. He ... many ideas. 5. I ... no time next week. 6. They ... a scientific conference last month.

to do: 1. Where ... you see him yesterday? 2. He ... not study such problems. 3. I ... not speak at the conference last month. 4. She ... not attend lectures now. 5. ... he often see his professor? 6. ... she answer your question when you saw her? 7. When ... he present his thesis? 8. How ... she write her abstract?

22. Ответьте на вопросы преподавателя.

LESSON EIGHT

Аудиторное занятие I

ГРАММАТИКА:

Future Indefinite в придаточных условиях и времени.

Местоимение "it".

Словообразование с помощью суффиксов: -ance, -ence, -ous, -ic(al).

a) Суффиксы существительного:

-ance — to assist — assistance — помощь;

-ence — to differ — difference — различие, разность;

b) Суффиксы прилагательного:

-ous — fam(e) — famous — знаменитый;

-ic(al) — history — historic — historical — исторический.

УПРАЖНЕНИЯ

1. Прочтите вслух за преподавателем и затем самостоятельно. conference, distance, substance, permanence, preference, presence;

famous, scandalous, scrupulous, various, serious;

artistic, automatic, basic, physical, academic, systematic, economical, specific.

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

subject ['sʌbdʒɪkt] *n*

course [kɔ:s] *n*

candidate ['kændɪdət] *n*

philosophy [fɪ'lɒsəfi] *n*

successfully

helpful

period ['piəriəd] *n*

dissertation [dɪsə'teɪʃən] *n*

journal ['dʒɔ:nəl] *n*

periodical [piəri'ɔdɪkəl] *n*

mathematical

interested *adj*

2. Прочтите вслед за преподавателем.

graduate ['grædjueɪt] *v* заканчивать (вуз)
graduate ['grædjuɪt] *adj* окончивший (вуз)
appointment [ə'pɔɪntmənt] *n* назначение
decide [dɪ'saɪd] *v* решать
deal (dealt) (with) [di:l], [delt] 1. *n*. сделка; 2. *v* иметь дело с
run (ran, run) [rʌn], [rʌn] 1. приводить в действие; 2. бежать
degree [di'ɡri:] 1. степень, уровень; 2. градус
foreign ['fɔ:ɡɪn] иностранный
defend [dɪ'fend] защищать
publish ['pʌblɪʃ] опубликовать
article ['ɑ:tɪkl] статья
present [pri'zent] 1. *v* представлять, дарить; [preznt] 2. *a* данный, настоящий
abstract ['æbstrækt] реферат
home-town ['həʊmtaʊn] родной город
hostel ['həʊstl] общежитие
get up ['get ʌp] вставать, подниматься
bed постель, кровать
usually ['ju:ʒuəli] обычно
always ['ɔ:lweɪz] всегда
thing [θɪŋ] вещь
adviser [əd'vaɪzə] советник, руководитель
expect [ɪks'pekt] ожидать, рассчитывать

certain ['sɜ:tən] некий, некоторый
(be) sure [ʃuə] быть уверенным
look [lʊk] 1. *n* взгляд; 2. *v* смотреть
through [θru:] через, посредством
suppose [sə'pəʊz] предполагать
like любить
if [ɪf] если
unless [ʌn'les] если не, разве что
until [ʌn'tɪl] пока не
before [bɪ'fɔ:] до того как
provided [prə'vaɪdɪd] при условии, если
Tuesday ['tju:zdi] вторник
Wednesday ['wenzdi] среда
Thursday ['θɜ:zdi] четверг
Friday ['fraɪdi] пятница
Saturday ['sætədi] суббота
evening ['i:vnɪŋ] вечер; in the e. вечером
morning ['mɔ:nɪŋ] утро; in the m. утром
meet (met) [mi:t], [met] встречать
(be) glad [glæd] радоваться
thank [θæŋk] благодарить
sister ['sɪstə] сестра
know (knew, known) [nou], [nju:], [naʊn] знать
mean (meant) [mi:n], [ment] иметь в виду, подразумевать
be afraid [ə'freɪd] бояться
exactly [ɪg'zæktli] точно

Пояснения к тексту

I come from ... — Я из ...

I became interested in ... — я заинтересовался

To take a post-graduate course — учиться в аспирантуре

The post-graduate course runs for — курс аспирантуры длится

To have three articles published — опубликовать три статьи

At the end — в конце

A lot of — много, масса

I am going to — я намереваюсь

I am sure — я уверен

Look through — просматривать

I should like to go and see ... — мне бы хотелось пойти и посмотреть

Glad to see you — рад видеть тебя

I am fine — я чувствую себя прекрасно

I had a very good time — я прекрасно провел время

I mean — я имею в виду

Not exactly — не совсем

2. Прочтите данные предложения, обращая внимание на употребление будущего времени в придаточных предложениях, вводимых союзами 'if', 'provided', 'as soon as', 'after', 'before'.

1. If he asks me this question, I shall answer it. 2. I shall discuss some problems with my teacher as soon as I see him. 3. He will translate the text provided he knows all the words. 4. We shall finish the work after we get their information. 5. She will take her exam in English before the term is over. 6. You will speak at the conference when you are ready. 7. If I pass my exams in time, I shall go home for my vacation. 8. He will certainly help you provided he knows all the facts.

3. Прочтите, обращая внимание: а) на усилительную конструкцию.

1. It is his work that I will show you. 2. It is in September that (when) he will have his vacation. 3. It is a reasonable answer that I must get. 4. It was my father who made me change my plans. 5. It is this program that they expect to discuss with us. 6. It is this book that (which) I want to get from the library. 7. It was in Kiev that (where) they held the conference. 8. It is this scientist whom I want to ask the question.

б) на значение местоимения 'it'

1. The text is not long. It is easy. 2. This is our classroom. It is large. 3. It is Monday. It is the beginning of the day. It is the 1st of September. 4. It will be interesting to see their program. 5. It was important to find the answer in time. 6. What is it? — It is a computer. 7. Who is this man? — It is a famous scientist. 8. Give me my book, please. I need it.

Задание I: 1. Лабораторные упражнения I-VII. 2. Домашние упражнения 4-6.

4. Ответьте на вопросы, используя слова в скобках. Не забудьте заменить местоимения там, где это требуется.

T.: What will you do if you see her. (speak to her)

St.: If I see her, I shall speak to her.

1. Where will you go as soon as she comes? (to the Institute)

2. What will *you* do if you not pass your exam? (take it again) 3. Where will *he* go after he gets the material? (to his scientific research adviser) 4. What will *she* do provided she finds the place? (show it to you) 5. What will *he* do before he sees his teacher of English? (go to the foreign language lab)

5. *Ответьте отрицательно, уточните.*

T.: Will you write your abstract? (article)

St.: No, it is my *article* that I shall write.

1. Must you translate the short text? (the long text) 2. Does he deal with cybernetics? (mathematical logic) 3. Do you know English? (French) 4. Do you usually work at the library? (at home) 5. Does she usually have her English class in the evening? (in the morning) 6. Did he decide to go to the University? (to the Institute)

6. *Задайте вопрос, используя данное вопросительное слово.*

1. He graduated from the University only two years ago. (who) 2. He is going to defend his dissertation next spring. (what) 3. My scientific research adviser discussed the program with me. (with whom) 4. These post-graduates live in the students' hostel. (who) 5. She usually looks through all the newspapers* in the evening. (what) 6. I suppose he will present the article tomorrow. (what) 7. I like his abstract. (who) 8. He got a good appointment. (who) 9. The lecturer entered the classroom at 9 o'clock exactly. (who) 10. My sister became a post-graduate last autumn. (whose sister) 11. He usually looks through foreign journals in the library. (what kind of) 12. Her brother thanked them for their help. (whose brother) 13. The publication of this article means a lot for him. (for whom) 14. The post-graduate course runs for three years. (what)

Аудиторное занятие II

7. *Прочтите контрольное упражнение*

mere, theft, kneel, they, rear, hear, teach, head, gently, meet, earn, clear, hero, grey, queer, eat, steady, seat, sea, eight, secret, spread, length, verse, weight, breath, bread;

cage, grow, gap, gent, glory, gender, green, log, stage, gay, edge, angle, bridge;

cute, care, concern, acclaim, accept, curtain, cube, coal, cruel, pence, clear, accent, decree, close, scene, face, accord, acute, accuse, accident, account, acid, ace.

8. *Прочтите и уточните, что именно будет сделано при данных обстоятельствах. Уточняющая реплика подается другим студентом.*

* newspaper — газета

T.: If he asks me this question, I shall answer it.

1st st.: What shall I do if he asks me this question?

2nd st.: You will answer it.

9. *Прочтите предложение и перефразируйте его.*

T.: It is this book that we are going to discuss.

St.: We are going to discuss this book.

Воспользуйтесь упр. 3(а).

10. *Прочтите каждое предложение упр. 6 и задайте вопрос, на который данное предложение является ответом.*

11. *Переспросите, выразив сомнение в справедливости сказанного.*

T.: He deals with physics.

St.: Does he really deal with physics?

12. *Прочтите за преподавателем слова урока. Прослушайте чтение текста преподавателем, внимательно следя за ударением и интонацией. Прочтите про себя текст урока с тем, чтобы затем в общих чертах изложить его содержание.*

I am a Post-graduate

My name is Alec Pavlov. I come from Sverdlovsk. A few years ago| I graduated from the University there. I did cybernetics. I got an appointment| to work at a research institute. There| I became interested in some special problems| and since I needed a research adviser| I decided to take a post-graduate course| at the University of Moscow. I passed my exams successfully| and I am in my first year now. I deal with computers.

The post-graduate course| runs for three years. During this period| a post-graduate| must work a lot. He must take his candidate's degree exams| in philosophy,| a foreign language,| and some exams in math. He must also have| two or three articles| on the subject of his research| published. At the end of the third year| the post-graduate defends his dissertations. But first he must present| the abstract of it.

Since Moscow is not my home-town| I live in the hostel| for post-graduate students now. I usually get up rather early in the morning| and do not go to bed until late in the evening. There is always so much to do| during the day: seminars,| lectures,| the library, and a lot of other things.

Today| I have an English class| at 10 o'clock in the morning. Then I am going to see| my scientific research adviser| since I expect to discuss| certain things with him. I am sure| he will see me| if he has time. Next, I must go| to the foreign language laboratory| to get ready for my English lesson| on Friday. I find my work in the lab very helpful. Besides,| I must go to the library. I am going to look| through some mathematical journals| and periodi-

cals there| and also take some books home. If I get those books, I suppose| I shall stay at home and work in the evening. If I do not get the books I should like to go| and see a friend.

Задание II: 1. Лабораторные упражнения VIII-XI. 2. Домашние упражнения 13—17.

13. Ответьте на вопрос, используя в ответе выделенные слова.

T.: Do you want to read the book or the *journal*?

St.: It is the *journal* that I want to read.

1. Do you usually look through *foreign journals* or newspapers? 2. Did he present his *abstract* or the article? 3. Did she graduate from *Moscow University* or the University in Leningrad. 4. Do you deal with *philosophy* or journalism? 5. Is he going to defend his dissertation in *winter* or in *spring*? 6. Can you translate English or *German articles*.

14. Ответьте на вопрос, используя союзы 'when', 'as soon as', 'after, before'.

a) T.: When will you come? (to have time)

St.: When I have time.

1. When will he defend his dissertation? (to write it) 2. When will she go home? (to have vacation) 3. When will he decide on the subject of his dissertation? (to see his scientific research adviser) 4. When are you going to look through this *journal*? (to get it) 5. How soon can he present his abstract? (to finish it) 6. When will he get an appointment? (to graduate from the Institute)

b) T.: Will she help him? (to have time)

St.: Yes, provided (if) she has time.

1. Will he read my abstract? (to come) 2. Does he attend seminars? (to find them interesting) 3. Will he graduate from the University? (to work hard) 4. Will she pass her exam in English? (to attend her English classes) 5. Are you going to begin exactly at 10 o'clock? (everybody, to come)

15. Задайте письменно вопрос к каждому предложению первого абзаца текста "I am a Post-graduate", исходя из того, что предложение является ответом на ваш вопрос.

16. а) Прочтите внимательно диалог.

Two friends meet at the University after their vacation.

A.: Good morning, Nick!

B.: Oh, good morning Ann.
Glad to see you. How are you?

A.: I am fine, thank you. I only came to Moscow yesterday.

B.: Where from?

A.: I was in Riga. My mother, father| and my little sister live there,| you know,| and

I wanted to stay with them.
And where did you go to| for your vacation?

A.: I am glad| you did. What are you going to do now?

A.: Did you not pass your exams| last spring?

B.: I went to a nice place| on the Volga. I had a very good time there.

B.: I have a lot of work. I must take my exams.

B.: Well,| I passed my examination in philosophy. But it is the foreign language| that I must do now. I mean English.

A.: Oh,| I see. Are you afraid of your exam?

B.: Not exactly. But I must work a lot| if I am going to pass it successfully.

в) после того, как вы прочли диалог, закройте правый столбец и попробуйте восстановить ответы и реплики, приведенные в нем;
с) закройте левую колонку и попытайтесь восстановить диалог.

17. Будьте готовы рассказать о себе и своей учебе.

Аудиторное занятие III

18. Прочтите и попытайтесь догадаться о значении выделенных слов:

to perform — *performance*, important — *importance*, present — *presence*, scandal — *scandalous*, serious — *seriously*, logic — *logically*, automatic — *automation*, system — *systematic* — *systematically*, various — *variance*, to graduate — *graduation*, appointment — *to appoint*, adviser — *to advise*, foreign — *foreigner*; usually — *usual*, to thank — *thankful*, to suppose — *supposition*; exactly — *exact*.

19. Ответьте на вопрос. Используйте в ответе выделенные слова.

a) T.: Do you want to give me *this book*?

St.: Yes, it is *this book* that I want to give you.

1. Are you going to translate *his text*? 2. Do you expect to get *these data*? 3. Does she want to help *her sister*? 4. Will you go home or to the *University*? 5. Did he come on *Monday* or on *Saturday*?

b) T.: Which is the first day of the week?

St.: Sunday is.

1. Which is the fourth day of the week? 2. Which is the second day of the week? 3. Which is the fifth day of the week? 4. Which is the third day of the week? 5. Which is the seventh day of the week? 6. Which is the sixth day of the week?

20. Ответьте на вопросы, используя слова в скобках.

a) T.: Do you suppose he will help me? (you, to ask him)

St.: I am sure he will. If you ask him.

1. Do you suppose he will finish the article tomorrow? (he, to work in the evening) 2. Do you suppose she will attend the foreign language lab? (teacher, to ask her) 3. Do you suppose he will become a scientist? (he, to work hard) 4. Do you suppose you will solve this problem? (I, to have enough time) 5. Do you expect he will find that information? (you, to help him)

b) T.: Does he speak English? (French)

St.: I am not sure. I suppose he speaks French.

1. Are there many students in their class? (10) 2. Does he often see his scientific research adviser? (every week) 3. Will you defend your dissertation in April? (in June) 4. Did he live at the hostel when he was at the University? (with his family) 5. Can they write this book together? (an article) 6. Must she take her exam in mathematics? (in philosophy) 7. Are there many foreign journals and periodicals in that library? (quite a few) 8. Does he deal with mathematical logic or algebra (algebra)

c) T.: When will you go there? (on Monday).

St.: I *should like* to go there on Monday.

1. What are you going to read? (some foreign periodicals) 2. What do you want to discuss with me? (the subject of my article) 3. What will you deal with? (philosophy of mathematics) 4. Where do you want to live? (in the hostel) 5. Whom do you want to speak to? (this foreign scientist) 6. When will you see your science adviser? (on Tuesday) 7. What are you going to do? (to thank him) 8. Whose abstract will you read now? (your abstract)

21. Переспросите, выразив сомнение в справедливости услышанного.

T.: It is his abstract that we must discuss now.

St.: Is it *really* his abstract that you must discuss now?

Аудиторное занятие I

ГРАММАТИКА:

Понятие о причастии II

Времена группы *Indefinite (Passive)*

Словообразование с помощью суффиксов *ity, ate*

a) Суффикс существительного:

ity — equal — equality — равенство

b) Суффикс глагола:

ate — activ(e) — activate — активизировать

УПРАЖНЕНИЯ

1. Прочтите вслед за преподавателем.

unity, equality, simplicity;
to graduate, to stimulate, to regulate, to simulate, to formulate,
to navigate.

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

numeration [ˌnju:mə'reɪʃən] *n*
system ['sɪstəm] *n*
represent [ˌreprɪ'zent] *v*
group [gru:p] *n, v*
combination [ˌkɒmbɪ'neɪʃən] *n*
base [beɪs] *n*
sentence ['sentəns] *n*
equal [i:kwəl] *adj*
special ['speʃəl] *adj*
plus [plʌs] *n*
minus ['maɪnəs] *n*
sum [sʌm] *n*

basic ['beɪsɪk] *adj*
arithmetic [ə'riθmətɪk] *n*
multiplication [ˌmʌltɪplɪ'keɪʃən] *n*
multiply ['mʌltɪplaɪ] *v*
multiplier ['mʌltɪplaɪə] *n*
result [rɪ'zʌlt] *n, v*
product ['prɒdʌkt] *n*
expression [ɪks'preʃən] *n*
check [tʃek] *n, v*
contain [kən'teɪn] *v*

2. Прочтите вслед за преподавателем.

without [wið'au] без (предлог)
 everywhere ['evriweə] повсюду
 page [peɪdʒ] страница
 number ['nʌmbə] число, количество
 numeral ['nʌmərəl] цифра, символ числа
 use [ju:z] пользоваться, использовать
 use [ju:s] польза, применение
 digit ['dɪdʒɪt] цифра
 vary ['veəri] меняться, изменяться
 value ['vælju:] 1. *n* величина, значение; 2. *v* ценить
 thus [ðʌs] таким образом
 example [ɪg'zɑ:mpəl] пример
 each [i:tʃ] каждый
 equation [ɪ'kwɛɪʃən] уравнение, равенство
 sign [saɪn] 1. *n* знак; 2. *v* подписывать
 between [bi'twi:n] между
 say (said) [seɪ, [sed] сказать
 add [æd] складывать, прибавлять
 addend [ə'dend] слагаемое
 inverse [ɪn'vɜ:s] обратный
 subtract [səb'trækt] вычитать
 minuend ['mɪnjuənd] уменьшаемое

subtrahend ['sʌbtrəhend] вычитаемое
 difference ['dɪfərəns] разность, разница
 summand ['sʌmənd] слагаемое
 multiplicand [ˌmʌltɪplɪ'kænd] множимое
 division [dɪ'vɪʃən] деление
 divide [dɪ'vaɪd] делить
 dividend ['dɪvɪdənd] делимое
 divider [dɪ'vaɪzə] делитель
 think [θɪŋk] (thought) [θɔ:t] думать
 remember [re'membə] помнить
 above [ə'boʊv] над, выше, сверх
 which [wɪtʃ] который
 quotient ['kwɒʃənt] частное
 case [keɪs] случай, дело
 whole [hoʊl] целый
 zero ['ziərou] ноль
 part [pɑ:t] часть
 leave [li:v] (left) 1. уходить; 2. покидать, оставлять
 remainder [ri'meɪndə] остаток
 whenever [wen'evə] когда бы ни, всегда
 except [ɪk'sept] кроме, за исключением
 meaningless ['mi:nɪŋlɪs] не имеющий смысла
 factor ['fæktə] 1. *n* сомножитель; 2. *v* разложить на сомножители

Пояснения к тексту

*and so on — и так далее
 *numeration system — система счисления
 *Hindu-Arabic system — арабская система
 *over and over again — многократно, часто
 *in a special way — особым образом
 *place-value system — позиционная система разрядов
 *one and the same — одно и то же
 *for example — например
 the same thing — то же самое
 a way of thinking of ... — способ представить себе ...
 from the above — из вышесказанного
 as a result of — в результате

a whole number of times — целое число раз
 a part left over — остаток, оставшаяся часть
 in our case — в нашем случае
 check division by using multiplication — проверить деление, пользуясь умножением

2. Прочтите следующие группы слов. Обратите внимание на положение определения, выраженного Причастием II относительно определяемого слова.

The opened box ... —	The box opened by him ...
The translated text ... —	The text translated by her ...
The selected subject ... —	The subject selected by them ...

3. Прочтите, обращая внимание на функцию выделенных слов.

a) 1. I stopped the man — The man stopped by me was old.
 2. She translated the sentence — The sentence translated by her was easy.
 3. They developed a new system — The system developed by them is good.

b) The ideas developed showed that
 2. The combination used gave ...
 3. The operation performed answered ...
 4. The question asked showed ...
 5. The problem solved presented ...

c) find — I found the length — The length found by me equalled ...
 — The length was found by me (was not found);

cut — line cut that segment — The segment cut by a line contained ...
 — The segment is cut by the line (is not cut);

tell — She told me a story — The story told by her showed ...
 — The story was told by her;

take — He took correct steps — The steps taken by him ...
 Were correct steps taken?

give — The machine gave energy — The energy given by the machine will ...
 — Will energy be given by the machine?

write — They wrote the new words — The new words written by them ...
 — Were the new words written?

make — They made various machines. — Various machines made by them ...
 — What kind of machines will be made there?

do — We did our work — The work done by us was ...
 — How was the work done?

see — They saw a good film — The film seen by them was good
 — When was the film seen?

Задание I: 1. Лабораторные упражнения I—VII. 2. Домашние упражнения 4—6.

4. Прочтите предложение и напишите то же самое об указанном (в скобках) лице или предмете. Время действия остается неизменным.

T.: I was given a room in the hostel. (we).
 St.: We were also given a room in the hostel.

1. The boy was asked about his family. (she). 2. I am told to present my abstract. (he). 3. They were given very interesting examples during the lecture. (we). 4. He was asked to show the result of his work. (they). 5. Their results were used in his work. (my result). 6. Base ten numeration system is used. (base two). 7. Arithmetic is taught at school. (algebra and physics). 8. My article will be translated. (her). 9. All the books were left on the table. (the journal). 10. His result was checked. (our results).

6. *Возразите и уточните.*

T.: The first equation was solved. (the second).

St.: No, the first equation was not solved, but the second was.

1. The minus sign is contained in the expression. (the plus). 2. The product will be named. (the quotient). 3. The sum was checked. (the summands). 4. The last case is discussed. (the first). 5. The sign between the first and the second digit was changed. (between the second and the third). 6. In this case base two numeration system is used. (base ten). 7. I was told to solve another equation. (they). 8. They were shown how to handle the machine. (he).

Аудиторное занятие II

7. *Прочтите контрольное упражнение.*

pill, lie, white, kin, achieve, pile, prize, slight, wire, sing, set, mice, knife, still, wig, wine, sigh, ink, ill, witch, vine, fifth, sight, gin, whim, while, vie, field, fire, imagine, injury, service, girl, circuit, since, science, admire, mild, mill, bind, giant, bird, violet, thief, firm.

8. *Подтвердите услышанное.*

T.: He showed *them* the town.

St.: Yes, that's right. *They* were shown the town.

1. He asked *her* that question. 2. They sent *him* their article. 3. I showed *you* how to do it. 4. She told *him* about the conference. 5. I showed *him* the difference. 6. He will give *them* various examples. 7. She usually asks *me* a lot of questions. 8. We sent *her* the results of our work. 9. She will tell *them* about the new system. 10. He showed *me* that page.

9. *Переспросите (в форме Passive). Воспользуйтесь упр. 8.*

T.: He showed them that combination.

St.: Were they shown that combination?

10. *Переспросите, уточнив интересующую вас подробность.*

T.: He was told about it yesterday. (who, when).

St.: Who was told about it yesterday?

When was he told about it?

1. That combination was used in the new system. (what). 2. The quotient is found by division. (what). 3. All these questions are discussed by the students during the seminar. (by whom) 4. The results were checked by that scientist. (what) 5. Such numerals are easily multiplied. (what kind of numerals) 6. Another example will be given by the teacher. (what) 7. They were given those periodicals last week (who) 8. He was asked a lot of questions by the examiner during the exam. (by whom)

11. *Подтвердите или выразите сомнение.*

T.: I suppose he can translate, this article. (yes, no).

St.: Yes, *I am sure* this article can be translated.

I am not sure this article can be translated.

1. He can solve that equation. (yes). 2. You must do it next week. (no). 3. You could ask her that question. (yes). 4. He must use the new method in this case. (no). 5. I must check the result of division by multiplication. (yes). 6. You could check the result of subtraction by addition. (yes). 7. You can leave your bag on the desk. (no). 8. We must use these combinations of digits. (yes).

12. *Возразите и уточните.*

T.: We can get this book everywhere. (in the library).

St.: We cannot get this book everywhere. We can get it in the library.

1. It is page seven. (eight). 2. In the Hindu-Arabic system we use five digits. (ten). 3. The result of multiplication is called the difference. (product). 4. We get the sum as a result of subtraction. (difference). 5. Division and subtraction are inverse operations. (division and multiplication). 6. Addition and multiplication are inverse operations. (addition and subtraction) 7. He found the product. (the sum) 8. She usually solves many equations. (very few). 9. You must place the plus sign between these numerals. (minus). 10. We spoke about the new system. (the old method). 11. The remainder equals 5. (10) 12. She left her book at home. (in the classroom). 13. This expression is meaningless. (meaningful). 14. He remembers the whole process. (only a few operations). 15. The book contains interesting information. (well-known facts). 16. This problem must be solved in a special way. (in the usual way). 17. He said important things. (meaningless). 18. In the expression $2+3=5$ two and three are factors. (addends). 19. In the equation $7-4=3$ three is the minuend. (the difference). 20. In the mathematical sentence $10:2=5$ 10 is the divisor. (dividend).

13. *Прочтите за преподавателем слова урока. Прочтите текст урока про себя и скажите: о чем этот текст; каковы его основные положения.*

Four Basic Operations of Arithmetic

We cannot live a day without numerals. Numbers and numerals are everywhere. On this page you see number names. They are zero, one, two, three, four and so on*. And here are the numerals: 0, 1, 2, 3, 4 and so on. In a numeration system, numerals are used to represent numbers, and the numerals are grouped in a special way. The numbers used in our numeration system* are called digits.

In our Hindu-Arabic system* we use only ten digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 to represent any number. We use the same ten digits over and over again* in a place-value system* whose base is ten.

These digits may be used in various combinations. Thus 1, 2, and 3 are used to write, 123, 132, 213 and so on.

One and the same* number could be represented in various ways. For example*, take number 3. It can be represented as $2+1$, $4-1$ and so on.

A very simple way to say that each of the numerals names the same number is to write an equation—a mathematical sentence that has an equal sign (=) between them. For example, $3+4=5+2$, or $3-1=6-4$. The + is a plus sign. The — is a minus sign. We say three plus six equals five plus four, or three minus 1 is equal to six minus four.

Another example of an equation is $3+5=8$. In this equation three is an addend. Five is also an addend. Eight is the sum. We add three and five and we get eight.

There are four basic operations of arithmetic that you all know of. They are addition, subtraction, multiplication and division. In arithmetic an operation is a way of thinking about two numbers and getting one number. As you remember from the above in the operation of addition the two numbers with which you work are called addends or summands and the number that you get as a result of this operation is the sum. In subtraction again you use two numbers. In the equation $7-2=5$ seven is the minuend and two is the subtrahend. As a result of this operation you get the difference. We may say that subtraction is the inverse operation of addition since $5+2=7$ and $7-2=5$.

The same might be said about multiplication and division, which are also inverse operations.

In multiplication there is a number that must be multiplied. It is the multiplicand. There is also a multiplier. If we multiply the multiplicand by the multiplier we shall get the product as a result. When two or more numbers are multiplied, each of them is called a factor. For example, in the expression 5×2 (five multiplied by two), the 5 and the 2 will be factors. The multiplicand and the multiplier are names for factors.

In the operation of division there is a number that is divided and it is called the dividend; the number by which we divide is called the divisor. As a result of the operation of division we shall get the quotient.

In some cases the divisor is not contained a whole number of times in the dividend. For example, if you divide 10 by 3 you will get a part of the dividend left over. This part is called the remainder. In our case it will be 1.

Since multiplication is the inverse operation of division you may check division by using multiplication.

There are two very important facts that must be remembered about division.

a) The quotient is 0 whenever the dividend is 0 and the divisor is not 0. That is, $0 : n$ for all values of n except $n=0$.

b) division by 0 is meaningless. If you say that you cannot divide by 0 it really means that division by 0 is meaningless. That is, $n : 0$ is meaningless for all values of n .

Теперь, после того, как вы прочли текст, изложите в общих чертах его содержание (по-русски).

Задание II: 1. Лабораторные упражнения VIII—XIV. 2. Домашние упражнения 14—17.

14. а) Переспросите, выразив сомнение в справедливости сказанного.

T.: The result was checked.

St.: Was the result really checked?

б) Подчеркните сказуемое в написанном вами вопросе.

1. He developed this idea. The idea developed by him was interesting. This idea was developed by him. 2. The teacher helped his students. The students, helped by the teacher, did their work. The students were helped by their teacher. 3. They will use the same method. The method used was the same. The same method will be used by them. 4. We always plan our work. The work planned by us, must be done in time. The work was planned last week. 5. I placed the ready abstract on the table before him. The abstract, placed on the table, was ready. The abstract was placed on the table.

15. Напишите полный ответ на вопрос, воспользовавшись словом в скобках.

1. Where can such books be found? (everywhere). 2. What kind of numeration systems are there? (various). 3. On which page could these examples be given? (fifteen). 4. How many numerals were used in this system? (four). 5. Where did they represent the University? (at that conference). 6. How were these digits grouped? (in a special way). 7. What kind of combination will it be? (easy). 8. What kind of sentence is it? (mathematical). 9. What do you remember? (all the examples). 10. What is contained in that bag? (all my journals). 11. What was said during the lecture? (a lot of interesting things). 12. What sign will be placed between these numerals? (the plus sign). 13. Where were those articles left? (in my desk). 14. In what way do

these systems vary? (in many ways). 15. Who thinks that the work was successful? (everybody). 16. How can he show the difference? (quite easily).

16. Просмотрите текст и выпишите из него в логической последовательности предложения, отражающие главные его положения (в виде плана).

17. Будьте готовы передать основное содержание текста по-английски.

Аудиторное занятие III

18. Прочтите и догадайтесь о значении выделенных слов.

expression — *to express*; product — *production*; remainder — *to remain*; electric — *electricity*; population — *to populate*; to think — *thinker*; equal — *equally* — *to equate* — *equality*; combination — *to combine*; difference — *to differ* — *to differentiate* — *differential*; base — *baselless*; to hope — *hopeless* — *hopeful*.

Используйте каждое из выделенных слов в сочетании с одним-двумя словами, например: *to express* — *to express interest*.

19. Определите, каким членом предложения является выделенное слово (какую функцию оно выполняет).

1. The system *used* is new. 2. The students *used* another method to check the value. 3. The *use* of this kind of recording information was reasonable. 4. Various combinations were *used* in processing the data. 5. The *answer* given by the student was correct. 6. The famous scientist *answered* all our questions. 7. They *presented* the data. 8. The *present* situation is quite complicated.

20. Подтвердите сказанное преподавателем, не называя субъекта действия.

T.: They changed the subject.

St.: Yes, that is right (I am sure). The subject was changed.

21. Ответьте на вопросы преподавателя в связи с текстом.

22. Дополните начатые высказывания.

1. We cannot live a day without ... 2. In a numeration system numerals are used to ... 3. The numerals used in our numeration system are called ... 4. These digits are used in various ... 5. In our Hindu-Arabic system we use 6. An equation is a mathematical sentence that has ... 7. There are four fundamental ... 8. Addition is the inverse ... 9. Division is the inverse ... 10. The number which we must multiply is called ... 11. The number by which we multiply is ... 12. The result of the multiplication is called ... 13. In the expression $2 \times 3 = 6$, the 2 and the 3 ... 14. The number which we divide is ... 15. The number by which we divide is ...

23. а) Спросите вашего товарища или скажите ему по-английски.

1. Вы умеете пользоваться этой системой счисления? 2. Сколько цифр в нашей системе счисления? 3. Что является основой индо-арабской системы счисления? 4. Какое это уравнение? 5. Как мы можем получить разность этих двух чисел? 6. Существует четыре основных действия арифметики. 7. Я умею умножать. 8. Он не должен произвести действие деления. 9. В выражении $3 \times 2 = 6$ имеется два сомножителя. 10. В выражении $10 : 5 = 2$, 10 есть делимое, а пять есть делитель. 11. В выражении $9 - 4 = 5,5$ есть разность. 12. Выражение $9 - 5 = 8 : 2$ есть уравнение. 13. В этом действии деления есть остаток? 14. Вы можете разделить 9 на 2?

б) Попросите вашего товарища.

1. Напишите три различных числа. 2. Назовите два числительных. 3. Напишите уравнение. 4. Представьте, что вы должны вычесть это число из 356. 5. Сложите 35 и 284 и назовите сумму. 6. Найдите разность. 7. Напишите знак равенства между этими числами. 8. Напишите различные комбинации этих чисел.

24. Определите, каким членом предложения является выделенное слово (какую функцию оно выполняет) и какой частью речи оно является.

1. She *placed* her book on the table. There are many *places* where you can go. The box *placed* on the desk was open. The table must be *placed* here. 2. *Name* the students in the room. Did he tell you the boy's *name*? 3. They *studied* the thesis. The question was *studied*. Their *study* of the problem was important. The paper *studied* by him is interesting. 4. I was *questioned* in English. He *answered* my *question* rather well. His *answer* was not right. 5. We can *control* these processes. They performed reasonable *control* of the operation. 6. This machines can *record* information automatically. The data were *recorded* by the computer. He showed me his *records*. 7. These *changes* might be *programmed*. They *changed* the *program*. Their *program* will be *changed*.

Аудиторное занятие I

ГРАММАТИКА:

Местоимения *some, any, no, every*

Понятие о причастии I

Времена группы Continuous (Active)

Словообразование с помощью суффиксов

a) Суффиксы существительного:

ure (ture) — press — pressure — давление; culture — культура

ness — read(y) — readiness — готовность

b) Суффиксы прилагательного:

able — to us(e) — usable — способный, быть использованным; употребимый

ible — to convert — convertible — обратимый

УПРАЖНЕНИЯ

1. Прочтите вслед за преподавателем. Догадайтесь о значении выделенных слов.

close — closeness, to open — openness, useful — usefulness, helpless — helplessness, between — betweenness;

to read — readable, to solve — solvable, to present — presentable, to value — valuable, to use — usable;

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

philosopher [fi'ləsəfə] *n*

mathematician [mæθimə'tɪfən] *n*

binary ['baɪnəri] *adj*

actually ['æktʃuəli] *adv*

to calculate ['kælkjuleɪt] *v*

museum [mju:'ziəm] *n*

electronic [ɪlɪk'trɒnɪk] *adj*

to indicate ['ɪndɪkeɪt] *v*

extensively [ɪks'tensɪvli] *adv*

speed [spi:d] *n*

mechanical [mɪ'kænikəl] *adj*

electric [ɪ'lektrɪk] *adj*

position [pə'zɪʃən] *n*

extensive [ɪks'tensɪv] *adj*

familiar [fə'mɪliə] *adj*

symbol ['sɪmbəl] *n*

2. Прочтите вслед за преподавателем.

latter ['lætə] последний (из перечисленных)

build [bɪld], (built) строить

complicated ['kɒmplɪkeɪtɪd] сложный

correspond [kə'reɪs'pɒnd] соответствовать

correspondence соответствие

off [ɒf] *зд.* выключение

on [ɒn] *зд.* включение

circuit ['sə:kɪt] цепь, контур

high [haɪ] высокий, высоко

power [paʊə] 1. энергия, сила;

2. показатель степени

below [bi'ləʊ] ниже, под

squared ['skwɛəd] в квадрате

switch [swɪtʃ] 1. *v.* переключать; 2. *n* переключатель

account (for) [ə'kaʊnt] объяснять

notation [nou'teɪʃən] обозначение

recently ['ri:səntli] недавно

therefore ['ðeəfɔ:] поэтому

because [bi'kɔ:z] так как; потому, что

advantage [əd'vɑ:ntɪdʒ] преимущество

disadvantage [disəd'vɑ:ntɪdʒ] недостаток

as [æz] 1. как; 2. так как; 3. по мере того как

Пояснения к тексту

* *some centuries before ...* — около трех столетий назад

* *in some of the host complicated* — в некоторых наиболее сложных

ных

* *as shown below* — как показано ниже

* 2^3 — two cubed or two to the third power

* 2^2 — two squared

* 1×2^3 — one multiplied by two to the third power

* *is the simplest ...* — самый простой

* *well familiar with ...* — хорошо знакомы с

* *the system has the advantage (disadvantage) of having ...* — система обладает тем преимуществом, что она имеет

* *many more* — гораздо больше

* *look like ...* — похожи на

2. Прочтите, обращая внимание на различные значения и употребление местоимений и наречий в предложениях.

утвердительных:

→ one (body)

some + → thing

→ where

1. I have got some time. 2. Some research laboratory will be built here. 3. We shall study some new subjects. 4. He has something to discuss with you. 5. Somebody must speak at this conference. 6. I saw this publication somewhere yesterday. 7. Someone gave an example. 8. Some 10 students attended the seminar.

вопросительных:

any +
 → one (body)
 → thing
 → where

отрицательных:

no +
 → one (body)
 → thing
 → where

not + any +
 → one (body)
 → thing
 → where

every +
 → one (body)
 → thing
 → where

1. Is there *any* remainder? 2. Have they *any* complicated problems? 3. Do you study *any* foreign language? 4. Did *anybody* attend the lecture last week? 5. Will you go *anywhere* tomorrow? 6. Does *anyone* of you speak English? 7. Did he find *anything* as a result of this operation?

1. They have *nothing* to tell you. 2. *Nobody* is going to do research in this field now. 3. *No one* is familiar with this complicated system. 5. *Nothing* certain was known about his appointment. 5. She could find his abstract *nowhere*. 6. He has *no* research adviser. 7. *No* computer can think.

1. I do *not* know *anything* about the binary system. 2. He does *not* deal with *any* problems of topology. 3. She did *not* have *any* publications. 4. There is not *anybody* here who knows this subject. 5. He *did* not answer *any* of my questions. 6. She does not remember *anything*.

Everyone (body) attended his lecture. Does he know *everything*? You can find this book *everywhere*.

3. Прочтите, обращая внимание на функцию Participle I. В каждом случае определите место подлежащего и сказуемого.

1. read — reading — *reading* a book he made notes — the boy *reading* a book is my brother — the boy is *reading* a book
2. speak—speaking— *speaking* at the conference he said some interesting things — the man *speaking* to professor is our teacher — the man is *speaking* to professor A.
3. write—writing — *writing* the equation he said ... — the boys *writing* the dictation are our students—the boys are *writing* the equations
4. develop — develop-
ing — *developing* the new system we expect to get good results — the man *developing* these ideas is a famous scientist — the man was *developing* his ideas

4. Прочтите данные ниже предложения.

a) Сравните и объясните употребление Indefinite и Continuous.

I like to read books.	I am reading a book now.
He speaks English.	He is speaking German now.
She went home after her work.	She was going home when she saw him.
You had a seminar yesterday.	You were having a seminar at 3 o'clock.
We shall discuss various aspects of the problem tomorrow.	We shall be discussing them this time tomorrow.
He gives us lectures on topology.	Tomorrow from 9 to 11 o'clock he will be giving us a lecture on topology.

b) Обратите внимание на структуру вопросительных предложений и краткие ответы.

Are you calculating the value?	→ Yes, I am.
Were they discussing the advantages of the system?	→ No, I am not.
Will he be reading his paper at the conference at 5 o'clock?	→ Yes, they were.
	→ No, they were not.
	→ Yes, he will.
	→ No, he will not.

c) Обратите внимание на построение отрицательной формы.

I am not adding these two numerals now.
He was not speaking about his thesis when I came in.
They will not be holding a seminar this time tomorrow.

Задание I: 1. Лабораторные упражнения I—XI. 2. Домашние упражнения 5, 6.

5. Замените русское слово в скобках английским словом.

1. She said (ничего) about her dissertation. 2. Was there (что-нибудь) interesting in that article? 3. (кто-то) came into the room. She was going to ask (кого-нибудь) to help her. 5. (Каждый) knows that this machine is very complicated. 6. You must go (куда-нибудь) for your vacation. 6). Have you got (что-нибудь) important to say? 7. (Никто) could perform that operation. 8. Did you find the same result (где-нибудь). 9. Was there (какой-нибудь) sign between these numerals? 10. (Все) must be done in time. 11. (Ни-

что) must be left in the house. 12. (Каждый) post-graduate must take exams in (несколько) subjects. 13. He is doing (ничего). 14. They are discussing (что-то). 15. They were going (куда-то) when I saw them.

6. *Задайте вопрос, ответом на который является данное предложение.*

1. He usually passes his exams successfully because he works a lot. 2. We discussed the advantages and the disadvantages of the new method recently. 3. As the machine is not complicated he could operate it. 4. They used mechanical power in the nineteenth century. 5. They are going to build a new computer in a few months. 6. The machine is working at high-speed now. 7. This famous scientist began his research in the latter part of the eighteenth century. 8. Electric power runs these machines. 9. Everybody is familiar with many of the great scientific developments of the twentieth century. 10. He went to some museum two days ago. 11. As soon as they build the new house my family will live in it. 12. There is a certain correspondence between their results. 13. I cannot account for his position. 14. When you read the text below you will find some new words. 15. I was thinking about him when he came. 16. Usually, from 5 till 8 o'clock in the evening he is working in the library.

Аудиторное занятие II

7. *Прочтите контрольное упражнение.*

typist, system, cycle, ready, yard, why, Egypt, myth, thirty, empty, type, cry, apply, imply, dirty, body, city, yell, vary.

8. а) *Переспросите. Воспользуйтесь упр. 2 (а).*

T.: I have got *some* books.

St.: Have you got *any* books?

б) *Ответьте утвердительно, а затем отрицательно.*

Воспользуйтесь упр. 2 (б):

T.: Did he give her *any* data?

St.: Yes, he gave her *some* data.

No, he did not give her *any* data.

в) *Возразите. Воспользуйтесь упр. 2 (с) (1, 2).*

T.: He has got *nothing* in his bag.

St.: I am sure he has got *something* in his bag.

9. *Прочтите и измените время в соответствии с обстоятельствами: 'at that time', 'when he came', 'when I saw her', 'now', 'at 7 o'clock', 'from eight till half past nine', 'when I saw him'.*

T.: I usually work in the lab.

St.: I am working in the lab *from three till four*.

1. He always spoke English. 2. We shall have a lecture tomorrow. 3. They had their German class yesterday. 4. She usually asks many

questions. 5. They took their exam two days ago. 6. He reads much. 7. They wrote a very good program. 8. He told me about it last week.

10. *Определите функцию выделенного слова.*

The *calculating* machine is complicated. 2. The student *making* a report is one of our post-graduates. 3. The students *having* an English lesson are in the next room. 4. *Having* no time I could not speak to him. 5. *Studying* this problem he found something very interesting. 6. *Taking* the abstract from him I thanked him. 7. *Using* some familiar symbols he spoke about a new system of notation. 8. Many machines using atomic power must be built in future. 9. *Switching* on the circuit he started the machine. 10. They used symbols *corresponding* to symbols familiar to everybody.

11. *Переспросите и уточните.*

T.: I am familiar with Markov's works. (whose).

1st st.: *Whose* works are you familiar with?

2nd st.: *Markov's*.

1. Albert Einstein was a great philosopher and a mathematician. (what). 2. He lived in the twentieth century. (when). 3. The binary system is another name for the base two system. (which system). 4. Modern machines work at very high speed. (what kind of machines). 5. These ideas are extensively developed. (how). 6. The instrument uses mechanical power. (what kind of). 7. These ideas were developed only recently. (when). 8. We actually changed the whole system. (who). 9. This method has certain advantages. (what). 10. The minus sign indicates that the work cannot be started. (what). 11. The plus sign indicates that the machine is operating well. (what). 12. I cannot account for this fact. (who). 13. His brother failed in his examination therefore he must take it again. (why). 14. He cannot tell you anything because he has no information. (why).

12. а) *Прочтите вслед за преподавателем слова урока. б) Прочтите текст и скажите: о чем говорится в данном тексте, какие основные моменты нашли отражение в тексте.*

Base Two Numerals

During the latter part of the seventeenth century a great German philosopher and mathematician Gottfried Wilhelm von Leibnitz (1646—1716), was doing research on the simplest numeration system. He developed a numeration system using only the symbols 1 and 0. This system is called a base two or binary numeration system.

Leibnitz actually built a mechanical calculating machine which until recently was standing useless in a museum in Germany. Actu-

ally he made his calculating machine some 3 centuries before * they were made by modern machine makers.

The binary numeration system introduced by Leibnitz is used only in some of the most complicated * electronic computers. The numeral 0 corresponds to *off* and the numeral 1 corresponds to *on* for the electrical circuit of the computer.

Base two numerals indicate groups of ones, twos, fours, eights, and so on. The place value of each digit in 1101_{two} is shown by the above words (on or off) and also by powers of 2 in base ten notation as shown below *.

...2 ³ *	2 ²	2 ¹	1
Eights	Fours	Twos	Ones
1	1	0	1

The numeral 1101_{two} means'
 $(1 \times 2^3) + (1 \times 2^2) + (0 \times 2) + (1 \times 1) = (1 \times 8) + (1 \times 4) + (0 \times 2) + (1 \times 1) = 8 + 4 + 0 + 1 = 13$
 Therefore $1110_{\text{two}} = 13$.

A base ten numeral can be changed to a base two numeral by dividing by powers of two.

From the above you know that the binary system of numeration is used extensively in high-speed electronic computers. The correspondence between the two digits used in the binary system and the two positions (on and off) of a mechanical switch used in an electric circuit accounts for this extensive use.

The binary system is the simplest* place-value, power-position system of numeration. In every such numeration system there must be symbols for the numbers zero and one. We are using 0 and 1 because we are well familiar with * them.

The binary numeration system has the advantage of having* only two digit symbols but it also has a disadvantage of using many more digits to name the same numeral in base two than in base ten.

$$476 = 111011100_{\text{two}}.$$

It is interesting to note that any base two numeral looks like a numeral in any other base. The sum of 10110 and 1001 appears the same in any numeration system, but the meaning is quite different.

10110_{two}	10110_{ten}	10110_{seven}
$+ 1001_{\text{two}}$	$+ 1001_{\text{ten}}$	$+ 1001_{\text{seven}}$

Задание II: 1. Лабораторные упражнения X—XIII. 2. Домашние упражнения 13—15.

13. *Задайте вопрос, ответ на который заключается в данном предложении.*

1. The binary numeration system is used in various computers.
2. In the nineteenth century such machines used mechanical power.
3. He showed the result of his calculation. 4. The plus and the mi-

nus signs are symbols. 5. Mathematics uses symbolic language. 6. Atomic power was not used until recently. 7. They are going to build a high-speed computer. 8. The method used was rather complicated. 9. Two cubed is the same thing as two to the third power. 10. You will find this information in the article below. 11. I could not account for this result. 12. The advantages and the disadvantages of this system will be discussed below. 13. I am familiar with his work, therefore I advise you to look through this article. 14. He cannot say anything because he does not know your position. 15. This machine is extensively used.

14. *Сократите текст, оставив лишь самое существенное для понимания его содержания.*

15. *Вы должны быть готовы передать по-английски основное содержание текста.*

Аудиторное занятие III

16. а) *Прочтите и, пользуясь знанием суффиксов, скажите, к какой части речи относятся данные слова.*

builder, calculate, calculation, indicator, indication, equality, useless, symbolic, notation, advantageous, powerful, classical, sameness, actually, correspondence, familiarity, activate, inversely, production, container, wholeness, baseless, physical, specially, successful, presence, appointment.

б) *Употребите каждое слово в сочетании с другими словами.*

17. *Ответьте на вопросы.*

T.: He is a philosopher, and they? (математики).

St.: I suppose they are mathematicians.

1. They use the base four system, and he? (двоичную) 2. This machine uses atomic energy, and the old machines? (механическую) 3. He went to the library after his classes, and they? (в музей) 4. The new method has a lot of advantages, and the old method? (некоторые недостатки) 5. We became familiar with this system of notation a long time ago, and they? (только недавно) 6. The black switch indicates *on*, and the red switch? (выключено) 7. The method developed by that group of scientists is quite easy, and the old method? (довольно сложный) 8. This great scientist lived two hundred years ago, and Einstein? (в двадцатом веке)

18. *Ответьте на вопросы преподавателя в связи с текстом.*

19. *Дополните данные высказывания.*

1. Leibnitz was doing research on ... 2. He developed a numeration system using ... 3. This system is called ... 4. Leibnitz actually ... 5. The binary numeration system is used only in ... 6. The numeral 0 corresponds to ... 7. The numeral 1 corresponds to ... 8. Base

two numerals indicate ... 9. A base two numeral can be changed to...
10. We are using 0 and 1 because we ...

20. Скажите или спросите по-английски.

1. Когда Лейбниц изучал простейшую систему счисления?
2. Сколькими символами он пользовался для своей системы счисления?
3. Эта система называется двоичной, так как она использует только две цифры.
4. По существу он создал вычислительную машину три века назад.
5. Какого рода вычислительные машины строят современные ученые?
6. Чему соответствует число 0 в этой системе?
7. Число 1 означает включение.
8. Современные электронные счетные машины очень сложны.
9. Число 1101 в двоичной системе соответствует числу 13 в десятичной системе.
10. В любой системе счисления должны быть цифры 1 и 0.
11. Двоичная система имеет некоторое преимущество.
12. Каковы недостатки этой системы?

LESSON ELEVEN

Аудиторное занятие I

ГРАММАТИКА:

Времена группы *Continuous (Passive)*
Словообразование с помощью суффиксов
th, age, ure, ify, ize, ive

- a) Суффиксы существительного:
th — long — length — длина
age — to know — knowledge — знание
ure — to close — closure — замкнутость
- b) Суффиксы глагола:
ify — simpl(e) — to simplify — упрощать
ize — symbol — to symbolize — символизировать
- c) Суффиксы прилагательного:
ive — effect — effective — эффективный

УПРАЖНЕНИЯ

1. Прочтите вслед за преподавателем.

long — length, wide — width, deep — depth, strong — strength;
to use — usage, to pass — passage, to know — knowledge;
closure, measure, exposure;
activize, specialize, summarize;
amplify, unify, exemplify;
effective, primitive, progressive, active, associative.

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

natural ['nætʃərəl] adj
unique [ju:'ni:k] adj

uniqueness [ju:'niknis] n
to produce [prə'dju:s] v

general ['d, enərel] *adj*
element ['element] *n*

axiom ['æksjəm] *n*
discussion [dis'kʌʃn] *n*

2. Прочтите вслед за преподавателем.

property ['prəpəti] свойство
closure ['klouzə] замкнутость
follow ['fəlu] следовать (за),
сопровождать
under ['ʌndə] под, при (пред-
лог)
statement ['steitmənt] утверж-
дение, заявление
notice ['nəʊtɪs] замечать
exist [ɪg'zɪst] существовать
existence [ɪg'zɪstəns] существо-
вание
both [bəʊθ] оба
imply [ɪm'plai] 1. заключать в
себе; 2. иметь в виду, означать
define [di'fain] определять
definition [defɪ'nɪʃən] определе-
ние
instead [ɪn'sted] вместо
asterisk ['æstərɪsk] звездочка
(в обозначениях)

consider [kən'sɪdə] считать, рас-
сматривать
necessarily ['nesɪsərɪli] обяза-
тельно
necessary ['nesɪsəri] необходи-
мый
true [tru:] истинный, справед-
ливый
appear [ə'piə] появляться
denote [di'nəʊt] обозначать
impossible [ɪm'pɒsɪbl] невоз-
можный
point out [pɔɪnt aʊt] отмечать
pair [peə] пара
accept [ə'ksept] принимать
proof [pru:f] доказывать
hence [hens] следовательно, от-
сюда
capital ['kæpɪtəl] заглавный,
важный

Пояснения к тексту

* *Following are other examples* — далее следуют другие приме-
ры.

* *Both ... and* — и ... и; как ... так и

* *In general* — вообще

* *as follows* — как следует далее

* *A capital* — заглавное А

* *operation* * = operation asterisk — действие, обозначенное
звездочкой

* *It must be pointed out* — следует отметить

2. Сравните следующие пары предложений.

- a) 1. She is multiplying these numerals. — These numerals are being mul-
tiplied.
2. You are checking the result. — The result is being checked.
3. They were developing their ideas. — Their ideas were being develo-
ped by others.
4. We are building computers. — Computers are being built eve-
rywhere.
b) 5. Was your paper being discussed when you came? — My paper was not being discus-
sed at that time.

6. Were the texts being translated during the lesson? — The texts were not being trans-
lated during the lesson.
7. Is the axiom being proved by him? — The axiom is not being proved.
8. Are your plans being changed? — My plans are not being chan-
ged.
c) 9. What are they constructing here? — What is being constructed he-
re?
10. How were they operating the machine? — How was the machine being
operated?
11. Who is asking the student? — Who is being asked by the te-
acher?
d) 12. They were given English lessons last year. — They were being given a lesson
when we came.
13. This article is translated. — The article is being translated
now.

Задание I. 1. Лабораторные упражнения I-V. 2. Домашние
упражнения 3-5.

3. Прочтите предложения и задайте вопрос, уточняющий ка-
кую-нибудь подробность.

T.: This problem is being discussed. (where).

St.: Where is the problem being discussed?

1. The students were being informed about the meeting. (by
whom). 2. The conference is being held now. (where). 3. Such meth-
ods are being developed. (why). 4. The results were being checked
at 6 o'clock. (how). 5. The computer was being placed there when
they entered. (what).

4. Замените слова в скобках их английскими эквивалентами
(столбик справа), употребив при этом соответствующее число, ли-
цо, время.

to take the
exam
to be
to follow
to accept
to try
to study
to exist
to consider
there+be
to give
to develop
to have
to imply

1. Three and four (являются) natural num-
bers. 2. They (последуют) my example. 3. The
new method (был принят) by our laboratory.
4. There (существуют) a few proofs of this
problem. 5. He (попытался) to prove that he
was right. 6. We (рассмотрели) all
these questions during the conference.
7. All the elements of the machine (будут изу-
чены). 8. This statement (заклучает в себе)
the closure property. 9. The general ideas (бы-
ли разработаны) during the discussion. 10.
(Существуют) a few definitions of this proper-
ty. 11. In this lecture the definitions of closure
and uniqueness (были даны). 12. They (сда-
вали экзамен) when I entered.

5. Переспросите.

1. This property is very important. 2. There are various definitions of this property. 3. The students followed their teacher. 4. The experiment was followed by an article in the mathematical journal. 5. Such a computer exists. 6. The existence of these machines is a fact. 7. He could prove his statement. 8. The proof of this problem is very complicated. 9. He took the book instead of the journal. 10. He finds it impossible to prove his statement. 11. I noticed a mistake in the text. 12. It is necessary to do something.

Аудиторное занятие II

6. Прочтите контрольное упражнение.

round, joke, brown, rose, worth, low, logic, come, course, fought, sock, soak, for, showed, shot, odd, ode, cook, wrong, some, knot, goat, got, go, soon, wrote, rod, hobby, noble, code, ought, wood, took, form, work, more, slow, your, you, young, ground, down, amount, power, account, shower, our, month, joint, over, toy, point, foil, rough, enough, hold.

7. Переспросите, уточнив интересующую вас подробность.

T.: The property is being defined. (how)

St.: How is the property being defined?

1. The proof is being given. (how) 2. The man is being followed. (by whom) 3. The axiom was being considered. (when) 4. The statement was being made. (how) 5. The closure, the uniqueness, and the existence properties are being defined. (which properties) 6. Both elements were being examined at the same time. (how) 7. All the necessary information is being produced. (what) 8. These natural numbers are being multiplied. (in what way)

8. a) Определите сказуемое в предложении. b) Задайте вопрос, ответ на который содержится в данном предложении.

1. He is defining the value of "b". 2. The statement need not be made during the conference. 3. This important fact must be pointed out. 4. The first article was followed by a few other articles. 5. All the necessary information is being sent to them. 6. It is impossible to give another definition of it. 7. This statement implies the following. 8. Some symbol can be used instead of these words. 9. The method developed appeared complicated. 10. You may easily notice this property of the given element. 11. The information produced showed interesting results. 12. There are a few axioms that everybody knows. 13. It is the general definition that I expect from you. 14. His words were accepted without proof. 15. The article translated by him appeared in the newspaper last week.

9. Возразите.

1. They discussed the property of closure. 2. There are some general definitions in this paper. 3. These are true statements of arithmetic. 4. She follows his example. 5. The definition is being considered. 6. This property was noticed by somebody. 7. It is necessary to find the result today. 8. It is true. 9. There appeared some articles on the subject. 10. Other facts must be pointed out. 11 Give some other example of natural numbers. 12. Everybody accepts this axiom. 13. The existence property is being implied in the given definition. 14. There exist a few machines of this kind. 15. The given element may be denoted by the same symbol.

10. a) Прочтите вслед за преподавателем слова урока. b) Прочтите текст урока и скажите: о чем в нем сообщается; каковы основные моменты, изложенные в тексте.

Closure Property

If we add two natural numbers, the sum will also be a natural number. For example, 5 is a natural number and 3 is a natural number. $5+3=8$ and only 8.

The sum, 8, is also a natural number. Following are other examples * in which two natural numbers are being added and the sum is another natural number. $19+4=23$ and only 23; $6+6=12$ and only 12; $1429+357=1786$ and only 1786. Actually if any two natural numbers are being added, the sum again is a natural number. Since this is true we say that the set of natural numbers is closed under addition. This is a statement of closure, one of special properties of addition.

Notice that we can name the sum in each of the above equations. That is, the sum of 5 and 3 exists, or for example, there is a number which is the sum of 19 and 4. In fact the sum of any two numbers exists. This is called the existence property.

Notice also, that when 5 and 3 are being added the sum is 8 and only 8 and not some other number. Since there is one and only one sum for $19+4$, we say that the sum is unique. This is called the uniqueness property.

Both existence and * uniqueness are implied in the definition of closure.

If a and b are numbers of a given set, then $a+b$ is also a number of that same set. For example, if a and b are any two natural numbers, then $a+b$ exists, it is unique, and it is again a natural number.

If we use the operation of subtraction instead of the operation of addition, we cannot make the statement we made above. If one natural number is being subtracted from another natural number the

result produced is sometimes a natural number, and sometimes not. $11-6=5$ and 5 is a natural number. $9-9=0$ and 0 is not a natural number.

Consider the equation $4-7=n$. It cannot be solved if we must have a natural number as an answer. Therefore, the set of natural numbers is not closed under subtraction.

When two natural numbers are being multiplied there is always a natural number which is the product of the two numbers. Every pair of natural numbers has a unique product which is again a natural number. Thus the set of natural numbers is closed under multiplication.

In general *, the closure property may be defined as follows *: if x and y are any elements, not necessarily the same, of set A and * (asterisk) denotes an operation *, then set A is closed under the operation * if $(x*y)$ is an element of set A .

It must be pointed out * that it is impossible, to find the sum or the product of every possible pair of natural numbers. Hence, we accept the closure property without proof, that is as an axiom.

Задание II: 1. Лабораторные упражнения VI—X. 2. Домашние упражнения 11—13.

11. Задайте вопрос по содержанию предложений.

1. If we add two natural numbers, we shall get a natural number as a result. 2. He gave the following example. 3. I followed his example. 4. It is true that this method must be used. 5. He made a very important statement. 6. This is the closure property. 7. Some special properties of these elements were examined. 8. Such problems exist. 9. The existence of such factors was considered during the seminar. 10. He gave the general idea. 11. He uses both methods in his work. 12. It is impossible to make the necessary calculations now. 13. They produced high-speed computers last year. 14. This definition is true in case of natural numbers.

12. Составьте план текста в виде коротких назывных предложений.

13. Будьте готовы передать по-английски основное содержание текста.

Аудиторное занятие III

14. Прочтите и скажите, к какой части речи относятся слова, данные ниже. Дайте их русские эквиваленты.

length, usage, knowledge, specify, minimize, actively, productive, productivity, localize, primitive, effectiveness, symbolic, measure, producer, generalize, generalization, activity, appearance, acceptable, impossibility, follower, useful, helpless.

15. Переспросите преподавателя, уточнив интересующую вас подробность.

16. Ответьте на вопрос преподавателя в связи с текстом.

17. Дополните начатое высказывание (в связи с текстом).

1. Actually if any two natural numbers are being added the sum is ... 2. This is a statement of ... 3. Since there is one and only one sum for $19+4$, we say ... 4. Both existence and uniqueness are implied ... 5. If a and b are numbers of a given set, then $a+b$ is ... 6. If we use the operation of subtraction instead of the operation of addition we cannot ... 7. If one natural number is being subtracted from another ... 8. When two natural numbers are being multiplied ... 9. Every pair of natural numbers has ... 10. It is impossible to find the sum or the product of every ...

18. Скажите по-английски.

1. Сумма двух натуральных чисел есть тоже натуральное число. 2. Поскольку это справедливо, мы говорим, что это замкнутое множество. 3. Свойство замкнутости есть одно из свойств сложения. 4. По существу сумма любых двух чисел существует. 5. Поскольку имеется одна и только одна сумма, когда мы складываем любые 2 числа, мы говорим, что сумма этих двух чисел однозначна (единственная). Если мы будем совершать действие вычитания, мы не сможем говорить об однозначности. 7. Рассмотрим уравнение $4-7=n$. 8. Следовательно, множество натуральных чисел не является замкнутым при вычитании. 9. Вообще, свойство замкнутости может быть определено следующим образом. 10. Следовательно, мы принимаем свойство замкнутости как аксиому, без какого-либо доказательства.

Аудиторное занятие I

ГРАММАТИКА:

Эквиваленты модальных глаголов

Словообразование с помощью приставок *in, im, un, dis, re*

a) Отрицательные приставки:

in — definite — indefinite — неопределенный

im — possible — impossible — невозможный

un — usual — unusual — необычный

dis — to like — to dislike — не любить

b) Приставка, означающая повторное действие:

re — to write — to rewrite — переписывать

УПРАЖНЕНИЯ

1. Прочтите вслед за преподавателем.

inactive, informal, dislike, disappear, disprove, unnecessary, unnatural, immoral, immorality, incorrect, inequality, unequal, insoluble, disproportion, replace, remake, reread, reproduce, reappear.

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

associative [ə'souʃiətɪv] adj summarize ['sʌməraɪz] v form [fɔ:m] n, v

2. Прочтите вслед за преподавателем.

concern [kən'sɜ:n] касаться, иметь отношение

none [nʌn] никто, ничто

single ['sɪŋɡl] один, единственный

common ['kɒmən] общий, обычный

even ['i:vən] 1. даже; 2. четный

odd [ɒd] нечетный

ought [ɔ:t] следовало бы, следует

should [ʃʊd] следует

able [eɪbl] способный, be able быть способным, быть в состоянии

allow [ə'laʊ] разрешить

agree [ə'ɡri:] соглашаться

omit [ə'mɪt] опускать, пропускать

namely ['neɪmli] а именно

regardless (of) [rɪ'ɡɑ:dɪs] независимо от

order ['ɔ:də] 1. n порядок; 2. v упорядочить

just [dʒʌst] как раз, именно

previous ['pri:vɪəs] предыдущий

exercise ['eksəsaɪz] упражнение

probably ['prɒbəbli] вероятно

factor ['fæktə] разлагать на множители

further ['fɜ:ðə] далее, дальнейший

turn [tɜ:n] 1. очередь; 2. поворачивать

already [ɔ'l'redi] уже

itself [ɪt'self] сам, себе, само

themselves [ðem'selvz] сами

Пояснения к тексту

* *are (not) concerned with* — (не) связаны с, (не) имеют отношения

* *let us agree* — давайте договоримся

* *common to all* — присущее всем

* *Regardless of the order* — независимо от порядка

* *that is* — то есть

* *0 times 5* — 0, умноженное на 5

* *more than* — более чем

* *when naming* — называя; когда мы называем

* *in turn* — в свою очередь

* *none of these* — ни один из них

* *other than* — отличные от; иные; кроме

* *with the exception of* — за исключением

2. Прочтите данные предложения, обращая внимание на оттенки значения, передаваемые эквивалентами модальных глаголов 'can', 'must', 'may'.

a) *to be able to*: 1. We are able to find the necessary data. 2. He was able to give only a general definition. 3. Shall we be able to consider the advantages of the method developed? 4. Was he able to find the difference? 5. She is not able to give the definition of closure. 6. They will not be able to check the result.

b) *to have to*: 1. She has to present her paper next month. 2. They will have to use the binary system of notation. 3. He had to prove his statement. 4. Did you have to accept their plan? 5. Does she have to deal with that subject? 6. Will you have to check division by multiplication? 7. He does not have to produce this information. 8. She will not have to answer all the questions.

c) *to be to*: 1. I am to write an abstract of my thesis. 2. He was to speak at the conference. 3. Am I to give you only the general idea of our work? 4. Was he to show them the result of their recent

research? 5. You are not to agree to this plan without discussion. 6. She is not to attend tomorrow's lecture.

d) *ought to*: 1. You ought to find time to help them. 2. He ought not to tell her such things. 3. She ought to agree with him. 4. You ought not to go there again.

e) *should*: 1. Scientists should develop this important branch of mathematics. 2. You should think about what you are saying. 3. He should not go there so late. 4. Should we accept everything you say without proof?

f) *to be allowed to*: 1. He was allowed to attend the seminar. 2. She will be allowed to take exams next week. 3. Were they allowed to change the order of their work? 4. We were not allowed to work in the laboratory on that day.

Задание I: 1. Лабораторные упражнения I—VII. 2. Домашние упражнения 3, 4.

3. Прочтите предложения и задайте вопрос, воспользовавшись вопросительным словом в скобках.

1. She had to agree with him. (why) 2. We were to write that test during the previous lesson. (what kind of) 3. He was able to turn the switch. (how) 4. You are to multiply these prime numbers. (how) 5. She has to summarize the results. (when) 6. You should know the associative property. (why) 7. He is to group all the even numbers on the one side (how) 8. He ought to read his paper at the seminar. (who) 9. He should find a common language with them. (how) 10. You are to omit all the odd numbers. (why) 11. Regardless of what he thinks he has to agree. (why) 12. We were to use only composite numbers. (what kind of) 13. Everybody without exception has to write the translation at home. (why) 14. He was able to come just in time. (how) 15. They should already know the results. (which results) 16. You ought to go further with these experiments. (who)

4. Замените слова, данные в скобках, их английскими эквивалентами. Затем напишите предложения в отрицательной форме.

to change
to contain
to turn
to consider
to omit
to concern
to place
to agree
to be meaningless
to summarize

1. The association property (было рассмотрено) during the previous seminar. 2. These elements (содержат) some common properties. 3. We (должны будем изменить) the subject of our discussion. 4. He (пропустил) a few words in his translation yesterday. 5. You (должны перевернуть) the page and read. 6. This problem probably (касается) you. 7. You should (сделать обзор) all these articles. 8. All the even and odd numbers (были помещены) on both sides of the vertical line. 9. He (соглашается) to answer my questions. 10. Further work (имеет смысл).

Аудиторное занятие II

5. Прочтите контрольное упражнение.

judge, cut, surface, current, useful, usual, pure, during, up, nut, burn, put, blue, unit, true, us, fur, push, curious, curcus, cute, rule, mule, user, fuss, bulb, clue, club, urgent, further, number, numeral, cure, full, such, furnish, tube.

6. Воспользуйтесь упражнением (2 а, b, с). Для каждого предложения дайте недостающие формы (утвердительную, отрицательную или вопросительную).

T.: They are able to work in the lab.

St.: Are they able to work in the lab?

They are not able to work in the lab.

7. Воспользуйтесь упр. 3 и задайте вопросы, ответы на которые содержатся в предложениях данного упражнения.

8. Возразите.

T.: They agreed to come.

St.: No, they did not agree to come.

1. We are going to discuss some common properties of numbers. 2. You are using a set of even numbers. 3. This property is common to all odd numbers. 4. She agreed to omit these words. 5. They are concerned with atomic physics. 6. He remembered the associative property of multiplication. 7. He will speak when his turn comes. 8. We shall discuss composite numbers next time. 9. The given expression contains three single numbers. 10. There are only prime numbers in this mathematical sentence. 11. This statement is concerned with the closure property. 12. He is concerned with mathematics. 13. She has something in common with him. 14. He gave an example of a composite number. 15. I could associate these two properties. 16. He had to agree with me. 17. We shall go further at the next seminar. 18. We followed the order accepted during the previous discussion. 19. It is possible to omit these signs. 20. He will probably have to use these symbols.

9. Назовите сказуемое в каждом предложении упр. 8.

10. Прочтите слова урока вслед за преподавателем.

Прочтите данный ниже текст и а) скажите, о чем этот текст; б) читая текст, выделите основные моменты, содержащиеся в нем.

Whole Numbers

Many statements in mathematics are concerned not with * a single number but with a set of numbers that have some common property. For example, such a set of numbers is the set of even numbers

0, 2, 4, 6, ... or the set of odd numbers 1, 3, 5, 7, ... What property is common to all * even numbers? What property is common to all odd numbers?

You ought to know that the result of multiplication is called a product, and that the numbers to be multiplied are called factors. When you write $6 \times 3 = 18$ it means that you write number 18 as a product of two whole-number factors. Another pair of whole-number factors will be 9 and 2. Since $9 \times 2 = 18$. Will you be able to name other factors of 18?

Because $6 \times 3 = 3 \times 6$ let us agree * to call 6 and 3 just one pair of factors of 18.

When you use 0 as one of the factors, what should the product be? That is, 0 times 5* equals what number? or 7 times 0 equals what number? The answers for these questions are summarized in the following statement: For any number a , $ax0=0=xa$.

In some cases when we have to name a whole number in factorial name more than * two factors can be used. We can, for example, name 60 as the product of 3 factors.

Since multiplication is associative, we know that $(3 \times 4) \times 5 = 3 \times 4 \times 5 = 3 \times (4 \times 5)$. We may also write $60 = 3 \times 4 \times 5$; $60 = 3 \times 5 \times 4$, and so on.

Since $a \times 1 = a$ for any number a , we know that 1 is a factor of every whole number. Let us agree to omit 1 as a factor when naming * a number in factored form.

In each of the above equations the same set of factors is used, namely, 3, 4, and 5. Regardless of the order* in which they are written, 3, 4 and 5 should be considered just as *one* set of three factors of 60. Also 60 can be written as the product of four factors as shown in the equation $60 = 3 \times 2 \times 2 \times 5$. In previous exercises you probably noticed that some of the factors you used could be factored further and others could not.

In the equation $18 = 6 \times 3$, the factor 6 can in turn* be written as 3×2 . If you do this, you will get $18 = 2 \times 3 \times 3$. None of these three factors can be written in factored form if you do not use 1 as a factor. Hence $2 \times 2 \times 3$ is the form containing the *smallest factors* of 18.

You will be able to do the same with an odd number, say 105, where $105 = 3 \times 35 = 3 \times 5 \times 7$.

You already know that every whole number has 1 and itself as a factor. That is $9 \times 1 = 9$ and $11 \times 1 = 11$. Some such numbers have only 1 and themselves as a factor. Since its only factors are 1 and 5, 5 is such a number.

A whole number is called a *prime number*, or just a prime if:

- It is greater than one.
- Its only factors are 1 and itself.

Any whole number other than 0 or 1 which is not a prime number is called a *composite number*, or just a *composite*.

Задание II: 1. Лабораторные упражнения VIII—XII. 2. Домашние упражнения 10—13.

10. *Задайте вопрос, ответ на который содержится в данном предложении.*

1. Some statements in mathematics are concerned with single numbers. 2. There is something in common between these two elements. 3. This property is common to all even numbers. 4. They ought to know the result of this operation. 5. The numbers to be added are called addends. 6. He agreed to answer all their questions. 7. Odd numbers were placed in a certain order. 8. The above equation is to be solved. 9. 7 times 5 equals 35. 10. Multiplication is associative. 11. We know that 1 is a factor of every whole number. 12. These signs may be omitted. 13. They were able to write the exercise themselves. 14. The machine is to perform all the operations itself. 15. A whole number is called a prime number. 16. Some of the factors used could be factored further. 17. Regardless of what they think they are going to help him. 18. The discussion concerns a very important problem.

12. *Запишите основные положения, изложенные в тексте в виде плана.*

13. *Будьте готовы рассказать то, что вам известно о целых числах. Вы можете выйти за рамки данного текста.*

Аудиторное занятие III

14. *Прочтите данные слова. О значении выделенных слов вы можете догадаться. Прежде чем дать их русские эквиваленты, назовите часть речи, к которой они относятся.*

to agree — to disagree — *agreement*; order — *disorder*; previous — *previously*; composite — *composition*; to form — *formal* — *to reform* — *to deform* — *to inform* — *information* — *informal* — *formality* — *formalize*; probably — *probability* — *improbable*; associative — *association* — *to associate*; sum — *summarize*.

15. *Выслушайте преподавателя и уточните (воспользовавшись подсказанным вопросительным словом) интересующую вас подробность.*

16. *Ответьте на вопросы в связи с текстом.*

a) 1. How many prime numbers are there between 1 and 100? 2. How many of the prime numbers are even numbers? 3. How many of the first 25 prime numbers are odd numbers? 4. With the exception of 2 and 5 notice that every prime ends with the digit 1, 3, 7 or 9. Does this mean that every whole number ending with 1 or 3 or 7 or 9 is a prime? 5. With the exception of 2 and 5, why is no

other whole number ending with 2 or 5 a prime number? 6. Without factoring, how do you know that 415 is not a prime? 7. Without factoring how do you know that 592 is not a prime? 8. Both addends in these additions are odd numbers $3+5=8$, $9+7=16$. Is each sum an even number? Do you think it is always true? 9. What number can be divided by 5? 10. Are you able to give a definition of a prime number?

b) Ответьте на вопрос преподавателя.

17. Заполните пропуски недостающими словами.

1. Many ... in mathematics are concerned not with a single number. 2. Such a set of numbers is a set of ... numbers 0, 2, 4 ..., or a set of ... numbers 1, 2, 3 3. What property is ... to all even numbers? 4. When you write $6 \times 3 = 18$ it ... that you write number 18 as a ... of two whole number factors. 5. Let us agree to call 6 and 3 just one ... of factors of 18. 6. Since multiplications is ..., we know that $(4 \times 3) \times 5 = 3 \times 4 \times 5 = 3 \times (4 \times 5)$. 7. Regardless of the ... in which these equations are written 3, 4, 5 make one set of three factors of 60. 8. $2 \times 2 \times 3$ is the form ... the smallest factors of 18.

18. Скажите по-английски.

1. Нам предстоит рассмотреть множество чисел. 2. Эти числа имеют ряд общих свойств. 3. Какое свойство считается общим для всех четных чисел? 4. Вас следует помнить, что результат умножения называется произведением. 5. Числа, которым предстоит быть помноженными, называются сомножителями. 6. Давайте согласимся называть 6 и 3 одной парой сомножителей числа 18. 7. Вам следует помнить, что умножение ассоциативно. 8. В каждом из вышеупомянутых уравнений нам дан один и тот же ряд сомножителей. 9. Порядок, в котором они должны быть записаны, не существен. 10. Вы сможете разложить данное число дальше.

Аудиторное занятие I

ГРАММАТИКА:

Степени сравнения прилагательных и наречий

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

equality [i:'kwɒlɪtɪ] *n*
 reflexive [rɪ'fleksɪv] *adj*
 symmetric [sɪ'metrɪk] *adj*
 transitive [træn'zɪtɪv] *adj*
 opposite [ɒ'pəzɪt] *adj*

correct [kə'rekt] *adj*
 incorrect [ɪnkə'rekt] *adj*
 essential [ɪ'senʃəl] *adj*
 inequality [ɪni:'kwɒlɪtɪ] *n*
 false [fɔ:ls] *adj*

2. Прочтите вслед за преподавателем.

part [pa:t] 1. *n* часть; 2. *v* делить
 member ['membə] член
 whether ['weðə] ли (союз)
 relation [rɪ'leɪʃən] отношение
 relate [rɪ'leɪt] относить (к)
 satisfy ['sætɪsfaɪ] удовлетворять
 while [waɪl] в то время как, между тем
 feature ['fi:tʃə] черта, свойство
 involve [ɪn'vɒlv] включать в себя; влечь за собой
 either ['aɪðə] 1. любой (из); 2. либо

direct [dɪ'rekt] 1. *adj* прямой; 2. *v* направлять
 concise [kən'saɪs] сжатый
 understanding [ʌndə'stændɪŋ] понимание
 understand (understood) понимать
 across [ə'krɒs] через, сквозь
 conventional [kən'venʃənəl] привычный, общепринятый
 replace [rɪ'pleɪs] замещать, заменять
 express [ɪks'pres] выражать

Пояснения к тексту

- * *you will remember* — вы, по-видимому, помните
- * *either true or false* — либо истинное, либо ложное
- * *both true and false* — как истинная, так и ложная
- * *To decide whether a closed sentence is ...* — чтобы решить, является ли замкнутое выражение ...
- * *we check to see* — мы проверяем, чтобы убедиться
- * *There is nothing incorrect about writing* — вовсе не ошибочно написать...

УПРАЖНЕНИЯ

1. Прочтите вслед за преподавателем и сравните.

long — longer — longer than — the longest
 big — bigger — bigger than — the biggest
 easy — easier — easier than — the easiest
 late — later — later than — the latest
 few — fewer — fewer than — the fewest
 important — more important — the most important
 interesting — more interesting — the most interesting
 general — more general — the most general

2. Прочтите, обращая внимание на степени сравнения.

a) 1. He is *young*. His sister is *younger*. She is the *youngest* in the family. 2. Their department is *large*. Our department is *larger than that one*. It is one of the *largest* in the University. 3. This machine is *complicated*. The new one is *more complicated*. It is the *most complicated* machine that I know of. 4. This definition is too *general*. There is a *less general* definition. 5. This example is not quite *good*. You ought to find a *better* one. I do not think it is the *best* example that you can give. 6. The result of their exam is *bad*. It is much *worse than* we expected. In fact, it is the *worst* in many years.

b) 1. This method of research is *more interesting than the one* we followed. 2. I am interested in history *less than* in philosophy. 3. The equation given to me was *easier than the one* he was given. 4. The remainder in this operation of division is *greater than* 1. 5. He speaks German *better than* I do.

c) 1. The texts you gave me are *as short as those* I was given last week. 2. The name of Leibnitz is *as familiar to us as that* of Newton. 3. This system is *as interesting as the one* you are studying. 4. I have *as much work as you do*. 5. He speaks English *as nicely as she does*.

d) 1. Their computer is *not so modern as the one* we have in our lab. 2. The lecture we were given yesterday was *not as interesting*

* too — слишком

as the one he gave us last week. 3. The definition given by you is *not so specific as* his definition. 4. I am *not much concerned* with this problem as he is.

e) *The sooner* we decide on this question *the better*. 2. *The later* he begins his research *the less time* he will have for writing his thesis. 3. *The more specific* definition you give *the better*.

Задание 1: 1. Лабораторные упражнения I—VI. 2. Домашние упражнения 3, 5.

3. Замените слова в скобках их английскими эквивалентами.

1. This statement is (самое сжатое). 2. This definition is (не такое существенное, как) the previous one. 3. These symbols are (более общеприняты, чем) the new ones. 4. This feature is (столь же важна, как) the other one. 5. The direct method is (самый простой). 6. This relation is (самое правильное). 7. He has a (лучшее понимание) of all these relations. 8. She understands English (хуже, чем) I do.

understanding
essential
important
simple
concise
bad
conventional
correct
easy
able

4. Напишите вопрос, уточняющий какую-нибудь подробность.

1. Either of these two computers could be used. (why) 2. I was satisfied with his answer during the examination. (with whose) 3. We shall have to replace one member of the equality with another. (why) 4. His statement was false. (which) 5. She gave a correct answer. (who) 6. I want to have a better understanding of the problem. (who) 7. I expect a concise definition. (what kind of) 8. Professor made a few essential remarks. (when) 9. It is impossible to replace this symbol by another one. (why) 10. It is necessary to replace the sign by the opposite one. (where)

Аудиторное занятие II

5. Прочтите контрольное упражнение.

start, leisure, shorten, special, usually, drawing, charge, brought, you, fast, division, assure, admission, measure, awful, floor, tall, artist, class, calm, walk, although, pause, Russian, provision, gorge, bath, decision, shorten, mortal, draft, war, army, quality, specialist.

6. Ответьте на вопросы преподавателя.

7. Замените слова в скобках их английскими эквивалентами.

1. (Чем скорее) you come (тем больше) we shall be able to do. 2. (Чем легче) the translation (тем меньше) time it will take. 3. (Чем сложнее) the problem (тем интереснее) I find it. 4. (Чем позднее) we begin the lesson (тем хуже). 5. (Чем раньше) we finish this work (тем лучше).

8. *Задайте вопрос, воспользовавшись словом в скобках.*

1. The second part of the text must be rewritten. (which) 2. These are false statements of mathematics. (what kind of) 3. The first part of this relation contains *y*. (what) 4. These are conventional symbols. (which) 5. We discussed certain features of those elements during the seminar. (when) 6. We have to replace *x* by some numeral. (by what) 7. The student placed the equality sign between the two parts of the relation. (where) 8. You must replace the + sign by the opposite sign. (why) 9. The teacher gave a concise definition. (when) 10. He was asked direct questions during the discussion. (when) 11. We were satisfied with the results of the conference. (with what) 12. She expected better understanding from him. (why) 13. As soon as he decides to take part in this work he will let us know. (when) 14. In arithmetic there exist false statements. (why) 15. We may use either a number or some other symbol. (where) 16. Those two expressions are related in a certain way. (how)

9. а) *Переспросите:* б) *Выразите несогласие с написанным.*

1. I find his position false. 2. The members of their scientific group took part in the seminar. 3. He decided to agree to the appointment. 4. The given relation satisfies the symmetric axiom. 5. The student understood his teacher's question well. 6. This article is concerned with the most essential political problems of today. 7. It was meaningless to use direct methods in such experiments. 8. It is professor A. who directs the research work in their lab. 9. You can replace the old parts of the machine by the new ones. 10. The teacher looked across the classroom.

10. *Прочтите слова урока вслед за преподавателем. Прочтите текст и скажите, какие математические понятия рассматриваются в нем.*

Something about Mathematical Sentences

You will remember that a mathematical sentence containing an equal sign is an equation. The two parts of an equation are called its members. A mathematical sentence that is either true or false* but not both is called a closed sentence. Both true and false* sentences are closed. To decide whether a closed sentence containing an equal sign is* true or false, we check to see* that both elements, or members of the sentence name the same number. To decide whether a closed sentence containing an \neq sign is true or false, we check to see that both elements do not name the same number.

The relation of equality between two numbers satisfies the following basic axioms for the numbers *a*, *b*, and *c*.

Reflexive: $a=a$.

Symmetric: If $a=b$, then $b=a$.

Transitive: If $a=b$ and $b=c$ then $a=c$.

In all branches of mathematics you need to write many sentences about numbers. While the symbol $=$ in an arithmetic sentence means *is equal to*, another symbol, \neq , means *is not equal to*. When an $=$ sign is replaced by \neq sign, the opposite meaning is implied. Thus $8=11-3$ is read eight is equal to eleven minus three while $9+6\neq 13$ is read nine plus six is not equal to thirteen.

The important feature about a sentence involving numerals is that it is either true or false, *but not both*. There is nothing incorrect about writing* a false sentence; in fact in some mathematical proofs it is essential that you write a false sentence.

Since mathematical language is so direct and concise we must have a good understanding of the meaning of each symbol that we use.

We already know that if we draw one short line across the symbol we shall change it to \neq . The symbol \neq implies either of two things — *is greater than* or *is less than*. In other words the sign \neq in $3+4\neq 6$ tells us only that the numerals $3+4$ and 6 name different numbers, but does not tell us which numeral names the greater or the lesser of the two numbers.

To know which of the two numbers is greater let us use the conventional symbols $<$ and $>$. $<$ means *is less than* while $>$ means *is greater than*. These are *inequality symbols* or *ordering symbols* because they indicate order of numbers. $6<7$ is read six is less than seven. $29>3$ is read twenty nine is greater than three.

The signs which express equality or inequality ($=$, \neq , $<$, $>$) are called *relation symbols* because they indicate how two expressions are related.

Задание II: 1. Лабораторные упражнения VII-XII. 2. Домашние упражнения 11. 12.

11. *Напишите вопросы, ответами на которые являются данные предложения.*

1. There is a certain difference between an equation and an equality. 2. There exist true and false mathematical sentences. 3. Both members of the equation name the same number. 4. We are to decide whether this sentence is true. 5. It is necessary to know whether this sentence is correct. 6. This relation of equality satisfies the following axioms. 7. We need to use symbols in all branches of physics. 8. The symbol \neq means *is not equal to*. 9. The symbol $>$ means *greater than*. 10. This mathematical sign implies the opposite meaning. 11. These features are considered essential. 12. In mathematics it is possible to write a false sentence. 13. Everyone who deals with mathematics must have a good understanding of the meaning of each symbol. 14. The symbol \neq implies either greater than or less than. 15. These are ordering symbols because they indicate the order of numbers.

12. Будьте готовы изложить содержание текста по составленному вами плану.

Аудиторное занятие III

13. Прочтите слова, данные ниже, и назовите часть речи, к которой относятся выделенные слова. Дайте русские эквиваленты этих слов.

to relate — *relative* — *relatively* — *relativity*; axiom — *axiomatic*; symbol — *symbolic* — *symbolize*; to imply — *implication*; to replace — *replacement*; meaning — *meaningless* — *meaningful*; numeral — *numeration*; to know — *knowledge*; different — *indifferent* — *indifference*; great — *greatness*; indicate — *indication*; express — *expression* — *expressionless* — *expressive*.

14. Выслушайте утверждение преподавателя и выразите согласие или несогласие. Если вы согласны с утверждением, начните свое предложение с: 'Yes, that's right', если не согласны — 'I am afraid it's not right, it's wrong'.

15. Ответьте на вопросы преподавателя по тексту.

16. Заполните пропуски недостающими словами.

1. A mathematical sentence having an equal sign is an... 2. Mathematical sentences may either be true or ... 3. Both true and false ... are closed. 4. The relation of equality satisfies the following ... for the numbers *a*, *b*, and *c*. 5. When an = sign is replaced with a \neq sign, the ... meaning is implied. 6. The important feature about a sentence involving numerals is that it is either ... or ... but not ... 7. In fact, in some mathematical proofs it is ... that you write a false sentence. 8. Since mathematical language is so direct and ... we must have a ...

17. Скажите или спросите его по-английски.

1. Уравнение содержит знак равенства? 2. Эти две части называют членами уравнения. 3. Математические выражения могут быть либо истинными, либо ложными. 4. Вам следует поставить знак неравенства между членами этого отношения. 5. Знак \neq заменяется знаком = в этом выражении. 6. Эти символы предполагают (заключают в себе) различные значения. 7. Они не смогли понять значения этого выражения. 8. Вы знаете общепринятые математические символы? 9. Это доказательство более правильно? 10. Язык математики — есть самый прямой и сжатый язык.

LESSON FOURTEEN

Аудиторное занятие I

ГРАММАТИКА:

Времена группы *Perfect (Active)*

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

fraction ['fræksən] *n*
fractional ['fræksənəl] *adj*
equivalent [i:'kwivələnt] *adj*
relatively ['relatɪvli] *adv*
rational ['ræʃənəl] *adj*
process ['prəʊsəs] *n*

reduce [ri'dju:s] *v*
determine [dɪ'tə:mɪn] *v*
divisible [dɪ'vɪzɪbl] *adj*
concept ['kɒnsept] *n*
principle ['prɪnsɪpl] *n*
valid ['vælɪd] *adj*

2. Прочтите вслед за преподавателем:

chapter ['tʃæptə] глава
numerator ['nju:məreɪtə] числитель
denominator [dɪ'nɒmɪneɪtə] знаменатель
into ['ɪntə] в (внутрь)
quantity ['kwɒntəti] количество
proper ['prɒpə] 1. правильный; 2. присущий, собственный
improper [ɪm'prɒpə] неправильный
mixed [mɪkst] смешанный
integer ['ɪntədʒə] целое число

term [tə:m] член, термин
choose [tʃu:z] (chose, chosen [tʃəʊz] [tʃəʊzən] выбирать
low [ləʊ] низкий
accordingly [ə'kɔ:dɪŋgli] соответственно
conclude [kən'klu:d] делать заключение, вывод
conclusion [kən'klu:ʒən] заключать
bring (brought) [brɪŋ] [brɔ:t] приносить

draw (drew, drown) [drɔ:]	ever ['evə] когда-либо
[dru:] [drɔ:n] 1. чертить; 2. про-	yet [jet] 1. тем не менее; 2. еще
тягивать	happen ['hæpən] иметь место,
never ['nevə] никогда	случаться

Пояснения к тексту

- * *The same is true of* — то же самое справедливо
- * *as a matter of fact* — кстати, между прочим
- * *The process of bringing* — процесс приведения
- * *reduce a fraction* — сократить дробь
- * *draw a conclusion* — сделать вывод
- * *just as valid* — столь же справедливо

УПРАЖНЕНИЯ

1. Прочтите данные пары предложений, а) сравните их и объясните употребление в каждом случае времен *Perfect*, *Continuous*, *Indefinite*.

I am checking the result	He has checked the result.
We are studying this feature	They have studied this feature.
She is changing the order	I have changed the order.
He is answering my question.	You have answered my question.
Have they solved the equation?	No, they have not. They are solving it now.
Has he defined those properties?	No, he has not. He is defining them now.
Have you built a new computer?	No, we have not. We are building it.
Has she considered those questions?	No, she has not. She is considering them at this moment.
Have you seen him?	Yes, I have. I saw him yesterday.
Has she used your system?	Yes, she has. She used it in her last work.
Has he given you the lecture?	Yes, he has. He gave us the lecture two days ago.
Have they held a conference?	Yes, they have. They held it last month.

б) Обратите внимание на обстоятельства, требующие употребления временных групп «*Perfect*».

Has he spoken to his research adviser?	Yes, he has (just) spoken to him.
Have you ever been there?	Yes, I have (often) been there.
Has she presented her thesis?	Yes, she has (already) presented it.
Have they passed their exams?	Yes, they have passed it (today, this week, this month).
Has he shown you his plan?	No, he has not shown it yet.
Have you been to Kiev?	No, I have never been to Kiev.
Have I come late?	No, you have not come late today.
Have they ever used this method?	No, they have never used it.
Has he done any calculations?	He said that he had done some.
Has she seen her research adviser?	She said she had seen him.
Have you found that paper?	I told you I had found it.
Have they discussed his thesis?	I thought they had discussed it.
Have you done the exercise?	I shall have done it by tomorrow.
Has she finished her work?	She will have finished it before you come.

What have you done? Where have you been? What kind of problem has he solved? Why have you told him about it? Whom have they seen there?

Задание I: 1. Лабораторные упражнения I-VIII. 2. Домашние упражнения 2, 3.

2. Прочтите предложения и напишите вопрос, уточняющий какую-нибудь подробность.

1. My research adviser has found the second chapter of my dissertation too long. (who) 2. The workers decided to produce more such machines. (what) 3. The examiner has found the conclusion correct. (what) 4. They have not given a direct answer to my question. (who) 5. Our group has determined to agree to this plan. (why) 6. I have just reduced the fraction. (in what way) 7. The worst has already happened. (what) 8. We have come to the conclusion that these features are essential. (to what conclusion) 9. These post-graduates have not taken part in our research. (why) 10. Our English teacher has brought some interesting journals. (what kind of) 11. You have not divided the given quantity into two parts. (why) 12. My sister has just translated the text from English into Russian. (how) 13. Father and mother do not know what has happened to the young man. (why) 14. They have chosen the conventional method. (why) 15. They have agreed to accept these principles as the basis of their work. (which) 16. I have found the ideas developed

by him quite rational. (which) 17. They have changed the whole system. (why) 18. Professor N. has found the proper solution for the problem. (how) 19. You have divided the numerator and the denominator by 3. (why) 20. I have divided the integer. (what) 21. Some first-year students have performed this relatively simple operation. (who)

3. Прочтите предложение и напишите, что вы полагали, что действие уже произошло. Замените выделенные слова местоимением.

T.: The doctor is examining *the boy*. (expect)

St.: I expected the doctor had examined *him*.

1. That student is looking through *your article*. (think) 2. The post-graduates are having *a seminar in philisophy now*. (think) 3. He is writing *the program for the computer*. (expect) 4. The scientists are changing *the process*. (think) 5. These workers are developing *a new system*. (expect) 6. My brother is writing *the first chapter of his dissertation*. (think)

Аудиторное занятие II

4. Прочтите контрольное упражнение.

become, burn, out, bus, slow, another, sold, world, early, own, cover, powerless, under, load, research, curve, circle, fuss, country double, trouble, word, boat, about, journal, young, counter, allow, among, without, grow, now, road, know, how, slowly.

5. Ответьте на вопросы преподавателя.

6. Ответьте на вопрос, заменив существительное местоимением.

T.: Has he taken *his exam*?

St.: I was told he had taken *it*.

1. Have they developed *that complicated system*? 2. Has she found *a proper answer to the question that interested her*? 3. Has he brought *all the necessary data*? 4. Have they published *that important material*? 5. Has she begun *research*? 6. Have they checked *the results of their calculation*?

7. Задайте вопрос, воспользовавшись вопросительным словом в скобках.

1. The numerator and the denominator of this fraction are divisible by two. (what) 2. The given quantity should be properly divided. (by whom) 3. He found the whole system relatively simple. (what) 4. It was impossible to reduce this fraction further. (why) 5. The given principle is valid for all such cases. (what) 6. The scientists were determined to develop further that idea. (who) 7. The newspaper was brought by my brother. (by whom) 8. You have to read the following chapter. (why) 9. He was able to find

a proper answer. (when) 10. I wanted to know what had happened to that machine. (what) 11. You are to choose the best program. (who) 12. We have just come to this conclusion. (why)

8. Прочтите слова урока вслед за преподавателем. Прочтите текст, данный ниже, и изложите в общих чертах его содержание.

Fractions

In this chapter you will deal with fractions. Every fraction has a numerator and denominator. The denominator tells you the number of parts of equal size into which some quantity is divided. The numerator tells you how many of these parts are to be taken.

Fractions representing values less than 1, like $\frac{2}{3}$ (two thirds) for example, are called proper fractions. Fractions which name a number equal to or greater than 1, like $\frac{2}{2}$ or $\frac{3}{2}$, are called improper fractions.

There are numerals like $1\frac{1}{2}$ (one and one second), which name a whole number and a fractional number. Such numerals are called mixed fractions.

Fractions which represent the same fractional number like $\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{6}$, $\frac{4}{8}$, and so on, are called equivalent fractions.

We have already seen that if we multiply a whole number by 1 we shall leave the number unchanged. The same is true of * fractions since when we multiply both integers named in a fraction by the same number we simply produce another name for the fractional number. For example, $1 \times \frac{1}{2} = \frac{1}{2}$. We can also use the idea that 1 can be expressed as a fraction in various ways' $\frac{2}{2}$, $\frac{3}{3}$, $\frac{4}{4}$ and so on.

Now see what happens when you multiply $\frac{1}{2}$ by $\frac{2}{2}$. You will have $\frac{1}{2} = 1 \times \frac{1}{2} = \frac{2}{2} \times \frac{1}{2} = \frac{2 \times 1}{2 \times 2} = \frac{2}{4}$. As a matter of fact * in the above operation you have changed the fraction to its higher terms.

Now look at this: $\frac{6}{8} = 1 = \frac{6}{8} : \frac{2}{2} = \frac{6:2}{8:2} = \frac{3}{4}$. In both of the above operations the number you have chosen for 1 is $\frac{2}{2}$. In the second example you have used division to change $\frac{6}{8}$ to lower terms, that is to $\frac{3}{4}$. The numerator and the denominator in this

fraction are relatively prime and accordingly we call such a fraction the simplest fraction for the given rational number.

You may conclude that dividing both of the numbers named by the numerator and the denominator by the same number, not 0 or 1 leaves the fractional number unchanged. The process of bringing* a fractional number to lower terms is called reducing a fraction*.

To reduce a fraction to lowest terms, you are to determine the greatest common factor. The greatest common factor is the largest possible integer by which both numbers named in the fraction are divisible.

From the above you can draw the following conclusion*: mathematical concepts and principles are just as valid* in the case of rational numbers (fractions) as in the case of integers (whole numbers).

Задание II. 1. Лабораторные упражнения IX—XV. 2. Домашние упражнения 9, 10.

9. Напишите вопросы, ответы на которые содержатся в данных предложениях.

1. Fractions like $\frac{2}{3}$ are called proper fractions. 2. In the proper fraction the denominator is greater than the numerator. 3. In the improper fraction the denominator is less than the numerator. 4. A mixed fractions contains an integer and a proper fraction. 5. There also exist equivalent fractions. 6. You are to give an example of a mixed fraction. 7. The little boy was able to multiply and divide fractions. 8. If you write first $\frac{1}{2} = \frac{3}{6}$ and then $\frac{1}{2} = \frac{n}{6}$ that means that you have replaced 3 with n . 9. The words choose and select mean one and the same thing. 10. If you change a fraction from $\frac{16}{48}$ to $\frac{1}{3}$ you will reduce it to its lowest terms. 11. We are to read another chapter of this book. 12. This chapter deals with various kinds of fractions. 13. Now we are concerned with mixed fractions. 14. You should take two parts of equal size for your experiment. 15. The quantity of material has to be reduced. 16. Everything happened during the recent experiment.

10. Выделите основные моменты в тексте и запишите их в виде вопросов в логической последовательности.

Будьте готовы изложить содержание текста!

Аудиторное занятие III

11. Прочтите слова, данные ниже, и постарайтесь догадаться о значении выделенных слов.

rational — rationalize — irrational, to reduce — reduction, com-

mon — uncommon, divisible — divisibility, equal — equalize, unequal, quantity — quantitative, part — partner, represent — representation, value — valuable — valueless, name — nameless, great — greatness, to mix — mixture — mixer, change — unchanged — changeless, simple — simply — simplify, simplicity, idea — ideal — idealist, relatively — relative — relativity.

12. Выслушайте утверждение преподавателя и выразите свое согласие или несогласие с услышанным. Начните с: I'm afraid it's wrong, On the contrary или That's right.

13. Ответьте на вопросы преподавателя по тексту.

14. Дополните начатые высказывания (в связи с текстом).

1. In this chapter you will deal with ... 2. The denominator tells you the number of parts of equal size ... 3. The numerator tells you ... 4. Fractions representing values less than 1 are ... 5. Fractions which name a number equal to or greater than one ... 6. We have seen that multiplying a whole number by 1 leaves the number ... 7. Changing a fraction to lowest terms by dividing both numbers names in a fraction by the same number not 0 is ... 8. By using mathematical ... and ... we can show the validity of this rule of arithmetic. 9. From the above we can draw the following ...

15. Скажите по-английски.

1. Мы уже знаем, что каждая дробь имеет числитель и знаменатель. 2. На что указывает знаменатель? 3. На что указывает числитель? 4. Дробь, подобные $\frac{2}{3}$ или $\frac{3}{5}$ называют правильными дробями. 5. Дробь, называющие число больше, чем единица, называют неправильными дробями. 6. Дайте пример смешанной дроби. 7. Мы только что разделили отрезок на равные части. 8. Что вы знаете об эквивалентных дробях? 9. Вы, возможно, помните, что когда целое число умножают на 1, оно остается неизменным. 10. Что вы изменили в этом уравнении? 11. В этом уравнении вы заменили a числителем. 12. Дробь $\frac{2}{3}$ меньше единицы.

13. Дробь $\frac{5}{3}$ больше единицы. 14. Возможно ли сократить эту дробь?

Аудиторное занятие I

ГРАММАТИКА:

Времена группы *Perfect (Passive)*
Времена группы *Perfect Continuous*

СЛОВА УРОКА

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

diagram ['daɪəgræm] <i>n</i>	introduce [ɪntrə'dju:s] <i>v</i>
separate ['sepɪt] <i>adj</i>	algorithm ['ɒlgərɪðəm] <i>n</i>
['sepəreɪt] <i>v</i>	placement ['pleɪsmənt] <i>n</i>
decimal ['desɪməl] <i>adj</i>	vertical ['vɜ:tɪkəl] <i>adj</i>
indefinitely [ɪn'defɪnɪtli] <i>adv</i>	standard ['stændəd] <i>adj</i>
procedure [prə'sɪ:dʒə] <i>n</i>	agreement [ə'ɡri:mənt] <i>n</i>
situation [ˌsɪtʃu'eɪʃən] <i>n</i>	identity [aɪ'dentɪti] <i>n</i>

2. Прочтите вслед за преподавателем.

comma ['kɒmə] запятая	namely ['neɪmli] а именно
point [pɔɪnt] точка	full [fʊl] полный
left левый	knowledge ['nɒlɪdʒ] знание
obtain [əb'teɪn] получать	care [keə] забота
skip пропускать	step [step] шаг
repeat [ri'pi:t] повторять	lie (lay, lain) [laɪ], [leɪ],
difficult ['dɪfɪkəlt] трудный	[leɪn] лежать
learn [lɜ:n] 1. узнавать; 2. выучить	keep (kept) [ki:p], [kept] дер-
pattern ['pætən] схема, образец	жать, хранить
observe [əb'zə:v] 1. наблюдать; 2. соблюдать	careful ['keəfʊl] тщательный, внимательный
	align [ə'laɪn] располагать на одной линии

far далеко
appropriate [ə'prɒpriət] соответствующий, подходящий

hour [aʊə] час
affect [ə'fekt] действовать на, влиять

Пояснения к тексту

- *over and over again — многократно
- *may prove helpful — может оказаться полезным
- *to the right (left) of — направо (налево) от
- *at the right of — справа от
- *just as well — точно так же
- *in full agreement with — в полном соответствии с
- *take care of — (зд.) охватить, предусматривать
- *This keeps each digit — это удерживает каждую цифру
- *as appropriate — как полагается, должным образом

УПРАЖНЕНИЯ

1. Прочтите и сравните форму сказуемого в предложениях.

a) He has defined the relation.	The relation has just been defined.
We have accepted the axiom.	The axiom has been accepted.
I have tried all the possible ways.	All the possible ways have already been tried.
She has changed the order.	The order has been changed.
b) Have they found the answers to these questions?	Have the answers to these questions been found?
Has she checked the result?	Has the result been checked?
Have you reduced the fractions?	Have these fractions been reduced?
c) We have not yet studied the second chapter?	The second chapter has not yet been studied.
They have not found the size of the given part yet.	The size of the given part has not yet been found.
He has not replaced the terms in the equation.	The terms in the equation have not been replaced.
You have not multiplied the denominator yet.	The denominator has not yet been multiplied.

d) Обратите внимание на согласование времен.

He said that the fact had been discussed.
I was told that the lecture had not been attended.
She knew that the plan had been changed.
I remembered that the seminar had not been held.

2. Прочтите и обратите внимание, как обстоятельства, характеризующие действие, влияют на форму глагола-сказуемого.

a) I am studying English.

She is trying to solve this problem.

They are discussing the definition.

He is speaking at the conference.

I have been studying it *since* September.

She has been trying to solve it *for* a long time.

They have been discussing it *for* some time.

He has been speaking *for* half an hour*.

b) Have you been working there *since* last year? Has he been developing these ideas *for* a long time? Have they been using this system *since* October? Has she been teaching you *since* December?

c) I have not been doing any research *since* last year. They have not been producing any information *for* a few months. You have not been reading this chapter *long*. She has not been writing anything *since* November.

d) I knew he had been trying to find an answer *for* a long time. He said she had been writing that paper *for* a week. I was told he had been lecturing *since* 1967. They had been considering that question *for* some time when I came.

Задание I: 1. Лабораторные упражнения I—VI. 2. Домашние упражнения 3, 4.

3. Задайте вопрос, уточняющий интересующую вас подробность.

1. Each step of the process has been carefully studied. (what) 2. The general pattern has been observed. (in what way) 3. The comma and the point have been properly placed. (what) 4. The new procedure has already been introduced. (by whom) 5. All the points have been placed on the left and on the right of the straight line. (where) 6. The necessary information has just been obtained. (what kind of) 7. The whole material has already been repeated by the students. (how) 8. All the digits have been aligned, as appropriate. (what) 9. We have been trying to obtain the diagram since Monday. (who) 10. The scientists have been studying the situation for a whole week. (why) 11. He has been carefully observing the procedure for a long time. (for how long) 12. They have been testing the new system over and over again for a month. (why)

4. Прочтите вопрос и ответьте, а) что вы полагали (вам было известно), что упомянутое действие уже было совершено (не называйте субъекта действия).

T.: Have they introduced new methods? (I was told)

St.: Yes, I was told that the new method had been introduced.

* half an hour — полчаса

1. Have the students repeated all the new words? (I expected) 2. Has the worker followed the necessary procedure? (They told me) 3. Have your friends drawn the diagram? (They said) 4. Has your brother obtained all the data? (I thought)

b) в ответе уточните, с какого времени (в течение какого времени) происходило действие.

T.: Was he working when you came? (since the morning)

St.: Yes, he said he *had been working* since the morning

1. Was she translating the text at 3 o'clock? (for half an hour) 2. Were they repeating the examination material when you entered? (since 10 o'clock) 3. Was he trying to obtain the information when you saw him? (since Tuesday) 4. Were they discussing the situation at that time? (for many hours)

Аудиторное занятие II

5. Прочтите контрольное упражнение.

east, eve, west, spread, humor, pool, soot, fewer, edge, teacher, each, blue, set, seek, pure, guess, news, piece, keep, boot, tune, bread, health, repeat, unit, least, due, seek, wretch, whether, weather, rule, union, juice, field, niece, eat, true.

6. Задайте вопрос, воспользовавшись словом в скобках.

a) The new department has just been opened. (where). 2. All her questions have been answered. (by whom). 3. He has been operating the machine. (for how long). 4. I have been looking through these journals. (since when). 5. He has been learning English since October. (who). 6. You have already been given many English lessons. (how many). 7. These students have been given a room in the hostel. (who). 8. Many books on mathematics have been translated from Russian into English. (what). 9. He has been showing them our laboratory since 11 o'clock. (what). 10. Atomic energy has already been captured. (how).

b) 1. I have found this procedure very helpful. (why). 2. You should skip this chapter because it is not interesting. (why). 3. You are to place a point between these two digits. (what). 4. You ought to repeat these words again. (who). 5. The vertical line separates the two groups of digits. (how). 6. Our discussion dealt only with the general pattern. (why). 7. They are going to introduce the new system. (when). 8. He will have to be very careful if he is going to perform this operation. (why). 9. The student gave an example of an algorithm. (when). 10. Our teacher introduced a new system of equations during the previous seminar. (what). 11. All those numerals were to be properly aligned. (in what way). 12. The results of the experiment affected their further work. (why).

7. Скажите, что лицо, упомянутое в скобках, не совершило указанного действия.

T.: I have studied this period. (he)

St.: He has not studied this period.

1. She has drawn the diagram. (I). 2. I found the whole procedure complicated. (she). 3. She was able to obtain the program. (they). 4. I have repeated the new text. (he). 5. He has been introduced to that foreign scientist. (they). 6. He always keeps his word. (she). 7. She considered each step carefully. (you). 8. He tried to observe the instruction. (they). 9. We followed the appropriate procedure. (they). 10. This boy has been separated from his mother. (his sister).

8. Прочтите слова урока вслед за преподавателем.

Прочтите про себя текст урока с тем, чтобы затем в общих чертах изложить его содержание.

Decimal Numerals

In our numeration system we use ten numerals called digits. These digits are used over and over again* in various combinations. Suppose, you have been given numerals 1, 2, 3 and have been asked to write all possible combinations of these digits. You may write 123, 132, 213 and so on. The position in which each digit is written affects its value. How many digits are in the numeral 7086? How many place value positions does it have? The diagram below may prove helpful*. A comma separates each group or period. To read 529, 248, 650, 396, you must say: five hundred twenty-nine billion, two hundred forty-eight million, six hundred fifty thousand, three hundred ninety-six.

Billions period			Millions period			Thousands period			Ones period		
Hundred billions	Ten-billions	One-billion	Hundred millions	Ten-millions	One-million	Hundred-thousands	Ten-thousands	One-thousand	Hundreds	Tens	Ones
5	2	9,	2	4	8,	6	5	0,	3	9	6

But suppose you have been given a numeral 587.9 where 9 has been separated from 587 by a point, but not by a comma. The numeral 587 names a whole number. The sign (.) is called a decimal point. All digits to the left of* the decimal point represent whole num-

bers. All digits to the right of* the decimal point represent fractional parts of 1.

The place-value position at the right of the ones place is called tenths. You obtain a tenth by dividing 1 by 10. Such numerals like 687.9 are called decimals.

You read .2 as two tenths. To read .0054 you skip two zeroes and say fifty four ten thousandths.

Decimals like .666..., or .242424..., are called repeating decimals. In a repeating decimal the same numeral or the same set of numerals is repeated over and over again indefinitely.

* We can express rational numbers as decimal numerals. See how it may be done.

$$\frac{31}{100} = 0.31. \quad \frac{4}{25} = \frac{4 \times 4}{4 \times 25} = \frac{16}{100} = 0.16$$

The digits to the right of the decimal point name the numerator of the fraction, and the number of such digits indicates the power of 10 which is the denominator. For example, .217 denotes a numerator 217 and a denominator of 10^3 (ten cubed) or 1000.

In our development of rational numbers we have named them by fractional numerals. We know that rational numerals can just as well* be named by decimal numerals. As you might expect, calculations with decimal numerals give the same results as calculations with the corresponding fractional numerals.

Before performing addition with fractional numerals, the fractions must have a common denominator. This is also true of decimal numerals.

When multiplying with fractions, we find the product of the numerators and the product of denominators. The same procedure is used in multiplication with decimals.

Division of numbers in decimal form is more difficult to learn because there is no such simple pattern as has been observed for multiplication.

Yet, we can introduce a procedure that reduces all decimal-division situations to one standard situation, namely the situation where the divisor is an integer. If we do so we shall see that there exists a simple algorithm that will take care of* all possible division cases.

In operating with decimal numbers you will see that the arithmetic of numbers in decimal form is in full agreement with* the arithmetic of numbers in fractional form.

You only have to use your knowledge of fractional numbers.

Take addition, for example. Each step of addition in fractional form has a corresponding step in decimal form.

Suppose you are to find the sum of, say, .26 and 2.18. You can change the decimal numerals, if necessary, so that they denote a common denominator. We may write .26=.260 or 2.18=2.180. Then

we add the numbers just as we have added integers and denote the common denominator in the sum by proper placement of the decimal point.

We only have to write the decimals so that all the decimal points lie on the same vertical line. This keeps each digit* in its proper place-value position.

Since zero is the identity element of addition it is unnecessary to write .26 as .260, or 2.18 as 2.180 if you are careful to align the decimal points, as appropriate*.

Задание II: 1. Лабораторные упражнения VII—XII. 2. Домашние упражнения 9—12.

9. Напишите вопрос, ответ на который содержится в данном предложении.

1. Yes, we consider your data very helpful. 2. All these combinations have been repeated over and over again. 3. There is a diagram below. 4. The change of the order may affect the result. 5. It has to be pointed out that the procedure developed is very complicated. 6. On the right and on the left of the comma you see three digits. 7. He obtained the difference after he had subtracted the numeral. 8. The identity property is being considered by the students. 9. The value of the digit is defined by its position. 10. Yes, the necessary procedure has always been followed. 11. The given definition corresponds to the idea of uniqueness. 12. You may change 3.29 to 3.290 if it helps you to obtain the correct answer. 13. When you deal with decimal numbers you are to align the decimal points. 14. In the operation of multiplication it is the product of the numerators and the denominators that we actually find. 15. We can multiply these numbers as we have so far* been doing with integers. 16. Students must study this illustration carefully. 17. In the given example we have been trying to show the validity of these principles. 18. This system of notation has to be observed. 19. These digits are separated from 6 by a point. 20. The scientists have been shown the pattern of the future system. 21. I have no idea of the situation. 22. All the points have been aligned on the vertical line.

10. Определите сказуемое в каждом предложении упр. 9. Обратите внимание на функцию глагола 'have'.

11. Определите функцию выделенного слова.

1. He *summed* these numerals, and then divided the *sum*. 2. Multiplying both integers *named* in a fraction by the same whole number simply produces another *name* for the fractional number. 3. This

* so far — до сих пор

increase in production is very important. They have *increased* the production. 4. We are going to *change* the definition. This *change* was quite unnecessary. 5. He is the *head* of this group of scientists. He *headed* their discussion. 6. I do not need your *help*. He is being *helped* by his research adviser. 7. We have *separated* these periods by a point. These are *separate* problems. 8. He *presented* me with a good book. The *present* situation appears rather unusual. Famous scientists were *present* at the conference.

12. Составьте план текста, следуя которому другие студенты могли бы изложить его содержание.

Аудиторное занятие III

13. Прочтите слова, данные ниже, и постарайтесь догадаться о значении выделенных слов.

separation — *separately*, *care* — *careless* — *carelessly* — *carelessness*, to observe — *observation* — *observatory*, combination — to *combine*, various — *variation*, to represent — *representation* — *representative*, to obtain — *obtainable* — *inobtainable*, difficult — *difficulty*, simple — *simplify*, possible — *possibility*, full — *fully*, agree — *agreement* — *disagreement*, to know — *knowledge*, to keep — *keeper*, identity — *identical* — *identify*, general — *generalize*, to prove — *provable* — to *disprove*.

14. Выслушайте преподавателя. Выразите свое согласие или несогласие с ним.

15. Ответьте на вопрос преподавателя по тексту.

16. Заполните пропуски недостающими словами.

1. In our numeration system we use ten numerals called 2. The position in which each digit is written affects 3. A comma separates 4. All digits to the left of the point ... whole numbers. 5. We obtain a tenth by ... 1 by 10. 6. Decimals like .6666 are called ... decimals. 7. We can ... rational numbers as decimal numbers. 8. Before performing addition with fractional numerals, the fractions must have a common 9. We can introduce a procedure that reduces all decimal-division situations to one standard 10. The arithmetic of numbers in decimal form is in full ... with the arithmetic of numbers in ... form. 11. Each step of the addition in fractional form has a corresponding 12. To find the sum of two or more decimal numerals, we can change 13. If we are going to keep each digit in its proper place-value position, we must

17. Скажите или спросите по-английски.

1. Эти числа использованы в различных комбинациях. 2. Диаграмма оказалась полезной. 3. Запятая отделяет периоды. 4. Этот

знак называют десятичной точкой. 5. В числе 5.2 цифра 5 находится слева от точки и обозначает целое число. 6. Если мы разделим 1 на 10, то мы получим одну десятую. 7. Повторяющиеся дроби были введены сегодня на уроке. 8. Рациональные числа могут быть выражены в десятичных дробях. 9. Покажите мне диаграмму. 10. Где схема? 11. Эту дробь нельзя сократить. 12. Отдели запятой эти три цифры. 13 Нам пришлось изменить процедуру. 14. Они получили нужную информацию? 15. Он сказал, что они уже обсудили ситуацию. 16. Она согласилась прийти?

Аудиторное занятие I

ГРАММАТИКА:

Согласование времен
Прямая и косвенная речь
Бессоюзные придаточные предложения

1. Прочтите данные интернациональные слова и назовите их русские эквиваленты.

popular ['pɒpjulə] *adj*
India ['ɪndiə] *n*
legend ['ledʒənd] *n*
vizier ['viziə] *n*
double ['dʌbl] *adj*

production [prə'dʌkʃn] *n*
constantly ['kɒnstəntli] *adv*
alternative [ɔ:l'tə:nətiv] *n, adj*
bushel ['buʃl] *n*

2. Прочтите вслед за преподавателем.

king [kiŋ] король
game игра
chess шахматы
nowadays ['naʊədeɪz] в наши дни
world [wɜ:ld] мир
according [ə'kɒdɪŋ] в соответствии
invent [ɪn'vent] изобретать
latter ['lætə] последний (из перечисленных выше)
please [pli:z] доставлять удовольствие
desire [dɪ'zaɪə] *n* желание; *v* желать

seem казаться
fulfil [ful'fɪl] выполнить
grain [greɪn] зерно
wheat [wi:t] пшеница
square [skwɛə] квадрат
chessboard ['tʃesbɔ:d] шахматная доска
cover ['kʌvə] *n* покрытие; *v* покрывать
count [kaunt] считать
empty ['empti] *v* опустошать; *adj* пустой
increase ['ɪnkri:s] *n* увеличение; *v* увеличивать

rapidly ['ræpɪdli] быстро
average ['ævərɪdʒ] в усред-
нять; *adj* средний
amount [ə'maʊnt] количество
remain [rɪ'meɪn] оставаться

debt [det] долг
head [hed] 1. *n* голова, глава;
2. *v* возглавлять
play [pleɪ] *n* игра; *v* играть
about [ə'baʊt] приблизительно

Пояснения к тексту

all over the world — во всем мире
the thing is — дело в том, что
the king had no idea — король не представлял себе
remain constantly in debt — постоянно оставаться в долгу
he thought it best — он решил, что лучше всего

УПРАЖНЕНИЯ

1. Прочтите, обращая внимание на согласование времен. Сравните группы предложений а), б).

- а) She says { the diagram is helpful.
the diagram was helpful.
the diagram will be helpful.
I know { he works there.
he worked there last year.
he will work there after the University.
She says { she is writing her abstract.
she was writing her abstract at that time.
she will be writing it all day tomorrow.
I am told { you speak English.
you spoke English to that foreign scientist
you will speak English at the conference.
б) He said { he knew that system.
he had studied that system.
he would study it.
They said { they considered the plan.
they had considered the plan.
they would consider it.
I was told { she wanted to go to Leningrad.
she had gone to Leningrad.
she would go to Leningrad.

2. Обратите внимание на согласование времен, на изменение местоимений и обстоятельства времени при переходе от прямой речи к косвенной и при образовании косвенного вопроса.

- He said (to me) { "I can find the value now".
"She was able to perform the operation
yesterday".
"We shall discuss various aspects of it
tomorrow".

- He said { he could find the value *then*.
He told me { she had been able to perform that opera-
tion *the day before*.
they would discuss various aspects of it
the next day.
She said (to me) { "Do you work in this field?"
"Did she present her thesis?"
"Will you consider the situation?"
She asked (me) { I worked in this field.
whether (if) { she had presented her thesis.
we would consider the situation.
He said (to me) { "Write the word".
"Do not go".
He told (asked) me { to write the word.
not to go.
I asked him { when he attended seminars.
where he had seen her.
how he would solve the problem.
She wanted to know { why I worked in that field.
when they had built the machine.
who would speak at the conference.
I am not sure { works there.
whether (if) he { wrote his thesis.
will come in time.
I was not sure { obtained information from them.
whether (if) she { had given the definition.
would need my help.

3. Сравните данные пары предложений. Обратите внимание на выпадение союза и перемещение предлога.

- | | |
|---|--|
| 1. Give me the book <i>about</i>
<i>which</i> you have told me. | Give me the book you have told
me <i>about</i> . |
| 2. This is the man <i>whom</i> I met
at the conference. | This is the man I met at the
conference. |
| 3. I showed him the journal
<i>through which</i> you have
looked. | I showed him the journal you
have looked <i>through</i> . |

Задание I: 1. Лабораторные упражнения I—IV. 2. Домашние упражнения 4—6.

4. Измените время сказуемого придаточного предложения в соответствии с правилами согласования времен. Помните, что время действия в главном предложении переносится в прошлое.

T.: I *know* that he *is* in Moscow.
St.: I *knew* that he *was* in Moscow.

1. He says she is working in the library. 2. Everybody knows that he works hard. 3. The boy says he has repeated the new words. 4. I want to know why you have done it. 5. He wants to ask you who will take part in the discussion. 6. He is going to find out when the library is open. 7. She says the machine will be built in a month or two. 8. He says they have found the unique solution for the problem. 9. He wants to know where I shall get that article. 10. It is well known that he did research in the field of atomic physics.

5. Прочтите данные предложения, содержащие косвенный вопрос, и напишите соответствующий прямой вопрос. Не забудьте произвести необходимые замены.

T.: I am not sure if he will come.
St.: Will he come?

1. I want to know whether that scientist was popular. 2. I am not sure if he uses the new chessboard. 3. She is asking me if I have ever seen that game. 4. I want to know when they increased the productions of those machines. 5. I am not sure if he has counted correctly. 6. He asks me if he has to double the number. 7. I wanted to know if he had any alternative. 8. I want to know whether this field of science is being constantly developed. 9. I ask the man why the world has changed during recent years. 10. I want to know what her desire was. 11. I asked her if she had emptied her bag. 12. I wanted to know what the average number of students in an English class was. 13. She asked them why he had remained there. 14. I wanted to know what legend he had told them. 15. He asked me whether the girl agreed with my words.

6. Отметьте предложения, в которых можно опустить союз.

1. The paper which you have given me is very interesting. 2. I have read his thesis which I found very long. 3. This is the report about which I have told you. 4. He told me which book he had asked her to bring. 5. She expected that they would hold the conference next May. 6. I was told that the work was very interesting. 7. He has solved the equation which seemed rather complicated. 8. The result which he has obtained was unexpected. 10. He gave me a book which looked very old. 11. The knowledge of mathematics which you have is enough to understand the given property. 12. The facts which the students have discussed are new. 13. The facts which helped them to understand the situation were discussed during the recent meeting. 14. He has agreed to speak at the conference, which means that he finds it important.

Аудиторное занятие II

7. Прочтите контрольное упражнение.

empty, hid, determine, night, blind, sight, play, steady, ink, toy, examine, plain, plane, mist, mild, coil, hit, boil, average, win, wind, aim, nice, again, faint, play, stay, my, soil, grey, coin, play, why, language, hide, damage, mail, male, mile, might, eighty.

8. Отнесите время действия сказуемого главного предложения к прошедшему времени, произведя при этом соответствующие изменения в придаточном.

T.: He *says* he *will* do it.

St.: He *said* he *would* do it.

1. I *hope* they will choose the proper time for the conference. 2. I *know* he will give an interesting lecture on the subject. 3. I *am sure* he will solve this equation in the best possible way. 4. He *expects* they will produce important information. 5. *Can* he tell you whether he will agree to do this work? 6. I *do not* know how I shall change the order of these numerals.

b) 1. I *am* not sure whether this number is rational. 2. He *wants* to know whether he had another alternative. 3. She *has* to tell me whether she took her exam last week. 4. He *is* not sure if we are able to speed up the production. 5. I *want* to ask her whether she has observed the general pattern. 6. I *am* not sure if you are working hard enough. 7. I *do not* know whether I have reduced the fraction correctly. 8. I *am* not sure whether everybody knows this legend.

9. Выслушайте преподавателя и задайте вопрос одному из ваших товарищей или преподавателю.

T.: Ask Nick if he likes his English lessons.

St.: Nick, do you like your English lessons?

10. Прочтите слова урока вслед за преподавателем.

Прочтите текст про себя и скажите: а) слышали ли вы эту легенду раньше, б) кем и где были изобретены шахматы, с) какова была просьба визиря, д) осуществима ли была просьба.

The Game of Chess

You will probably know that the game of chess so popular nowadays all over the world* comes from India. According to an old legend it was invented by king Shirham's vizier Sissa Ben Dahir and presented to the king by the latter. The King was very pleased and asked Sissa Ben whether he could do anything to thank him for the present. His vizier's desire seemed quite easy to fulfil. He asked his king to give him a grain of wheat to put on the first square of the chessboard, and two grains to put on the second square, and four grains to put on the third square and eight grains to put on

the fourth and so on doubling the number for each square that came next. He said he wanted the grains to cover all 64 squares of the board.

The king thought his vizier did not ask too much for what he had done and said that he would certainly give him what he asked for.

And he told his men to bring a large bag full of wheat.

But when the counting began, with 1 grain for the first square, 2 for the second, 4 for the third and so on the bag was emptied before the twentieth square was covered with wheat. More bags were brought before the king but the number of grains needed increased so rapidly that the king soon saw he would not be able to keep his word.

The thing is* that a bushel of wheat contains about 5,000,000 grains. The king had, certainly, no idea* of it and did not expect that he would have to give 4000 billion bushels to Sissa Ben.

Since the world production of wheat averages about 2,000,000,000 bushels a year, the amount of wheat asked by the vizier equalled the world's wheat production for the period of some two thousands years.

Thus king Shirham found that he either had to remain constantly in debt* to his vizier or cut his head off. He thought it best* to choose the latter alternative.

Задание II: 1. Лабораторные упражнения V—X. 2. Домашние упражнения 11—13.

11. Напишите вопросы, ответы на которые содержатся в данных предложениях.

1. Nowadays the game of chess is very popular all over the world. 2. Scientists all over the world know Newton's name. 3. Leibnitz actually invented and built the first computer. 4. There are 64 squares on the chessboard. 5. You have to double this number. 6. We expect to cover all these problems. 7. I have just played a game of chess with a friend. 8. The production of these machines remains constant. 9. The average number of students in an academic group is constant. 10. He has spoken to the head of our laboratory today. 11. It is possible to count the amount of work. 12. She seemed pleased and thanked us for our help. 13. His desire to become a mathematician has been fulfilled. 14. The number of words we must remember increases rapidly. 15. The room is empty since everybody has left. 16. As I had no other alternative I agreed. 17. Every year the amount of information all over the world is rapidly increasing. 18. According to the legend the king chose the latter alternative.

12. Определите место, где опущен союз, вводящий придаточное предложение. По каким признакам вы определили место союза? Вставьте союз.

1. A computer needs a program it can use for performing various operations. 2. The increase of production the workers are planning is quite possible. 3. This is the amount of energy the machine needs. 4. One of the problems Newton has worked at was the problem of gravitation. 5. Einstein developed an absolutely new idea of the world we live in. 6. The field of science they are concerned with is rather new. 7. The information the students have obtained seems interesting. 8. The question the post-graduates dealt with during the seminar has already been answered. 9. I want to know if the results you have checked are really correct. 10. He was not sure whether the research the group had fulfilled was important.

13. Напишите план текста в виде вопросов так, чтобы, отвечая на ваши вопросы, говорящий подробно изложил содержание текста.

Аудиторное занятие III

14. Прочтите слова, данные ниже, и назовите русские эквиваленты выделенных слов.

probable — probably — improbable — probability, popular — popularize — popularization, according (to) — accordingly — in accordance with, legend — legendary, desire — undesired, to fulfil — fulfilment, to cover — to discover, certainly — certain — certainly — uncertain, empty — emptiness, able — ability — unable, to invent — invention, inventive, alternative — to alternate, to count — countable — countability — uncountable.

15. Задайте вопрос, ответ на который содержится в данном предложении (воспользуйтесь упр. 12).

16. Выслушайте преподавателя и выразите свое согласие или несогласие с ним.

17. Ответьте на вопросы преподавателя по тексту. Некоторые вопросы начинаются со слов: I wonder, например:
I wonder if (whether) the king was pleased with the present.

18. Дополните данные высказывания.

1. According to an old legend the game of chess was ... by Sissa Ben Dahir. 2. The king was very ... with the present. 3. The vizier's desire ... quite easy to fulfil. 4. He asked his king to give him a grain of wheat to put on the first 5. Sissa Ben said he wanted the grains to ... all 64 squares of the chessboard. 6. When the counting began the number of grains needed increased very 7. A bushel of wheat...about 5,000,000 grains. 8. The world...of wheat averages about 2,000,000,000 bushels a year.

19. Скажите по-английски.

1. Он сказал, что знает эту игру. 2. Она сказала мне, что довольна моей работой. 3. Он сказал, что эта машина была изобре-

тена группой ученых. 4. Он спросил меня, сосчитал ли я количество студентов в комнате. 5. Я хотела знать, увеличится ли производство этих компьютеров. 6. Они надеялись, что профессор останется в их лаборатории. 7. Какова другая альтернатива? 8. Он сказал мне, что постоянно думает о доказательстве этого уравнения. 9. Я хотел знать, согласились ли они обсудить наш доклад. 10. Эта игра, кажется, очень популярна. 11. Все было сделано в соответствии с планом. 12. Вторая (последняя) из двух задач, данных выше, более трудная.

PART II

LESSON SEVENTEEN

Classwork I

Grammar:

The Gerund. Its forms and functions.

EXERCISES

Ex. 1. Read the sentences below. Define the functions and the forms of the Gerund. Name the predicate in every sentence of a), b), c).

a) 1. Writing a sentence in algebraic form as we have seen, involves two steps. 2. Knowing the properties of equality will help you decide whether a sentence is true or false. 3. Having performed the first step made it possible to take the following steps. 4. Having located this point on the y -axis gives you the first point on the line.

b) 1. The young scientist began experimenting. 2. Reducing a fraction means bringing it to lower terms. 3. Our task is proving the correctness of the given statement.

c) 1. He likes being consulted. 2. We expected being given further assistance. 3. This kind of objects are capable of being deformed.

d) 1. You have already learned to use parentheses* as a means** for indicating that one group of terms is to be multiplied by another group of terms. 2. The idea of using symbols instead of words proved very helpful. 3. The procedure of reducing a fraction to its lowest terms is not complicated.

e) 1. In factoring as in all other algebraic processes, the first step is always to make a careful study of the given expression. 2. In other words, you change the two of the three signs without

* parentheses — скобки

** means — средство

changing the value of the fraction. 3. The product may be found by multiplying the factors contained in the given mathematical sentence. 4. Before trying to multiply terms containing letters, let us summarize the basic facts you will need to remember for performing multiplication. 5. On obtaining the data the scientists went on working. 6. We cannot agree to testing the new method without being given additional time.

Ex. 2. Compare the Gerund and the Participle in the sentences below. In every case state the subject and the predicate.*

Gerund

- a) 1. Reading such books is necessary.
2. Knowing these rules will help you.
3. Finding a proper answer will make it possible...
4. Speaking English well is rather difficult.
- b) 1. In comparing the circuits we found...
2. By bringing in this example they can show...
3. In solving these equations one must be very careful with the signs one uses.

Participle

1. Reading such books we obtain...
2. Knowing these rules you will be able to...
3. Finding a proper answer they can...
4. Speaking English during the lesson students will...
1. Comparing the circuits we could see...
2. Bringing in this example they will be able to...
3. Solving these equations one may expect to...

ASSIGNMENT I

1. Exercises to be done at home 3—6
2. Laboratory exercises (to be done after homework) I—VI

Homework I

WORDS

1. Read these words and guess their meaning.

geometry [dʒiˈɒmɪtri] *n*
 Babilonia [bæbɪˈlouniə] *n*
 Egypt [ˈiːdʒɪpt] *n*
 practical [ˈpræktɪkəl] *adj*
 pyramid [ˈpɪrəˌmɪd] *n*
 Egyptian [ˈiːdʒɪpˈiən] *adj*
 Greece [ɡriːs] *n*
 Greek [ɡriːk] *adj*

intriguing [ɪnˈtriːɡɪŋ] *adj*
 mysterious [mɪsˈtɪəriəs] *adj*
 Euclid [ˈjuːklɪd] *n*
 object [ˈɒbdʒɪkt] *n*
 geometric [dʒiəˈmetrɪk] *adj*
 fundamental [ˌfʌndəˈmentl] *adj*
 end point *n*
 every day *adj*

* compare — сравните

2. Read these words.

measure [ˈmeɪʒə] *v* измерять; *n* мера
 earth [ɜːθ] земля
 land земля
 direction [dɪˈreɪʃən] направление
 volume [ˈvɒljum] объем
 apply [əˈplaɪ] применять
 spread (spread) распростра-
 нять (ся)
 sequence [ˈsiːkwəns] последо-
 вательность
 improve [ɪmˈpruːv] улучшать,
 исправлять
 letter 1. буква; 2. письмо
 draw [drɔː] (drew, drawn)
 [druː], [drɔːn] 1. чертить,
 рисовать; 2. тянуть
 straight [streɪt] прямой
 imagine [ɪˈmædʒɪn] вообра-
 жать, представлять себе
 extend [ɪkˈstend] простираться
 extension [ɪkˈstɛnʃən] протяженность, рас-
 ширение, продолжение
 complete 1. *v* заканчивать; 2.
adj полный, заверченный

include [ɪnˈkluːd] включать
 shape [ʃeɪp] форма, очертание
 space [speɪs] пространство
 feel (felt) чувствовать
 measurement [ˈmeɪʒəmənt] из-
 мерение, мера
 move [muːv] двигать (ся)
 dimension [dɪˈmɛnʃən] размер
 sky [skaɪ] небо
 sun [sʌn] солнце
 dot [dɒt] точка
 picture [ˈpɪktʃə] *n* изображе-
 ние; *v* изображать
 refer (to) [rɪˈfɜː] ссылаться,
 отсылать; иметь отношение к
 capital [ˈkæpɪtəl] 1. главный,
 основной; 2. прописная (за-
 главная буква)
 location [ləuˈkeɪʃən] определе-
 ние местонахождения, распо-
 ложение
 figure [ˈfɪɡə] 1. цифра; 2. ри-
 сунок, фигура

NOTES

*Egyptians were mostly concerned with ... — египтян главным образом интересовало...

* B. C. — до нашей эры (до Рождества Христова)

*put into a logical sequence — дать в логической последова-
 тельности

*Think of a point as... — представьте себе точку как...

*Points are commonly referred to as... — обычно точки назы-
 вают...

Ex. 3. Ask questions using the question words in brackets. State the function of the Gerund.

1. By applying your knowledge of geometry you can locate the point in the plane. (how) 2. In measuring the volume of an object one must be very careful. (when) 3. We discussed improving the shape of the model. (what) 4. Imagining the shape of the earth is easy. (what) 5. We cannot draw a complete picture of cosmic space without knowing the dimensions of the sun. (why) 6. In naming geometric objects we often use capital letters. (when) 7. Having drawn a straight line in one direction gives you a one way extension. (what) 8. Instead of being moved to the right the dot is moved

to the left. (where) 9. The scientist expected being included in the experimental group. (who)

Ex. 4. Write questions to which the sentences below are the answers.

1. Both geometry and algebra deal with equations. 2. One can easily measure the amount of work performed. 3. Mathematical measurements have many practical uses. 4. Nowadays information spreads all over the world within a few hours, if necessary. 5. This method can be applied for measuring volumes. 6. One, two, three, four, and so on make a sequence of numbers. 7. I cannot imagine how one can draw this line without using a ruler. 8. It is possible to find the location of this object in space. 9. The complete picture of the object includes both its dimensions. 10. Knowing fundamental rules is important. 11. Drawing a long straight line without a ruler is not easy. 12. This terminology needs improving. 13. Both the Sun and the Earth move constantly. 14. One cannot feel how the Earth moves.

Ex. 5. a) Read the first text of the lesson without consulting the dictionary to get the general idea of the text;

b) After you have read the text analyse the sentences you find difficult to understand and translate them. Pay special attention to sentences 3, 4, 13, 16, 18, 20, 22, 24, 26. Consult the dictionary whenever necessary;

c) Read the same text again. You will have to discuss it during the lesson.

The Meaning of Geometry

1. Geometry is a very old subject. 2. It probably began in Bibi-lonia and Egypt. 3. Men needed practical ways for measuring their land, for building pyramids, and for defining volumes. 4. The Egyptians were mostly concerned with* applying geometry to their every-day problems. 5. Yet, as the knowledge of Egyptians spread to Greece the Greeks found the ideas about geometry very intriguing and mysterious. 6. The Greeks began to ask "Why? Why is that true?" 7. In 300 B. C.* all the known facts about Greek geometry were put into a logical sequence* by Euclid. 8. His book, called Elements, is one of the most famous books of mathematics. 9. In recent years men have improved on Euclid's work. 10. Today geometry includes not only the study of the shape and size of the earth and all things on it, but also the study of relations between geometric objects. 11. The most fundamental idea in the study of geometry is the idea of a point. 12. We will not try to define what a point is, but instead discuss some of its properties. 13. Think of a point as* an exact location in space. 14. You cannot see a point, feel a point, or move a point, because it has no dimensions. 15. There are points (locations) on the earth, in the earth, in the sky, on the sun, and

everywhere in space. 16. When writing about points, you represent the points by dots. 17. Remember the dot is only a picture of a point and not the point itself.

Lines and line segments

18. Points are commonly referred to* by using capital letters. 19. The dots below mark points and are referred to as point A, point B, and point C.



20. If you mark two points on your paper and, by using a ruler, draw a straight line between them, you will get a figure. 21. The figure below is a picture of a line segment



22. Points D and E are referred to as endpoints of the line segment. 23. The line segment includes point D, point E, and all the points between them. 24. Imagine extending the segment indefinitely. 25. It is impossible to draw the complete picture of such an extension but it can be represented as follows.



26. Let us agree on using the word *line* to mean a straight line. 27. The figure above is a picture of line DE or line ED.

Ex. 6. Go back to the text. Insert the missing words and finish these sentences.

1. Geometry probably began in Egypt as a means for 2. Men needed practical ways for measuring their land and for defining 3. The Egyptians were concerned with ... geometry to their every-day problems. 4. Euclid put all the known facts about geometry into a 5. In recent years men have ... on Euclid's work. 6. Geometry includes not only the study of the size and the ... of the earth, but also the study of relations between 7. The most ... idea in the study of geometry is the idea of a point. 8. You cannot see, feel or move a point since it has no 9. Using a ruler you may

draw a ... between two points. 10. It is impossible to draw a complete ... of such an extension as a segment. A line segment includes both endpoints and also all the points ...

Classwork II

Ex. 7. a) Read these words according to the rules of reading.

due, good, union, knew, early, ought, worth, secret, draw, circle, fast, army, field, seem, beta, warm, urgent, ruler, tall, author, yard, mean, bought, salt, third, fourth, work, article, true, wall, earn, tune, group, curve, law, soon, watch, person, autumn, war, yours, drawing.

b) Stress the word properly and give your explanation for the stress.

expect, dislike, geometry, single, agree, simple, capital, indicate, about, specify, famous, subject, fundamental, property, university, planet, contain, exist, discuss, conclude, knowledge, indefinite, refer, communication, mechanical, dissertation, academy, academic, decimal.

Ex. 8. Listen to your teacher's statements and ask questions about them according to the model.

T.: It is important to use proper terminology.

St.: Is it important to use proper terminology?

Ex. 9. Translate sentences 3, 4, 13, 16, 18, 20, 22, 24, 26 from the text (1).

Ex. 10. Listen to your teacher's statements and say whether they are true or false. If you think they are false, say why. Begin your statements with: I am afraid you are wrong; As far as I know; I don't think so.

Ex. 11. Answer your teacher's questions in connection with the text.

Ex. 12. Guess the meaning of these words.

local, localize, foundation, pyramidal, application, applied, improvement, shapeless, sunless, movable, a feeling, a drawing.

Before you begin working with the text (2) 'Points and Lines' read these words and guess their meaning.

mathematician [ˌmæθɪməˈtɪʃən] n, 'model n, 'alphabet n, 'definite adj, lo'cation.

You can guess the meaning of the words: 'arrow' ['ærou] n, 'subset' n, 'ray' n, and 'vertex' n from the context.

Read these notes:

*serve as models — служат в качестве моделей

*have in common — имеют общее

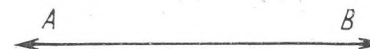
Read the text to get its general idea:

Points and Lines

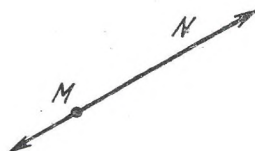
1. The world around (вокруг) us contains many physical objects from which mathematicians have developed geometric ideas. 2. These objects can serve as models* of the geometric figures. 3. The edge (грань) of a ruler, or an edge of this page is a model of a line. We have agreed to use the word line to mean straight line. 4. A geometric line is the property these models of lines have in common*; it has length but no thickness (толщина) and no width; it is an idea. 5. A particle (частица) of dust (пыль) in the air (воздух), or a dot on a piece of paper is a model of a point. 6. A point is an idea about an exact location; it has no dimensions. 7. We usually use letters of the alphabet to name geometric ideas. 8. For example, we speak of the following models of points as point A, point B, and point C.

.A .B .C

9. We speak of the following as line AB or line BA.



10. The arrows on the model above indicate that a line extends indefinitely in both directions. Let us agree to use the symbol \leftrightarrow to name a line. \overleftrightarrow{AB} means line AB. 12. Can you locate (поместить) a point C between A and B on the drawing of \overleftrightarrow{AB} above? 13. Could you locate another point between B and C? Could you continue (продолжить) this process indefinitely? Why? 14. Because between two points on a line there is another point. 16. A line consists of (состоять из) a set of points. 17. Therefore a piece (кусочек) of the line is a subset of the line. 18. There are many kinds of subsets of a line. 19. The subset (piece) of \overleftrightarrow{AB} shown below is called a line segment. 20. The symbol for the line segment AB is \overline{AB} . 21. Points A and B are the endpoints, as you may remember. 22. A line segment is a set of points consisting of the two endpoints and all of the points on the line between them. 23. How does a line segment differ from (отличаться от) a line? 24. Could you measure the length of a line? Of a line segment? 25. A line segment has definite length but a line extends indefinitely in each of its directions. 26. Another important subset of a line is called a ray. 27. That part of \overleftrightarrow{MN} shown below is called ray NM. 28. The symbol for ray MN is \overrightarrow{MN} .



29. A ray has indefinite length and only one endpoint. 30. The endpoint of a ray is called its vertex. The vertex of \overrightarrow{MN} is M. 31. In the drawings above you see pictures of a line, a line segment, and a ray — not the geometric ideas they represent. 32. Let us agree that to draw a geometric figure means to draw its picture.

Now that you have read the text look through it again and say what its main points are.

ASSIGNMENT II

1. Exercises to be done at home 13—16.
2. Laboratory exercises (to be done after homework): VII—XI.

Homework II

Ex. 13. Compare the ing-forms in these sentences and translate the sentences.

1. Measuring land is impossible without special instruments. 2. Measuring the length of a segment one must use a ruler. 3. He is defining the volume of a geometric object. 4. The teacher spoke of defining volumes. 5. Geometry presented practical ways for obtaining information about the size and shape of various objects. 6. Obtaining that information we shall be able to extend our knowledge of space. 7. Extending a line indefinitely can be represented symbolically like \longleftrightarrow 8. Now I am extending the given line both to the left and to the right.

Ex. 14. Write questions to which the given sentences are the answers.

1. We use the edge of a ruler for drawing a line. 2. He continued preparing for the conference. 3. Those particles have much in common. 4. The direction is shown by the arrow. 5. Dust particles move in all directions in the air. 6. The book consists of six chapters. 7. A particle may serve as a model of the Earth. 8. The letter B names the common vertex of the given rays.

Ex. 15. Read the text (2) and analyse the sentences you find difficult to understand. Pay special attention to sentences 1, 4, 5, 7, 19, 23.

Ex. 16. Get the central idea of each of the logical parts in both of the texts of the lesson (to be done in written form).

Classwork III

Ex. 17. Read the words of ex. 7.

Ex. 18. Form nouns by using the given suffixes.

- ion — to indicat(e), to discuss, to translat(e);
- ation — to inform, to found, to continu(e), to examin(e), to combin(e)
- sion — to conclu(de), to divi(de), to deci(de)
- ence — to differ, to exist
- er — to work, to contain, to write, to produce, to read
- ity — activ(e), equal, continu(e)
- ness — thick, exact, between, helpless

Ex. 19. Define the functions of the ing-forms.

1. Computers like the one pictured in this book are capable of solving systems with a hundred or more unknowns, if necessary. 2. They are concerned with applying their knowledge of the subject to solving these problems. 3. Drawing a correct conclusion is not always easy. 4. Seeing, feeling or moving a point is impossible since a point has no dimensions. 5. Seeing a straight line we know it is a geometric figure. 6. We usually use letters of the alphabet for naming geometric ideas. 7. I am naming the point by the capital letter A. 8. The arrow indicating the direction in which the line is extending is placed over the letters. 9. Indicating the direction in which the line is extending is necessary. 10. Continuing the process indefinitely is rather difficult. 11. In our case it is easy to know just by looking at the first equation what the following equation should be. 12. The products of several kinds of multiplication problems may be called special products since they can be determined directly from the form of the given problem without writing any of the multiplication.

Ex. 20. a) Ask questions to which the sentences 1, 4, 5, 7, 19, 23 of text 2 are the answers.

b) Translate the above mentioned sentences.

Ex. 21. Answer your teacher's questions in connection with the text.

Ex. 22. a) Speak on the meaning of geometry. b) Why do we say that the most fundamental idea in the study of geometry is the idea of a point. c) Speak on points and lines in detail.

Ex. 23. Say the following in English (use the Gerund).

1. При определении объема ... 2. Посредством применения этого метода ... 3. Протяжение прямой линии может ... 4. Определение местонахождения точки в пространстве будет ... 5. Мы рассчитываем улучшить систему. 6. Представить такую геометрическую фигуру не трудно. 7. Мы обсуждали включение этой главы ... 8. Не зная размеров предмета, нельзя определить его объем. 9. Студенты начали изучение нового текста. 10. Задача состоит в изменении формы ... 11. Продолжайте чертить линию в этом направлении. 12. Частица воздуха продолжает двигаться во всех направлениях.

Classwork I

Grammar:

More about the Gerund

EXERCISES

Ex. 1. Indicate the Gerund Construction.

1. His having proved the advantages of the new systems is very important. 2. The line's having been extended indefinitely is shown in the figure below. 3. We can speak of this object serving as a model of the Earth. 4. We know of the Earth's moving around the Sun constantly. 5. Their continuing the work is unnecessary. 6. The power having been reduced changed the pressure. 7. Having been reduced did not change the value of the fraction. 8. We know of these properties being used in the operations of division and multiplication. 9. Your having graphed the linear equation helped you in solving it. 10. Everybody knows of Newton's having done research in the field of gravitation.

ASSIGNMENT I

- Exercises to be done at home 2—5.
- Laboratory Exercises I—VI.

Homework I

1. Read these international words and guess their meaning.

to deduce [di'dju:s] <i>v</i>	parallel ['pærələl] <i>adj</i>
interior [in'tiəriə] <i>n</i>	parallelogram
exterior [eks'tiəriə] <i>n</i>	[,pærə'leləgræm] <i>n</i>
to classify ['klæsɪfaɪ] <i>v</i>	congruent ['kɒŋgruənt] <i>adj</i>
hypotenuse [haɪ'pɒtɪnju:z] <i>n</i>	rhombus ['rɒmbəs] <i>n</i>

2. Read these words.

originate [ə'ridʒ ɪneɪt] брать на-
чало
angle ['æŋɡl] угол
though [ðəʊ] хотя
right 1. прямой; 2. правый,
правильный
lie (lay, lain) [laɪ], [leɪ]
[leɪn] лежать
acute [ə'kju:t] острый
obtuse [əb'tju:s] тупой
triangle [traɪ'æŋɡl] треуголь-
ник

equalateral [i:kwə'lætərəl] рав-
носторонний
isosceles [ai'sɒsili:z] равнобед-
ренный
leg 1. сторона, катет; 2. нож-
ка (циркуля)
quadrilateral [kwɒdrɪ'lætərəl]
четырехсторонний
rectangle ['rektæŋɡl] прямо-
угольник
evident очевидный
as well as — так же как и

Ex. 2. Translate these sentences.

1. It is evident that there is no hope of our finding a proper solution to the problem at present. 2. We insisted on their following the usual procedure. 3. Without having improved on the properties of this material one cannot expect getting better results. 4. I knew nothing of their having completed the experiment. 5. This results in the product of two or more factors being equal to zero. 6. Besides its being used as an everyday word the term "work" has a special meaning in mechanics. 7. I did not know anything about your science adviser having spoken at the international congress on mechanics. 8. Euclid's having brought all the known facts about geometry into a logical sequence was very important for the development of geometry. 9. We know of Lobachevsky's having developed a new geometry different from that of Euclid. 10. Upon having placed all the elements according to the accepted order we were able to continue the work.

Ex. 3. Ask questions to which the given sentences are the answers.

1. It is possible to deduce, therefore, that between any two points on a line there is another point. 2. Two lines originating from the same point form an angle. 3. The point where these lines originate is called a vertex. 4. An angle of 35°* is an acute angle. 5. An angle having 105° is an obtuse angle. 6. A triangle is a closed geometric figure having three sides. 7. A triangle having all sides of equal length is referred to as an equalateral triangle. 8. A triangle containing one right angle is referred to as a right triangle. 9. A rectangle is a closed geometric figure having four sides and four right angles. 10. A rectangle having four sides of equal length is referred to as a square. 11. They are discussing a very acute problem. 12. We have denoted the point lying on the plane by the letter B. 13. You

* 35° — 35 degrees

are to classify these elements according to the rule. 14. Geometry originated in Egypt.

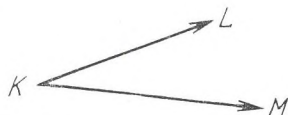
Ex. 4. a) Read the text (1) of the lesson without consulting the dictionary.

b) After you have read the text analyse the sentences you find difficult to understand and translate them. Pay special attention to sentences 1, 9, 10, 14, 22.

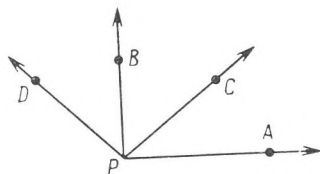
c) Read the same text again.

Rays, Angles, Triangles, and Quadrilaterals

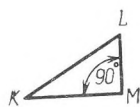
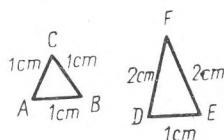
1. You certainly remember that by extending a line segment in only one direction we form a ray. 2. Below is a picture of such an extension. M is the endpoint of the ray $M \rightarrow N$. 3. From what you already know you may deduce that drawing two rays originating from the same endpoint forms an angle. 4. Their common endpoint is the vertex of the angle.



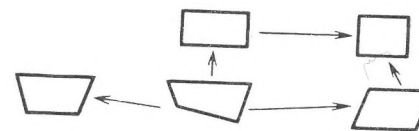
5. Angles, though open figures, separate the plane into 3 distinct sets of points: the interior, the exterior, the angle.



6. In the drawing above ray \overrightarrow{PA} and ray \overrightarrow{PB} form a right angle. 7. Since \overrightarrow{PC} (except for point P) lies in the interior of $\angle APB$, we speak of $\angle CPA$ being less than a right angle and call it an acute angle. 8. Since \overrightarrow{PD} (except for point P) lies in the exterior of $\angle APB$, we say that $\angle APD$ is greater than a right angle and call it an obtuse angle. 9. As far as triangles are concerned they may be classified according to the measures of the angles or the measures of the sides.



10. $\triangle ABC$ is referred to as an equilateral triangle. 11. The sides of such a triangle all have the same linear measure. 12. $\triangle DEF$ is called an isosceles triangle which means that its two sides have the same measure. 13. You can see it in the drawing above. 14. $\triangle MKC$ being referred to as a right triangle means that it contains 1 right angle. 15. In $\triangle MKL$, $\angle M$ is the right angle, sides MK and ML are called the legs, and side KL is called the hypotenuse. 16. The hypotenuse refers only to the side opposite to the right angle of a right triangle. 17. Quadrilaterals are geometric figures ha-



ving four sides. 18. A parallelogram is a quadrilateral whose opposite sides are parallel. 19. Then the set of all parallelograms is a subset of all quadrilaterals. Why? 20. A rectangle is a parallelogram in which all angles are right angles. 21. Therefore we can speak of the set of rectangles being a subset of the set of parallelograms. 22. A square is a rectangle having four congruent sides as well as four right angles. 23. Is every square a rectangle? Is every rectangle a square? Why or why not? 27. A rhombus is a parallelogram in which the four sides are congruent. 25. Thus it is evident that opposite sides of a rhombus are parallel and congruent. 26. Is defining a square as a special type of rhombus possible? 27. A trapezoidal has only two parallel sides. 28. They are called the bases of a trapezoid.

Ex. 5. Which sentences in the text are the answers to the questions given below?

1. How many rays form an angle? 2. Into how many distinct sets of points do angles separate a plane? 3. According to what principle do we classify triangles? 4. What is an isosceles triangle? 5. What does the hypotenuse refer to? 6. What is a parallelogram? 8. How many sides of a square are congruent?

Classwork II

Ex. 6. Read these words.

a) Observe * the rules for reading.

under, up, want, wand, heavy, wallow, spread, duty, move, hook, wan, couple, hue, watt, guess, another, ever, wasp, cover, measure, dew, foot, true, usually, rude, soon, through, Euclid, newly, prove, ink, done, monthly, none, ready, myth, unity, impulse.

b) Give your explanation for the stress.

* observe — соблюдать

angle, certainly, extend, segment, direction, below, picture, extension, origin, common, vertex, separate *v*, distinct, exterior, interior, concern, classify, refer, hypotenuse, opposite, define, special.

Ex. 7. Ask questions, to which the sentences of Ex. 2 are the answers.

Ex. 8. Listen to your teacher's statements and ask questions about them.

T.: This is one of the legs of the triangle.

St.: Is this one of the legs of the triangle?

Ex. 9. Analyse and translate sentences 1, 9, 10, 14, 22 from the text (1).

Ex. 10. Listen to the following statements and say whether they are true or false. If you disagree with a statement begin with the words 'I am afraid it is wrong', As is known, As far as I know'.

Ex. 11. Answer your teacher's questions in connection with the text.

Ex. 12. Read the words below. Use them in short phrases of your own.

uncertain, to direct, formalization, deductive, separately, immeasurable, greatness, to lessen, rightness, classification, undefined.

Before you begin working with the text (2) «Euclidean and non-Euclidean geometries» read these words and guess their meaning.

postulate ['pɒstjʊlɪt] <i>n</i>	para'doxical situation
vari'ation	reason ['ri:zən] <i>n</i>
in'tuitively	pseudospherical [ˌpsjudou'sfe- rikəl]
diagonal [dai'ægənəl] <i>n</i>	de'ductive.
ellip'soidal <i>n</i>	
essentially [i'senfəli]	

b) Read these notes:

* at least — по крайней мере

* so-called — так называемый

* conclusions which may be drawn — выводы, которые можно сделать

* neither ... nor — ни ... ни

* It should be borne in mind — следует помнить

* so far — до сих пор

* they are just as valid — они столь же справедливы

* even though — даже хотя

Read this text to get its general idea.

Something about Euclidean and Non-Euclidean Geometries

1. It is interesting to note that the existence of the special quadrilaterals discussed above is based upon the so-called * parallel po-

stulate of Euclidean geometry. 2. This postulate is now usually stated as follows: Through a point not on line *L*, there is no more than one line parallel to *L*. 3. Without assuming (не допуская) that there exists at least * one parallel to a given line through a point not on the given line, we could not state the definition of the special quadrilaterals which have given pairs of parallel sides. 4. Without the assumption (не допуская) that there exists no more than one parallel to a given line through a point not on the given line, we could not deduce the conclusion we have stated (сформулировали) for the special quadrilaterals. 5. An important aspect of geometry (or any other area of mathematics) as a deductive system is that the conclusions which may be drawn * are consequences (следствие) of the assumptions which have been made. 6. The assumptions made for the geometry we have been considering so far * are essentially those made by Euclid in Elements. 7. In the nineteenth century, the famous mathematicians Lobachevski, Bolyai and Riemann developed non-Euclidean geometries. 8. As already stated, Euclid assumed that through a given point not on a given line there is no more than one parallel to the given line. 9. We know of Lobachevski and Bolyai having assumed independently of (независимо от) one another that through a given point not on a given line there is more than one line parallel to the given line. 10. Riemann assumed that through a given point not on a given line there is no line parallel to the given line. 11. These variations of the parallel postulate have led (привели) to the creation (создание) of non-Euclidean geometries which are as internally (внутренне) consistent (последовательный) as Euclidean geometry. 12. However, the conclusions drawn in non-Euclidean geometries are often completely inconsistent with Euclidean conclusions. 13. For example, according to Euclidean geometry parallelograms and rectangles (in the sense (смысл) of a parallelogram with four 90-degree angles) exist; according to the geometries of Lobachevski and Bolyai parallelograms exist but rectangles do not; according to the geometry of Riemann neither parallelograms nor * rectangles exist. 14. It should be borne in mind that the conclusions of non-Euclidean geometry are just as valid * as those of Euclidean geometry, even though * the conclusions of non-Euclidean geometry contradict (противоречат) those of Euclidean geometry. 15. This paradoxical situation becomes intuitively clear (ясно) when one realizes (понимаем) that any deductive system begins with undefined terms. 16. Although (хотя) the mathematician forms intuitive images (образы) of the concepts to which the undefined terms refer, these images are not logical necessities (необходимость). 17. That is, the reason for forming these intuitive images is only to help our reasoning (рассуждение) within a certain deductive system. 18. They are not logically a part of the deductive system. 19. Thus, the intuitive images corresponding to the undefined terms straight line and plane are not the same for Euclidean and non-Euclidean geometries. 20. For example, the pla-

ne of Euclid is a flat (плоский) surface (поверхность); the plane of Lobachevski is a saddle-shaped (седлообразный) or pseudo-spherical surface; the plane of Riemann is an ellipsoidal or spherical surface.

Ex. 12. Now, that you have read the text above, look through it again and say what its main point is. Into how many logical parts (paragraphs) could you divide the text?

ASSIGNMENT II

1. Exercises to be done at home 14—17.
2. Laboratory exercises: VII—XI.

Homework II

Ex. 14. Translate these sentences. Note the use of the Gerund.

1. He does not like being contradicted. 2. He knew nothing of our having realized the program. 3. This results in the product of two or more factors being equal to zero. 4. Instead of being divided by three the resulting number must be divided by four. 5. Besides being asked to speak at the conference he was asked to write an article. 6. We know of Lobachevski's having created a geometry different from Euclid's geometry. 7. Writing a sentence in algebraic form, as we have seen, involves two steps: (a) choosing the important words and groups of words and (b) replacing each of these words with algebraic symbols or expressions. 8. Graphing these two different equations involving the same unknowns gives one and only one pair of values for the unknowns that will check in both equations. 9. Dividing both the numerator and the denominator by the same value gives you the following expression. 10. Having only one solution is a different thing from having two equal solutions. 11. The two scientists' doing research independently made it possible to create two essentially different ways of solving the same problem. 12. One cannot do anything without thinking of the consequences. 13. The two statements being internally consistent is evident. 14. The Earth's moving around the Sun is common knowledge nowadays. 15. Because of its having no dimensions you cannot see a point, feel a point, or move a point. 16. A segment being extended indefinitely is easy to imagine.

Ex. 15. Ask questions to which the following sentences are the answers.

1. There is every reason to expect that their assumption is correct. 2. It is difficult to follow your line of reasoning. 3. The statement seems internally consistent. 4. These words contradict the commonly accepted principles. 5. Neither of them realized the necessity of changing the procedure. 6. The surface of the area should either

be flat or saddle-shaped. 7. Since we do not know the situation it is difficult to imagine the consequences. 8. They came to the same conclusion independently of one another.

Ex. 16. Read the text (2) and analyse the sentences you find difficult to understand. Pay special attention to sentences 3, 5, 6, 9, 11, 14, 15, 17.

Ex. 17. Summarise the principal ideas developed in both of the texts of the lesson.

Classwork III

Ex. 18. Read the words of Ex. 6 (a, b).

Ex. 19. Form a) adjectives and b) nouns by using the following suffixes.

- | | |
|----------|---|
| a) -able | — to reason, to vary, to imagin(e), to consider, to realiz(e), to measur(e), to use |
| -al | — form, physic(s), mechanic(s), practic(e) |
| -ous | — congru(ent), to var(y) |
| -ive | — act, product, effect, progress |
| -less | — base, air, work, use, sense |
| -full | — help, use, meaning |
| b) -ity | — valid, formal, certain |
| -ness | — right, thick, acut(e), flat, good |
| -ation | — to realiz(e), to imagin(e) |
| -ion | — to contradict, distinct, opposit, definit(e), to separat(e) |

Ex. 20. Ask question to which the sentences of ex. 14 are the answers. State the function of the Gerund in the sentences.

Ex. 21. Translate sentences 3, 5, 6, 9, 11, 14, 15, 17 from the text (2) of the lesson.

Ex. 22. Answer your teacher's questions in connection with the text (2).

Ex. 23. Say the following in English.

1. Мы можем сделать вывод... 2. Эти лучи берут начало в той же самой точке. 3. Данные лучи образуют тупой и прямой угол. 4. Треугольник ABC называют равнобедренным. 5. Прийти к выводу ... 6. Что касается геометрии Евклида ... 7. Эти выводы не противоречат выводам ... 8. Данное предположение может быть справедливым ... 9. В соответствии с необходимостью ... 10. Последствия такого рода рассуждений ...

Classwork I

Grammar:

The Participle. Its forms and functions

EXERCISES

Ex. 1. Read these groups of words and note the function and the form of the Participle.

1) 1. The moving point is ... 2. The speaking man may ... 3. The improving picture of ... 4. The developing system has produced ...

2) 1. The rays originating from the given point ... 2. This line extending indefinitely will ... 3. The angle separating the plane is ...

4. The intuitive images corresponding to ...
3) 1. The divided diagonal remained ... 2. The given postulate states ... 3. The applied method will give ... 4. The improved picture of the process showed ...

4) 1. The sentences written in algebraic form are ... 2. The two lines drawn parallel will never ... 3. Their work continued the next day showed ... 4. This object taken as a model serves to ...

5) 1. The statement made is consistent with ... 2. The problem dealt with seems important. 3. The calculations made were very accurate. 4. The number subtracted equals the difference.

6) 1. Drawing a rectangle one must ... 2. Finding the measure of the perimeter you can ... 3. When realizing this plan we ... 4. While giving his reason for ... 5. Assuming this as an axiom we can ... 6. When applying these rules one must remember ... 7. While checking these operations he ... 8. While considering the property of identity ...

7) 1. When asked about the consequences he ... 2. When applied carefully this method may ... 3. If continued further the work will be helpful. 4. If changed a little the problem will be easy to solve.

8) 1. Having prepared the article for publication he ... 2. Having obtained the necessary information the student ... 3. Having imagined this figure one must ... 4. Having been asked to remain in the lab he ...

9) 1. Being checked carefully the result must ... 2. Being reduced the fraction will not ... 3. Being spread all over the world the information may ... 4. Being given the dimensions of an object one can...

ASSIGNMENT I

1. Exercises to be done at home 2—5.

2. Laboratory work (to be done after homework): I—VI.

Homework I

1. Read these international words and guess their meaning.

distance ['distəns] n	fix [fiks] v	perimeter [pə'rimitə]
radius ['reidiəs] n	chord [kɔ:d] n	diameter [dai'æmitə]
symbolize ['simbəlaiz] v		center ['sentə] n, v

2. Read these words.

sharp острый	'matter 1. дело; 2. материя
compass ['kʌmpəs] циркуль	'sightly слегка
sheet лист (бумаги)	fortunately ['fɔ:tʃənətli] к счастью
enclose [in'klouz] заключать, окружать	discover [dis'klvə] обнаруживать
circle ['sə:kl] круг	ratio ['reifiou] соотношение
equidistant [i:kwɪ'distənt] равноудаленный	twice [twais] дважды
trough [θru:] через, сквозь	designate ['dezigneit] обозначать
arc дуга	while между тем, в то время
circumference [sə'kʌmfərəns] окружность	как

NOTES

* *no matter how* — независимо от того как, как бы ни

* *is equal to twice the length* — вдвое больше длины

Ex. 2. State the functions and the forms of the Participles. Translate these sentences.

1. Any expression like $x+5$ or $2x-3$ containing two or more terms may be called a polynomial which means an expression with many parts. 2. Such quantities as 5, x , $a-1$, and n^2+1 are prime, since they are not divisible by any quantities excepting themselves and 1. 3. In problems dealing with abstract numbers, negative answers are just as acceptable as positive ones. 4. Think of this point as lying not on the line. 5. Most of the problems concerning digits (0 through 9) are based on the fundamental principle of our decimal

system: that is, the position of a digit with respect to the decimal point indicates the value represented by it. 6. The signs of the two numbers being added in each of the problems above are the same, that is they are both positive or both negative. 7. An axiom is a statement generally accepted as true without proof. 8. The feature referred to seemed important. 9. No matter how * the problems dealing with the division of polynomials are stated they should always be copied in the form used for long division in arithmetic. 10. Having divided both the numerator and the denominator by x you will get the following expression. 11. Having defined the volume of this geometric object we can solve the given problem.

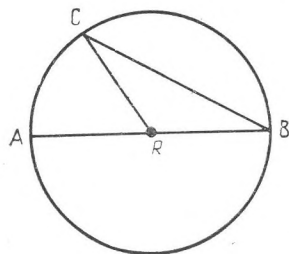
Ex. 3. Ask questions to which the sentences below are the answers.

1. A circle can easily be drawn with the help of a compass. 2. These points are fixed. 3. The line segment AR joins point A of the circle with its centre. 4. A circumference is another name for a circle. 5. A circumference encloses a part of a plane. 6. Yes, points A and B representing the opposite points of a circle are equidistant from the center. 7. The diameter of a circle passes through the centre. 8. They considered the matter carefully. 9. The ratio has been slightly changed. 10. Yes, the article is twice as long as his. 11. When changed slightly the plan was accepted. 12. The area enclosed in the circle can be measured provided one knows the measure of the circumference. 13. Having fixed the sharp end of the compass he drew a curved line. 14. They attend their English class twice a week. 15. The ratio of the distance to time must be stated first of all.

Ex. 4. a) Read the text (1) of the lesson. b) Analyse the sentences you find difficult to understand and translate them. Pay special attention to sentences 4, 10, 13, 14, 17. c) Read the same text again. Make sure you understand it in detail.

Circles

1. If you hold the sharp end of a compass fixed on a sheet of paper and then turn the compass completely around you will draw a curved line enclosing parts of a plane. 2. It is a circle. 3. A circle is a set of points in a plane each of which is equidistant, that is the same distance from some given point in the plane called the center. 4. A line segment joining any point of the circle with the center is called a radius. 5. In the figure above R is the center and RC is the radius. 6. What other radii are shown? 7. A chord of a circle is a line segment whose endpoints are points on the circle. 8. A diameter is a chord which passes through the center of the circle. 9. In



the figure above \overline{AB} and \overline{AC} are chords and \overline{AB} is a diameter. 10. Any part of a circle containing more than one point forms an arc of the circle. 11. In the above figure, the points C and A and all the points in the interior of $\angle ARC$ that are also points of the circle are called arc AC which is symbolized as \widehat{AC} . 12. \widehat{ABC} is the arc containing points A and C and all the points of the circle which are in the exterior of $\angle ABC$. 13. Instead of speaking of the perimeter of a circle, we usually use the term circumference to mean the distance around the circle. 14. We cannot find the circumference of a circle by adding the measure of the segments, because a circle does not contain any segments. 15. No matter how short an arc is, it is curved at least slightly. 16. Fortunately mathematicians have discovered, that the ratio of the circumference (C) to a diameter (d) is the same for all circles. This ratio is expressed $\frac{C}{d}$. 17. Since $d=2r$ (the length of a diameter is equal to twice the length * of a radius of the same circle), the following denote the same ratio.

$$\frac{C}{d} = \frac{C}{2r} \text{ since } d = 2r.$$

18. The number $\frac{C}{d}$ or $\frac{C}{2r}$, which is the same for all circles, is designated by π . 19. This allows us to state the following:

$$\frac{C}{d} = \pi \text{ or } \frac{C}{2r} = \pi.$$

20. By using the multiplication property of equation, we obtain the following:

$$C = rd \text{ or } C = 2\pi r.$$

Ex. 5. Which sentences in the text answer the questions given below?

1. How can one draw a curved line enclosing part of a plane? 2. In what geometric figure are all the points equidistant from the center? 3. Which line segment passes through the center of the circle? 4. Is a short arc also curved? 5. What have mathematicians discovered about the ratio of the circumference (c) to the diameter (d)? 6. Do we usually speak of a perimeter of a circle or do we rather use the term circumference? Why?

Classwork II

Ex. 6. Read these words.

a) Observe the reading rules.

may, vail, sigh, idle, outer, wild, design, old, designate, mind, amount, explain, town, cloud, fable, rain, gold, coal, try, host, cycle, wait, to graduate, blow, round, noble, break, blind, flow, approach, although.

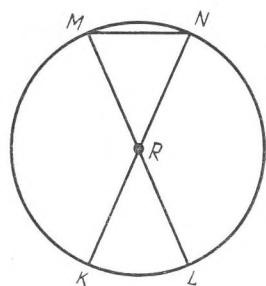
b) Give your explanation for the stress.
around, complete, enclose, circle, distant, radius, figure, above,
contain, symbol, symbolic, instead, around, measure, mathematician,
ratio, design, express.

Ex. 7. Ask questions to which the sentences of Ex. 2 are the answers.

Ex. 8. Listen to your teacher's statement and ask a question about it. The question must begin with the question word given by your teacher.

Ex. 9. Translate sentences 4, 10, 13, 14, 17 from the text.

Ex. 10. Use the figure for completing the following statements.



a) 1. RM is called a ... of the circle. 2. KN is twice as long as ... 3. LM is called a ... of a circle. 4. RL has the same length as ... 5. $\triangle MRN$ is an ... triangle. 6. Point R is called the ... of the circle and the ... of $\angle KRL$. 7. \overline{MN} is called ... of a circle. 8. \widehat{MN} is called an ... 9. $\angle MRN$ is an ... angle. 10. $\angle MRK$ is a ... angle.

b) 1. No matter how short an arc is it is ... at least slightly. 2. The term circumference means ... 3. A diameter is a chord which ... 4. A circle is a set of points in a plane each of which ... 5. We cannot find the circumference of a circle by adding ...

Ex. 11. Answer your teacher's questions in connection with the text (1).

Ex. 12. Guess the meaning of the italicised words.

radius — radial, circle — circulate — circulation, center — concentrate, symbolize — symbolically, short — to shorten, designate — designation.

Before you begin working with the text (2) "Circumference of a Circle" read these words and guess their meaning.

tra'dition tra'ditional 'formula n intro'duce v 'limit v , n 'clearly a , approxi'mation to approximate [ə'prɒksimeɪt] v approximate [ə'prɒksɪmit] adj bisect [baɪ'sekt] v 'regular 'octagon 'illustrate v

Read the notes:

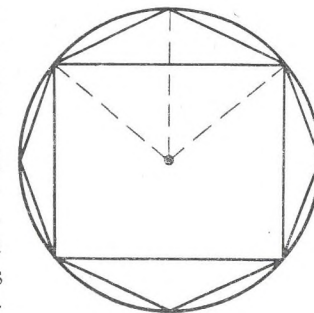
* in other words — иными словами

* To arrive at this more precise definition — для того чтобы прийти к такому более точному определению

Read this text. You will have to answer a few questions about the text.

Circumference of a Circle

1. In traditional approaches (подход) to mathematics, the circumference of a circle has not always been clearly defined. 2. That is, sometimes the circle itself was called the circumference, and at other times, the measure of the distance around the circle was called the circumference. 3. Here we shall define the circumference as the perimeter of the circle, in other words *, the measure of the entire path (весь путь) formed by the circle. 4. This definition is symbolized by the formula $C = \pi d$ or the formula $C = 2\pi R$. 5. There exist more precise (точные) definitions of a circumference. 6. To arrive at this more precise definition *, it is necessary to introduce the concept of limits. 7. By using the limit concept, the circumference of a circle may be defined as the limit of the perimeter of an inscribed (вписанного) regular polygon. 8. To illustrate this, we can first inscribe a square in a circle. 9. The sum of the sides of the square will be an approximation of the circumference of the circle. 10. Then, bisecting the central angles, which are subtended (стянуты) by the sides of the square we can inscribe a regular octagon. 11. The sum of the sides of the octagon will be a closer approximation of the circumference. 12. Next, bisecting the central angles subtended by the sides of the octagon, we can inscribe a regular 16-gon. 13. The sum of the sides of the 16-gon will be an even closer approximation of the circumference. 14. By a similar process we can then inscribe a regular 32-gon and 64-gon, and so on. Clearly the sum of n sides of an inscribed regular n -gon can be made to approximate the circumference of the circle as closely (близко) as desired by choosing n sufficiently (достаточно) large. 16. Thus the circumference of a circle may be defined as the limit of the perimeter of an inscribed regular n -gon as n increases.



Ex. 13. Now that you have read the text, say which sentences answer the following questions.

1. What makes us think that in traditional approaches to mathematics the circle has not always been clearly defined? 2. What concept is introduced for a more precise definition of the circumference? 3. How can one inscribe a regular octagon in a circle. 4. In what way can the sum of n sides of an inscribed regular n -gon be made to approximate the circumference of a circle as closely as possible?

ASSIGNMENT II

- Exercises to be done at home 14—17.
- Laboratory exercises: VII—XI.

Homework II

Ex. 14. Note the use of the Participle in the sentences to follow. Name the subject and the predicate in the sentences and translate them.

1. The procedure being used seems complicated. 2. Newton created his theory of Universal Gravitation being only 24 years old. 3. Having made a great number of experiments Faraday discovered electromagnetic induction. 4. The definition arrived at was sufficiently precise. 5. The results obtained changed the entire picture. 6. The students found the laboratory closed. 7. Having been properly approached the problem appeared easy to solve. 8. Physical facts expressed in terms of mathematics do not seem unusual nowadays. 9. The method followed appeared interesting and quite new. 10. When asked about the measure of the circumference he could not say anything. 11. Given the measure of two of the three sides of the triangle and the angle between them one can define the length of the third side. 12. If directed properly the particles will be constantly accelerated. 13. The approach to the problem being considered remained traditional.

Ex. 15. Ask questions to which the sentences below are the answers.

1. This is a traditional approach to the solution of such equations. 2. Having obtained sufficient information the scientists continued research. 3. I insist on his making precise measurements. 4. The entire situation was quite clear. 5. The words 'way' and 'path' sometimes mean the same thing. 6. We are to limit our discussion to only a few questions. 7. Yes, all the foreign delegates have already arrived. 8. Yes, the concepts introduced should be considered in detail.

Ex. 16. Read the text (2) and analyse the sentence you find difficult to understand. Pay special attention to sentences 3, 5, 6, 7, 8, 10, 15.

Ex. 17. Write a plan to help you while speaking on Circles and Circumference of a circle.

Classwork III

Ex. 18. Read the words of ex. 6 (a, b).

Ex. 19. Read these words and say whether they are nouns, verbs, etc. Guess the meaning of the italicised words. Give their Russian equivalents.

closely — to close — *close* — closure — to enclose, circle — circular — to encircle, precise — *precision* — *precisely*, to introduce — introduction, limit — *limitless* — *unlimited* — *limitation*, regular — *regularly* — *regularity* — *irregular*; to approximate — *ap-*

proximately — approximation, distance — *distant*, fortunately — *unfortunately*.

Ex. 20. Note the difference in the usage of the italicised words. Translate these sentences.

1. There was a man in the *center* of the circle. 2. All the children *centered* around the man. 3. Each angle of an equilateral triangle *measures* 60°. 4. All radii of the same circle have the same *measure*. 5. Computers like the ones *pictured* in this book are complicated. 6. Will you draw a *picture* of some polygon? 7. Mathematical measurements have many practical *uses* everywhere. 8. Without *using* your knowledge of unit *measure* you cannot expect, to *measure* perimeters or volumes of geometric objects.

Ex. 21. Ask questions for which the sentences of Ex. 14 provide the answers.

Ex. 22. Listen to the following statements and say whether they are true or false. If you disagree, begin your answer with: I am afraid you are wrong, In my opinion...

Ex. 23. Answer questions in connection with the text (2).

Ex. 24. Say the following in English.

Иными словами; это определение представлено следующей формулой; существует более точное определение; независимо от того как; путем деления угла пополам; можно легко вписать; дважды в месяц; прийти к заключению; к счастью для математиков.

Classwork I

Grammar:

Absolute Participle Construction

EXERCISES

Ex. 1. Read these sentences and see how the Absolute Participle construction is translated into Russian when it is placed (a) at the beginning of a sentence and (b) at the end of a sentence.

a) 1. The sides of triangle having the same measure, the angles opposite these sides have the same degree measure. 2. Numbers 5.168 and 3.8 being names for fractional numbers, we may write the above division as a complex fraction. 3. The measure of the circumference (being) given, you can find the area of the interior of the circle. 4. a and b being real numbers, the general expression $a+bi$ represents a complex number. 5. The theorem having been stated, the students could begin solving it. 6. With the distance (having been) defined, you can expect to find the speed. 7. With the temperature changing constantly, we could not make precise measurements. 8. With an object moving at constant speed, the distance covered is directly proportional to time.

b) 1. Every measurement can be named in many different ways, the most convenient name being chosen in every case. 2. We have drawn a triangle, the measure of its altitude being three times the measure of its base. 3. Electronic computers use binary numerals, 1 being represented by an electric circuit with the switch *ON* and 0 being represented with the switch *OFF*. The area of a circle is given by the formula $A=\pi r^2$, r representing the radius.

ASSIGNMENT I

1. Exercises to be done at home 2—5.
2. Laboratory exercises I—VIII.

Homework I

1. Read these international words and guess their meaning:
region ['rɪdʒən] *n* theorem ['θiərəm] *n* cons'truct *v* 'total *adj*

2. Read these words.

ancient ['eɪnfənt] древний
stretch вытягивать(ся), растягивать(ся)
rope веревка
unit ['ju:nɪt] 1. единица; 2. единица измерения
dash штрих, черточка

compare [kəm'preɪ] сравнивать
relationship [rɪ'leɪʃənʃɪp] взаимоотношение, соотношение
'credit 1. *n* зачет; 2. *v.* зачислять (заслугу)
area ['æəriə] площадь
several ['sevrəl] несколько

NOTES

* *Pythagoras is credited for* — Пифагору приписывают заслугу (воздают должное)

* *to begin with* — для начала

Ex. 2. Translate into Russian the following groups of words and sentences. Note the place of the Absolute Participle construction with respect to the Principal Clause.

1. The angle measure being known, we can ... 2. The definition given, it is possible ... 3. The statement being false, one cannot expect ... 4. All the other conditions being equal, it is necessary ... 5. With the experimental work completed, they could publish the results obtained. 6. With the first question considered, we can pass over to the next one. 7. There being no solution for a problem presented, it was difficult to ... 8. The previous chapter dealt with polygons, this type of geometric figures being very important in studying geometry. 9. Pythagoras having noticed this relationship, we credit him with the proof of the problem. 10. Other things being equal, the given relationship holds for this particular case.

Ex. 3. Ask questions using the question-words in brackets.

1. Pythagoras succeeded in stating this relationship. (in what way) 2. You have to stretch these ropes. (why) 3. I know several proofs of this theorem. (who) 4. This region of the area is dashed. (why) 5. Two right triangles are to be constructed in the given region. (how) 6. The sum of the four triangles makes the total area of this square. (why) 7. To begin with we shall divide the entire

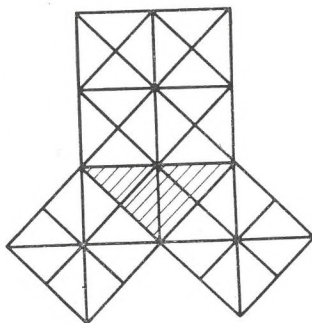
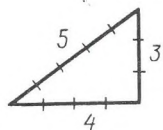
area into several equal units. (what) 8. The proof of the theorem stated seemed rather complicated. (the proof of which theorem)

Ex. 4. a) Read the text (I) of the lesson. b) Analyse the sentences you find difficult to understand and translate them. Pay special attention to sentences 1, 2, 7, 8, 9, 21, 24.

The Pythagorean Property

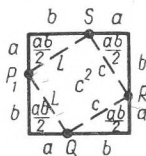
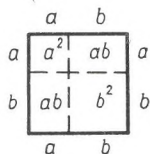
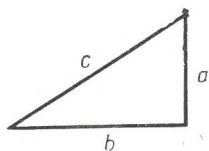
1. The ancient Egyptians discovered that in stretching ropes of lengths 3 units, 4 units and 5 units as shown below, the angle formed by the shorter ropes is a right angle. 2. The Greeks succeeded in finding other sets of three numbers which gave right triangles and were able to tell without drawing the triangles which ones should be right triangles, their method being as follows. 3. If you look at the illustration you will see a triangle with a dashed interior. 4. Each side of it is used as the side of a square.

5. Count the number of small triangular regions in the interior of each square. 6. How does the number of small triangular regions in the two smaller squares compare with the number of triangular regions in the largest square. 7. The Greek philosopher and mathematician Pythagoras noticed the relationship and is credited with the proof of this property known as the Pythagorean Theorem or the Pythagorean Property. 8. Each side of a right triangle being used as a side of a square, the sum of the areas of the two smaller squares is the same as the area of the largest square.



Proof of the Pythagorean Theorem

9. We should like to show that the Pythagorean Property is true for all right triangles, there being several proofs of this property-



10. Let us discuss one of them. 11. Before giving the proof let us state the Pythagorean Property in mathematical language. 12. In the triangle below, c represents the measure of the hypotenuse, and a

and b represent the measures of the other two sides. 13. If we construct squares on the three sides of the triangle, the area-measure will be a^2 , b^2 and c^2 . 14. Then the Pythagorean Property could be stated as follows: $c^2 = a^2 + b^2$. This proof will involve working with areas. 16. To prove that $c^2 = a^2 + b^2$ for the triangle above, construct two squares each side of which has a measure $a+b$ as shown below.

17. Separate the first of the two squares into two squares and two rectangles as shown. 18. Its total area is the sum of the areas of the two squares and the two rectangles.

$$A = a^2 + 2ab + b^2.$$

19. In the second of the two squares construct four right triangles. 20. Are they congruent? 21. Each of the four triangles being congruent to the original triangle, the hypotenuse has a measure c . 22. It can be shown that PQRS is a square, and its area is c^2 . 23. The total area of the second square is the sum of the areas of the four triangles and the square PQRS. $A = c^2 + 4(\frac{1}{2}ab)$. 24. The two squares being congruent to begin with *, their area measures are the same. 25. Hence we may conclude the following:

$$a^2 + 2ab + b^2 = c^2 + 4\left(\frac{1}{2}ab\right)$$

$$(a^2 + b^2) + 2ab = c^2 + 2ab.$$

26. By subtracting $2ab$ from both area measures we obtain $a^2 + b^2 = c^2$ which proves the Pythagorean Property for all right triangles.

Ex. 5. a) Which sentences in the text (1) answer these questions?

1. Could the ancient Greeks tell without drawing the triangles which ones would be right triangles? 2. Who noticed the relationship between the number of small triangular regions in the two smaller squares and in the largest square? 3. Is Pythagorean Property true for all right triangles? 4. What must one do to prove that $c^2 = a^2 + b^2$ for the triangle under consideration? 4. What is the measure of the hypotenuse if each of the four triangles is congruent to the original triangle?

b) Get the central idea of each of the logical parts of the text.

Classwork II

Ex. 6. Read these words.

a) Observe the reading rules.

latter, later, mainly, fare, halt, paste, applause, harm, draw, letter, sell, season, seem, learn, fear, grey, eight, knew, fit, find, field,

tired, light, firmly, formula, hope, fold, oil, come, worm, took, tool, blow, brown, fought, tune, use, fury, cue, cut, true, rule, fry, cycle, ready, your, you.

b) Give your explanation for the stress.

ancient, discover, without, illustration, region, compare, philosophy, property, language, follow, above, below, origin, total, conclude.

Ex. 7. Change the sentences of Ex. 2 according to the following model.

T.: The angle measure being known, we can ...

St.: Since (as, if, when) the angle measure is known we can ...

Ex. 8. Ask questions for which the sentences of Ex. 3 provide the answers.

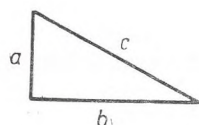
Ex. 9. Translate sentences 1, 2, 7, 8, 9, 21, 24 from the text (1).

Ex. 10. Answer your teacher's questions in connection with the text.

Ex. 11. Speak on the Pythagorean Property. Draw a picture to help you while speaking.

a) 1. When dealing with sets of three numbers the Greeks were able to tell without drawing the triangles which ones ... 2. They drew a triangle each side of which ... 3. They constructed small triangular regions in ... 4. Pythagoras noticed that there was a certain relationship between the number of ... and ... 5. If each side of a right triangle is used as a side of a square, the sum ...

b) 1. In the triangle below, c represents ... and a and b ... 2. If



you construct squares on the three sides of a ... 3. This means that $c^2 = \dots$ 4. To prove that the above formula is true we may construct two squares ... (The student is expected to construct the squares and go on with the proof).

c) Could you give some other proof of the same theorem?

Ex. 12. Guess the meaning of the italicised words. Use them in short phrases:

construct — construction — reconstruction — constructive, to compare — comparable — incomparable, relationship — to relate — relative — relatively, able — ability, notice — unnoticed, proof —

disproof, measure — measurable — measurability, to separate — separation — inseparable.

Before you begin working with the text (2) "Square Roots" read these words and guess their meaning.

par'ticularly 'positive 'negative 'radical n ex'press v re'sulting adj ir'ational.

Read the notes:

* In order to make sure — чтобы убедиться

* As a matter of fact — кстати говоря; на самом деле

* ... is about as near to 4^2 as ... — примерно так же приближается к 4^2 , как...

Read this text. After you have read it indicate the sentences conveying the main points.

Square Root

1. It is not particularly useful to know the areas of the squares on the sides of a right triangle, but the Pythagorean Property is very useful if we can use it to find the length of a side of a triangle. 2. When the Pythagorean Property is expressed in the form $c^2 = a^2 + b^2$, we can replace any two of the letters with the measures of two sides of a right triangle. 3. The resulting equation can then be solved to find the measure of the third side of the triangle. 4. For example, suppose the measures of the shorter sides of a right triangle are 3 units and 4 units and we wish (хотим) to find the measure of the longer side. 5. The Pythagorean Property could be used as shown below.

$$c^2 = a^2 + b^2, c^2 = 3^2 + 4^2, c^2 = 9 + 16, c^2 = 25.$$

6. You will know the number represented by c if you can find a number which, when used as a factor twice gives a product of 25. 7. Of course, $5 \times 5 = 25$, so $c = 5$ and 5 is called the positive square root (корень) of 25. 8. If a number is a product of two equal factors, then either (любой) of the equal factors is called a square root of the number. 9. When we say that y is the square root of K we merely (всего лишь) mean that $y^2 = K$. 10. For example, 2^2 is a square root of 4 because $2^2 = 4$. 11. The product of two negative numbers being a positive number, -2 is also a square root of 4 because $(-2)^2 = 4$. 12. The symbol $\sqrt{\quad}$ called a radical sign is used to denote the positive square root of a number. 13. That is \sqrt{K} means the positive square root of K . 14. Therefore $\sqrt{4} = 2$ and $\sqrt{25} = 5$. 15. But suppose you wish to find the $\sqrt{20}$. 16. There is no integer whose square is 20, which is obvious (очевидно) from the following computation. $4^2 = 16$ so $\sqrt{16} = 4$; $5^2 = 25$, so

$25 = 5$. 17. $\sqrt{20}$ is greater than 4 but less than 5. 18. You might try to get a closer approximation of $\sqrt{20}$ by squaring some num-

bers between 4 and 5. 19. Since 20 is about as near to 4^2 as* to 5^2 , suppose we square 4.4 and 4.5.

$$4.4^2 = 19.36$$

$$a^2 = 20$$

$$4.5^2 = 20.25$$

20. Since $19.36 < 20 < 20.25$ we know that $4.4 < a < 4.5$. 21. 20 being nearer to 20.25 than to 19.36, we might guess that $\sqrt{20}$ is near to 4.5 than to 4.4. 22. Of course, in order to make sure that $\sqrt{20} = 4.5$, to the nearest tenth, you might select values between 4.4 and 4.5, square them, and check the results. 23. You could continue the process indefinitely and never get the exact (точное) value of $\sqrt{20}$. 24. As a matter of fact*, $\sqrt{20}$ represents an irrational number which can only be expressed approximately as a rational number. 25. Therefore we say that $\sqrt{20} = 4.5$ approximately (to the nearest tenth).

Ex. 13. You have read the text above. Which sentences reflect the most important things about the text?

ASSIGNMENT II

1. Exercises to be done at home 14—17.
2. Laboratory exercises: VII—XI.

Homework II

Ex. 14. Translate these sentences paying special attention to the forms of the Participle.

1. All the necessary changes having been made, the experiment showed different results. 2. All the other conditions remaining the same, the temperature differs but slightly from the original temperature. 3. With the period of rotation being constant, we may expect... 4. With the work completed, it was possible ... 5. The area was defined, the measurements having been made with the help of a compass and a ruler. 6. While calculating the mass of an object we are to remember ... 7. When asked to compare the two approaches he agreed immediately. 8. Having multiplied both fractions by the same number we actually did not change the value of the fractions.

Ex. 15. Ask questions for which the sentences below provide the answers.

1. The origin of mathematics is rooted in the ancient world. 2. Both positive and negative roots will be dealt with in this chapter. 3. Wishing to know the average speed of the automobile one has to divide the total time by the distance covered. 4. The word *wish*

has the same meaning as the word *desire*. 5. He illustrated his words with the obvious facts. 6. I merely wished to express the same idea in a different way.

Ex. 16. Read the text (2) and analyse the sentences you find difficult to understand. Pay special attention to sentences 6, 11, 21, 22.

Ex. 17. Write a short summary of both of the texts of the lesson.

Classwork III

Ex. 18. Read the words of ex. 6 (a, b).

Ex. 19. Say which parts of speech the words given below belong to. Give Russian equivalents of the italicised words.

useful — useless — *uselessly*; to replace — *replacement*; to solve — *solvable*; suppose — *supposition*; product — *productive* — to produce; negative — *negation*; root — *rootless*; integer — *integral*; sure — *surely*; to continue — *to discontinue*; rational — *rationalize*.

Ex. 20. Read these sentences and state the functions of the *ing*-forms.

1. We have defined these sets as being equal. 2. Let us try dividing these numerals. 3. It is no use performing this operation now. 4. Having reduced the fraction we obtained the expected result. 5. The entire situation is being slightly changed. 6. We know of their having succeeded in finding an appropriate explanation. 7. When working with these signs one must be very careful. 8. On obtaining the difference one must check the result by addition to make sure it is correct. 9. Being reduced to its lowest terms the fraction is not changed. 10. Reducing the fraction to its lowest terms leaves it unchanged.

Ex. 21. Listen to the following statements and say whether they are true or false. If you think they are false say why. Begin your answer with: 'On the contrary ...'.

Ex. 22. Answer questions in connection with the text.

Ex. 23. Say the following in English.

Мы можем заменить c^2 величиной ...; предположим, например ...; говоря это, мы имеем в виду следующее; $\sqrt{20}$ больше чем 4, но меньше чем 5; мы можем продолжать этот процесс бесконечно.

Classwork I

Grammar:

The Infinitive. Its forms and functions

EXERCISES

Ex. 1. Read these sentences and note the form and the function of the Infinitive.

1. To solve this equation multiply each term in it by the quantity that precedes it. The first step in solving such a problem is to read the problem carefully to understand it correctly. In order to leave the number unchanged in value we are to multiply it by the same power of ten. We are to consider the following condition so as to imagine the consequences.

2. To prove this theorem means to find a solution for the whole problem. To check the result of the calculation is very important. To give a true picture of the natural world around us is the aim of science. To define which of these numerals is greater is not difficult.

3. The problem has been to simplify the procedure under consideration. Our aim is to extend the previous definition. The purpose of our article was to show the development of this particular area of mathematics. To do this means to reduce the fraction to its lowest terms.

4. Most of the stated problems in the chapter to follow will be problems with two or more unknowns. Now, you are to change the sign of the number to be subtracted mentally. **. The procedure to be followed depends *** entirely on the student. There are some im-

* aim — цель

** mentally — мысленно

*** depend (on) — зависеть

portant properties of division to be considered at this lesson. Euclid was the first to bring all the known facts about geometry into one whole system. The method to be applied is rather complicated.

5. Students are to study the laws * of mathematics and mechanics. It is to be noted that the decimal point separates every three numbers. Use is to be made of the information presented. In working with numerals one is to be very careful with the signs.

6. They must have attended his lecture. You may have seen this article in the book I gave you. This equation must have been solved. They may have obtained the necessary data.

ASSIGNMENT I

- Exercises to be done at home 2—5.
- Laboratory exercises: I—VI.

Homework I

- Read these international words and guess their meaning.

con'dition	'tennis	col'lection
'person	start n, v	'algebra
'theory n	com'ment v	'comment n

- Read these words.

adjust [ə'dʒʌst] приспособить,
регулировать
plant растение
people ['pi:pl] люди
truth [tru:θ] правда, истина
gain выиграть, приобрести
'likely вероятно
viewpoint ['vju:pɔɪnt] точка
зрения
series ['siəri:z] ряд
purpose ['pʊr:pəs] цель
dish тарелка
tool инструмент
play 1. игра; 2. играть
nevertheless [ˌnevəðə'les] тем
не менее

hear (heard) [hiə] [hə:d] слы-
шать
similar ['similə] подобный
contents содержимое
be'long принадлежать
stamp марка
'match-box спичечная коробка
des'cribe описывать
moreover [mɔ:g'ouvə] более то-
го
brace 1. круглые скобки; 2. за-
ключать в скобки
misunderstanding непонима-
ние, недоразумение
membership ['membəʃɪp] член-
ство
game игра

NOTES

* It is generally agreed — общепринято

* at least — по крайней мере, во всяком случае

* law [lɔ:] — закон

* *are not likely to change a great deal* — вряд ли существенно изменятся

* *better understanding ... can be gained* — можно добиться лучшего понимания

* *and the like* — и тому подобное

* *so that* — так что, как чтобы

Ex. 2. State the function of the Infinitive. Translate these sentences.

1. To find the truth is the aim of our discussion. 2. To know the truth you must make sure that you have considered every detail. 3. One has to know all the conditions to arrive at a certain conclusion. 3. To arrive at a certain conclusion was the aim of the discussion. 4. To adjust the new program to the existing machine is the purpose of this work. 5. To adjust the new program we shall have to do a great deal of work. 6. We must use braces or brackets so as to avoid misunderstanding. 7. The purpose of his questioning was to hear everybody's viewpoint. 8. My task has been to comment on the game. 9. The method to be described is rather convenient. 10. The tools to be used for this experiment should be very precise. 11. To belong to a group means to be a member of this particular group. 12. Similar situations will be described in the chapter to follow. 3. This collection of stamps must have belonged to one of them. 14. You may have played football when being a child. 15. You are to give your viewpoint on the subject.

Ex. 3. Ask questions to which the sentences below are the answers.

1. I heard your comment. 2. I cannot agree with what I have heard since it is not true. 3. He described a few similar situations. 4. There must have been some misunderstanding. 5. Our purpose was to gain some time. 6. This collection of match-boxes belongs to my little brother. 7. It is likely that they will adjust the new machine to the purpose of their research. 8. We must know the truth so as to help him. 9. The computer must be properly adjusted. 10. He stated his viewpoint at the conference. 11. This object belongs to a set of similar objects. 12. We are going to start a new series of experiments.

Ex. 4. a) Read the text (1) of the lesson. b) Analyse the sentences you find difficult to understand. Pay special attention to sentences 1, 2, 4, 7, 8, 10, 17.

Set Theory

1. If you stop to think of all the new things that have been developed since you can remember, you will agree with the often repeated comment that you live in a changing world. 2. Nothing can live and be useful without becoming adjusted to the conditions around

und it. 3. This is as true of mathematics and other areas of knowledge as it is of plants and people. 4. It is generally agreed * that the basic truths and most of the fundamental processes of arithmetic and algebra are not likely to change a great deal *. 5. Nevertheless, better understanding of the meaning of these relationships and operations can sometimes be gained * by studying them from a different viewpoint or expressing them in different terms and symbols.

6. One of the more recent approaches to the meanings of algebra is based on the idea of sets of things. 7. Everyone has used the word set at some time to mean a group or series of things to be used together or for a single purpose as a set of dishes, a set of tools and so on. 8. You may have played — or at least * you may have heard of — a set of tennis, meaning a particular series of games considered as a group.

9. The meaning of sets in algebra is very similar to the general use of the word. 10. That is, a set means any collection of objects, persons, or ideas that is so defined or limited that one can always tell whether or not a given object or idea belongs to that collection. 11. In other words, a collection of stamps, match-boxes and the like * can be called a set if the content of the collection is limited to the objects described in the name of the collection. 12. Moreover, you are a member of several sets. 13. The first set of which you became a member was your family. 14. Then when you started to school you became a member of your class, and so on.

15. A set is usually represented by a capital letter. 16. Any objects or idea that belongs to a set is called an element of the set. 17. All elements of a set are to be enclosed in braces { } so that * there should be no misunderstanding of what is included in the set.

18. Sets of mathematical objects or ideas are usually collections of particular numbers, points, lines, angles, and so on. 19. As you work with mathematical sets, remember that the term "set" means a collection which includes all of the numbers, points, or lines that satisfy the stated conditions for membership and which does not include any numbers, points, or lines, that do not satisfy the given conditions.

Ex. 5. Write a few questions about the text the answers to which might serve as a plan, reflecting the main points of the text.

Classwork II

Ex. 6. Read these groups of words. Give their Russian equivalents.

a theoretical approach; a proper adjustment; algebraic theories; a purposeless discussion; problems of similarity; to generalize the statement; a personal question; an idealistic position; a careful description; a familiar picture; satisfaction with one's work; to misuse

one's ideas; a usual misunderstanding; a truthful description; a baseless statement.

Ex. 7. Ask questions for which the sentences of Ex. 2 provide the answers.

Ex. 8. Translate sentences 1, 2, 4, 7, 8, 10, 17 of the text (1).

Ex. 9. Ask each other questions you wrote at home (Ex. 5). Observe the logical sequence of the text in asking questions.

Ex. 10. Speak on sets. Use the sentences below.

1. Nothing can live and be useful without becoming ... 2. It is generally agreed that the basic truths and most of the fundamental ... 3. Nevertheless, better understanding of the meaning ... 4. One of the more recent approaches to the meanings of algebra is based ... 5. The meaning of sets in algebra is ... 6. A set means any ... 7. Any object or idea that belongs to a set is called ... 8. Sets of mathematical objects or ideas are usually collections of ...

Before you begin working with the text (2) "Solution Sets" read these words and guess their meaning:
specific, 'planet, 'orbit, 'Jupiter, 'Mercury, des'cription

Read the notes:

* you are sure to remember — вы, разумеется, помните

* In this case — в этом случае

* orbits of both planets do lie ... — орбиты обеих планет действительно находятся

Read this text. You are expected to answer a few questions about it.

Solution Sets

1. If each element of a set makes a given statement true, the set is called the solution (решение) set for that statement. 2. You have worked with statements of equality as well as with statements called inequalities. 3. You are sure to remember * that the simple fact that one number is not equal to another can be expressed by the symbol \neq . For example $5-2 \neq 4$. 4. However, to know which of two unequal numbers is the larger we need a more exact description. 5. In this case * we use more specific symbols $<$ or $>$. Therefore a mathematical sentence like $5 \neq 3$ expresses the general inequality, $5 > 3$ stating the specific condition that 5 is greater than 3 and $3 < 5$ showing the specific condition in which 3 is less than 5. 7. In dealing with mathematical sentences you are to choose the correct symbol for a statement to be true. 8. If you choose the incorrect symbol, the statement is false. 9. Similar statements in which the symbol of relationship is given, but one of the required (тре-

буемых) quantities is missing (недостающий), are called open sentences. 10. Thus, the sentence "— is a planet whose orbit around the sun is smaller than the earth's orbit" is an open sentence. 11. If you write "Jupiter" in the blank (пробел) you have not made a true statement. 12. The solution set for this open sentence is { Venus, Mercury }, since both of these planets satisfy the two conditions of the required set. 13. That is, the orbits of both planets do lie * inside (внутри) the earth's orbit and these are the only known planets that do travel (проходят) closer to the sun than the earth does.

14. Mathematical sentences may also be written as open sentences. 15. Thus to write $5+ _ = 8$ is to write an open sentence whose solution set is {3} since this is the only number that will make this a true statement. 16. The open sentence $5+ _ > 8$, however (однако), can be completed with any number greater than 3. 17. Therefore, the solution set for this sentence can be written {all numbers greater than 3}. 18. When the numbers from which you are to choose a solution set are limited to a particular group of numbers, it sometimes happens (случается) that there is no solution to satisfy a given statement. 19. That is, there is no natural number that will make the two statements $5+ _ = 3$ and $5+ _ < _$ true statements. 20. Therefore, if you are limited to natural numbers the solution for such statements is said to be an empty set, which is indicated by the symbol \emptyset .

Ex. 11. Now that you have read the text Solution Sets say a) What is specific about these sets? b) What is an empty set? c) What is an open set?

ASSIGNMENT II

1. Exercises to be done at home 12—15, 2. Laboratory exercises XII—XI.

Homework II

Ex. 12. a) Note the form and the function of the Infinitive in the sentences below. Look for the Subject and the Predicate. Translate these sentences.

1. The energy to be captured must be produced ... 2. Automatic control of the entire process is to be performed. 3. To answer this question means to find a solution for the problem as a whole. 4. To record the information the machine is to be properly adjusted. 5. The article to be published consists of several parts. 6. He may have changed his opinion on the subject. 7. A certain way out of the situation must have been found out. 8. The instrument to be used is very sharp. 9. These numerals are to be grouped in a special way so as to represent a certain sequence. 10. Christopher Columbus was the first to have travelled from Europe to America.

b) Note the use and the meanings of the verb 'do'. Translate these sentences.

1. These two planets do travel at the same speed. 2. The point does lie inside the triangular region. 3. This system as well as the other one does require a certain modification. 4. This term students do not attend as many lectures as they did during the previous term. 5. The article describes the method worse than the book does.

c) Note the various meanings of the italicised words. Translate the sentences.

1. These equations differ *only* a little. 2. The *only* difference between these statements is ... 3. This is *the very* advantage that makes the new system better than the old one. 4. The process being described takes place at *very* high temperatures.

Ex. 13. Read the text (2) and analyse the sentences you find difficult to understand. Pay special attention to sentences 3, 4, 6, 7, 13, 15, 18.

Ex. 14. Write a plan to help you while speaking on Solution Sets.

Ex. 15. Arrange these words according to the parts of speech they belong to.

1. true — truth — truthful — untrue; equal — equalize — equality; sure — surely, simple — simply — simplification — simplify; symbol — symbolic — symbolize; specific — specify — specification; general — generally — generalize; condition — conditional; correct — correctness; false — falsify — falsification; to require — requirement; orbit — orbital; planet — planetary; natural — naturally — nature; to solve — solvable.

Classwork III

Ex. 16. a) Read the words of Ex. 15. b) Use each word in a combination of words to make sure you understand its meaning, for example: a true mathematical sentence, a truthful answer, etc.

Ex. 17. Ask questions for which sentences 3, 4, 7, 15, 16, 18 of the text (2) provide the answers.

Ex. 18. Listen to the following statements by the teacher and say whether they are true or false. Use: 'I think you are wrong'; 'To my mind'; 'On the contrary'.

Ex. 19. Answer questions in connection with the text.

Ex. 20. Say the following in English.

Это правило справедливо для; это неравенство можно выразить символом; нам нужно более точное описание; особое условие; имея дело с математическими выражениями; нам предстоит выбрать правильный знак; требуемое множество; планеты проходят; если мы ограничены натуральными числами; с другой точки зрения; иными словами; заключать в скобки.

Classwork I

Grammar:

Complex Object

The for-phrase and the Infinitive

EXERCISES

Ex. 1. Read these sentences and note the form and the function of the Infinitive.

a) 1. Let us assume the product to be equal to 10. 2. Suppose the volume of the box to be n . 3. We expect this sentence to be true. 4. One may assume this law to hold for all similar cases. 5. We know mathematics to have become man's second language. 6. We expect a variable or a mathematical expression containing a variable to represent a number. 7. We know two numbers to be relatively prime to each other if their greatest common factor is 1. 8. We expect this solution to satisfy the given statement. 9. Teachers want their students to attend classes regularly. 10. The students saw their teacher draw (drawing) a line segment. 11. We heard him speak (speaking) at the conference. 12. I heard them discuss (discussing) similar question.

b) 1. We have to consider whether it is possible for this sentence to become true. 2. This question is too difficult for him to answer it immediately. 3. It is impossible for the students to solve this equation without knowing commutative law. 4. For a book to be useful it must be studied carefully. 5. For this sentence to become true you are to replace the variable with the proper numeral.

ASSIGNMENT I

- Exercises to be done at home 2—5.
- Laboratory exercises I—VI.

Homework I

1. Read these international words and guess their meaning.

in'terpret <i>v</i>	in,terpre'tation	graph <i>n, v</i>
hori'zontal	co'operative <i>v</i>	com'mutative
non-commutative	perpen'dicular <i>adj</i>	numerical
coordinate <i>n, adj</i>	[kou'ɔ:dimit],	<i>v</i> [kou'ɔ:dineit]

2. Read these words.

Cartesian [ka:'tizejən] декартов
im'portance значение, важность
'ordered упорядоченный
still ещё, всё ещё
purposeless ['pə:pəsli:s] бес-
смысленный
of course [əf'kɔ:s] разумеется,
конечно
2. интересоваться
vice versa ['vaisi] [və:sə] нао-
борот

'label 1. *n* ярлык; 2. *v* обозна-
чать отмечать
wonder ['wʌndə] 1. удивляться;
assign [ə'sain] приписывать,
придавать
'upper верхний
axis (pl. axes) ['æksis]
[æksi:z] ось
lo'cate определить местона-
хождение
a'long вдоль
pre'cede предшествовать

NOTES

- * *be of some importance* — иметь некоторое значение
- * *you will wonder* — вы будете недоумевать
- * *at first* — сначала
- * *given that* — если дано, если задано
- * *the Cartesian product of set 'A' with itself* — декартово произведение множества 'A' само на себя
- * *perpendicular to each other* — перпендикулярны друг другу

Ex. 2. In the sentences to follow look for the complex object and then translate the sentences.

1. We know this magnitude to depend on temperature. 2. We expect them to have intensified the whole process. 3. They did not believe this cooperation to be of great consequence. 4. I expect you to locate the object by applying the rule you have just learned. 5. You cannot see a point moving along the line. 6. I wonder why he considers your experiment purposeless. 7. Everybody knows matter to consist of small particles called atoms. 8. Nobody heard the machine begin operating. 9. For the calculation to be correct you must carry it out carefully. 10. He found the modification to require a lot of work. 11. We believed the advantages of the new computer to be obvious. 12. I expected the new measuring instruments to have been already sent to the laboratory.

Ex. 3. Replace the Object with the Complex Object.

I.: I want to label this number line with X. (he).

St.: I want *him* to label this number line with X.

1. He expects to locate the object in the sky. (I). 2. I want to draw both axes. (she) 3. I expect to speak about the importance of coordinating our research. (they) 4. I want to assign the letter Y to the horizontal line. (you)

Ex. 3. Ask questions for which the sentences of Ex. 1 provide the answers.

Ex. 4. a) Read the text (1) of the lesson. b) Analyse sentences you find difficult to understand. Pay special attention to sentences 4, 8, 14, 18, 19, 20, 21, 26.

The Coordinate Plane

1. Now, we want you to consider two sets: A and B , such that $A = \{a, b, c\}$ and $B = \{d, e\}$. We will form a new set from sets A and B , which we will call the Cartesian product, or simply the product set, by forming all possible ordered pairs (x, y) such that x is from set A and y is from set B . 3. This new set is denoted by $A \times B$ (read A cross B).

$$A \times B = \left\{ \begin{array}{l} (a, b), (a, c) \\ (b, d), (b, e) \\ (c, d), (c, e) \end{array} \right\}$$

4. Let us use the notation $n(A)$ to mean the number of elements in set A and $n(A \times B)$ to mean the number of elements (ordered pairs) in $A \times B$. 5. Observe that $n(A \times B) = 6$ and that $n(A) = 3$ and $n(B) = 2$. 6. Since $3 \times 2 = 6$, we see there is a relationship of some importance * between the set operation of forming the Cartesian product and multiplication of numbers $n(A) \times n(B) = n(A \times B)$. 7. Now let us form $B \times A$.

$$B \times A = \left\{ \begin{array}{l} (d, a), (d, b), (d, c) \\ (e, a), (e, b), (e, c) \end{array} \right\}$$

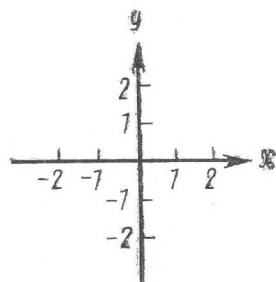
8. You may have noticed that no elements (ordered pairs) of $B \times A$ are the same as those of $A \times B$, though their numbers are still the same. 9. This means that $A \times B \neq B \times A$, while $n(A) \times n(B) = n(B) \times n(A)$. 10. Forming the product set is a non-commutative operation. 11. In this case it is a non-commutative multiplication. 12. In our next step we do something that as first * will seem purposeless. 13. Given that set $A = \{a, b, c\}$, we will form the new set $A \times A$.

$$A \times A = \left\{ \begin{array}{l} (a, a), (a, b), (a, c) \\ (b, a), (b, b), (b, c) \\ (c, a), (c, b), (c, c) \end{array} \right\}$$

14. This is, of course, the Cartesian product of set A with itself *, and you will wonder * what you can do with it. 15. Its use will become clear if we let $X = \{0, 1, 2\}$ and let $Y = \{0, 1, 2\}$. 16. Then find $X \times Y$ the Cartesian product of a set with itself since $X = Y$.

$$X \times Y = \left\{ \begin{array}{l} (0, 0), (0, 1), (0, 2) \\ (1, 0), (1, 1), (1, 2) \\ (2, 0), (2, 1), (2, 2) \end{array} \right\}$$

17. We then interpret this set of ordered pairs of numbers as a set of points in a plane such that to each point there corresponds one ordered pair of numbers and vice versa. 18. Now it is necessary for us to set up a model for geometric interpretation. 19. To do this we intersect two number-lines at the zero-point, or the origin of the graph, so that the lines are perpendicular to each other *. 20. Label the number lines as shown in the following figure by choosing X to denote the set of points on the horizontal line and Y to denote the set of points on the vertical line. 21. Now we are to assign positive



numbers to the right half-line of x and negative numbers to the left half-line of x . 2. Similarly we assign positive numbers to the upper half-line of y and negative numbers to its lower half-line. 23. The two number lines are called axes. 24. We speak of x -axis when we refer to the horizontal number line and of y -axis when we refer to the vertical number line. 25. We now have an interpretation such that every ordered pair of numbers labels a point in the plane determined by the x and y axes.

26. Since we find each of the axes to represent an ordered set of points and both axes to cooperate in determining the plane, such a system is said to be a coordinate system and the plane determined by it is said to be a coordinate plane. 27. Each ordered pair (x, y) tells you how to locate a point in the coordinate plane, by starting from the origin. 28. (x, y) means: first move x units from $(0,0)$ along x -axis to the right or left (indicated by + or — preceding the first numeral of the pair); then move y units from that point parallel to the y -axis (up or down as indicated by + or — preceding the second numeral of the pair).

Ex. 5. Write down the main points of the text (1).

Classwork II

Ex. 6. Read these groups of words. Give their Russian equivalents.

a) highly productive method; high productivity; to formalize the results; the necessary formality; elemental analysis; the property of

commutativeness, to falsify the truth; a wonderful thing; our correspondent; an outstanding geometrician; axial rotation; close cooperation; coordination of various viewpoints.

Ex. 7. Replace the Complex Object with the Object Clause wherever possible. Use Ex. 2.

Ex. 8. Translate sentences 4, 8, 14, 18, 19, 20, 21, 26 of the text (1).

Ex. 9. Answer your teacher's questions in connection with the text.

Ex. 10. You wrote down the main points of the text (1) at home. Now speak on every point in detail.

Before you begin working with the text (2) "More about the Coordinate Plane" read these words and guess their meaning:

to 'generate, o'iginal, corres'pondence, mathe'matically, to point (on).

Read the Notes:

*union of sets — объединение множеств

* they may very well — они могут с успехом

* one-to-one correspondence — однозначное соответствие

* $A \cup B$ — union of sets A and B — объединение множеств A и B

* $A \cap B$ — intersection of sets A and B — пересечение множеств A и B .

Read this text. You are expected to say a few words about it after you have read it.

More about the Coordinate Plane

So far our set operations (union of sets *, intersection of sets) have led (привели) us to new sets whose elements are of the same kind mathematically, as those of the original sets. 2. For example, if the elements of set A are students and the elements of set B are students, then the elements of $A \cup B$ * and $A \cap B$ * (if it is not empty) are students. 3. In the previous article you have learned about a set operation that generates a new set whose elements are different, mathematically, from the elements of the original sets. 4. This new set the elements of which will consist of ordered pairs of elements from the original sets, is called the Cartesian product, as you already know. 5. We have defined two ordered sets to be equal if and only if (iff) they contain exactly the same elements in exactly the same order. 6. For example, if set $X = \{0, 1, 2, 3\}$ and set $Y = \{0, 1, 2, 3\}$ then set $X =$ set Y . 7. You may wonder why we have different names for two equal sets. 8. The answer is that although (хотя) the sets are equal as sets, they may very well * represent different physical entities (сущности). 9. We define set Y as the set of all y such that these y are points on a vertical straight line. 10. By assigning numerals to these points, we establish (устанавливаем) two one-to-one

correspondences * between a set of numbers and a set of points, one for the number line called x and the other for the number line called y . 11. As a result we obtain a model of a rectangular coordinate system. 12. The important thing is that we can use these two one-to-one correspondences to establish one single one-to-one correspondence between all the points in the plane and all ordered pairs of real numbers. 13. This means that every point of the Cartesian plane is uniquely defined by one ordered pair of numbers, and that conversely (наоборот), to every ordered pair of real numbers there corresponds one and only one point of the plane. 14. Since ordered pairs of numbers define points and since points define lines and polygons, we have established a basic pattern whereby (тем самым) number relations can express geometric figures and geometric figures can be reduced to numerical expressions. 15. Thus we find arithmetic and geometry to have become one single mathematical system.

Ex. 11. Now that you have read the text (2), say whether anything new has been introduced in it as compared to the previous text (1) as far as the coordinate system is concerned. What is it?

ASSIGNMENT II

1. Exercises to be done at home 12—17.
2. Laboratory exercises. VII—IX.

Homework II

Ex. 12. Note the form and the function of the Infinitive in these sentences and translate them.

1. We consider these two phenomena to be of the same origin. 2. I expect this law to hold for all similar cases. 3. We understand this method to consist of several steps. 4. They wanted us to establish a certain correspondence between these two facts. 5. We assume the program to have been carefully developed. 6. We suppose the particles to be generated at very high speed. 7. For a proper correspondence between these phenomena to be established they first have to be considered separately. 8. For correct conclusions to be drawn all the conditions must be observed. 9. It was impossible for the process to continue. 10. I wonder if it is necessary for them to come. 11. For you to begin the work now is very important. 12. For the problem to be understood it must be read carefully.

Ex. 13. Translate these groups of words.

1. The union of sets so far considered can be ... 2. The correspondences so far established are ... 3. The entities so far defined are ... 4. The particles so far observed move ... 5. The energy so far generated seems ...

Ex. 14. Read the text (2) and analyse the sentences you find difficult to understand. Pay special attention to sentences 1, 5, 12, 15.

Ex. 15. Write down the main points of the text (2) in the form of questions to ask your class-mates during the discussion on the coordinate plane.

Ex. 16. Write a short summary of both of the texts of the lesson to reflect the main points.

Ex. 17. Arrange these words according to the parts of speech they belong to.

empty — emptiness — to empty; previous — previously; to generate — generator — generation; define — definable — undefinable — definitely; product — to produce; to contain — container; order — disorder — ordered; answer — unanswerable; result — resultant; single — singular — singularity; real — reality — unreal.

Classwork III

Ex. 18. a) Read the words of Ex. 17; b) Use each word in a combination of words to make sure you understand its meaning.

Ex. 19. Ask question for which sentences 1, 5, 9, 10, 11, 12, 15 of the text (2) provide the answers.

Ex. 20. Complete these sentences.

1. In the previous article you have learned about a set operation that generates a new set whose elements are different, mathematically, from ... 2. This new set the elements of which will consist of ordered pairs of elements from the original sets is called ... 3. We have different names for equal sets since these sets may represent different ... 4. By assigning numerals to the points we establish two one-to-one correspondences between a set and ... 5. Every point on the Cartesian plane is uniquely defined by ... 6. Thus we find arithmetic and geometry to have become one ...

Ex. 21. Listen to the following statements and say whether they are right or wrong. If you think they are wrong say why.

Ex. 22. You wrote questions about the text (2) at home (Ex. 15). Now ask your class-mates the questions you have in logical sequence.

Ex. 23. Say the following in English.

Первоначальное множество порождает новое множество; элементы множества состоят из; как вы уже знаете из определения; устанавливать взаимоднозначное определение; упорядоченная пара чисел; мы определяли; пересечение множеств; объединение множеств; приписать точное числовое значение; если нам дано; подобным же образом; брать начало в точке пересечения; справа от оси x ; двигаться от точки; вверх или вниз вдоль оси.

Classwork I

Grammar:

Complex Subject

EXERCISES

Ex. 1. Read these sentences. Note the form of the Complex Subject. Name the predicate in these sentences and translate them.

1. The students are expected to know that law. 2. Their approach is supposed to give a certain advantage. 3. This law has always been thought to be useful. 4. The procedure appeared to be appropriate. 5. He seems to have changed his point of view. 6. A proper interpretation of this fact appears to have been obtained. 7. The computation proved to be complicated. 8. My teacher happened to have read the article. 3. They were understood to agree with our viewpoint. 10. There seems to have been a slight misunderstanding.

11. These rules appear to be just the opposite of the rules introduced previously. 12. Any fraction may be supposed to represent the quotient of its numerator divided by its denominator. 13. If a radicand * has both a positive and a negative root, the radical is understood to mean the positive root which is called the principal root. 14. Any object or idea that belongs to a set is said to be an element of the set. 15. These laws are known to apply to all kinds of exponents: positive and negative, integral or fractional. 16. After Leibnitz's death **, the binary system was almost forgotten but in recent years this system has been found to be very useful. 17. The students are not expected to remember these proportions. 18. It is generally agreed that the basic truths and most of the fundamental processes of

* radicand — подкоренное выражение
** death — смерть

arithmetic and algebra are not likely to change a great deal. 19. This law does not appear to hold for all the equations considered. 20. There does not appear to be an agreement between the results obtained.

ASSIGNMENT I

1. Exercises to be done at home 1—6.
2. Laboratory exercises I—VII.

Homework I

1. Read these international words and guess their meaning. poly'nomial, bi'nomial, tri'nomial mo'nomial, ex'ponent, coe'fficient
2. Read these words.

law [lɔ:] закон
skip перескакивать, прыгать
restrict ограничивать
parenthesis (pl. parentheses) [pə'renθisis [pa'renθisi:z] скобка
arrange [ə'reindʒ] размещать, располагать

res'pect отношение, касательство
des'cend 1. снижение; 2. убывать, спускаться
as'cend 1. подъем; 2. подниматься, восходить
convenient [kən'vi:njənt] удобный

NOTES

- * you are going to need — вам понадобится
- * may be thought of as — можно представить себе как
- * in much the same way — примерно так же
- * used to — бывало, обыкновенно
- * with respect to — относительно

Ex. 2. In the sentences below look for the predicate and the complex subject. Translate these sentences.

1. Scientists are sure to find an appropriate answer to this question some day. 2. The hypothesis proved to be based on the wrong assumption. 3. The conditions do not seem to be properly observed. 4. Certain changes appear to have taken place. 5. The experiment is likely to have failed. 6. These results are believed to have been published recently. 7. This hypothesis is unlikely to have been proved. 8. The article I was interested in happened to be in our library. 9. Only a century ago the atom was believed to be indivisible. 10. The theory of relativity happened to be a turning point in physical thinking. 11. These particles have recently been discovered to be of complex structure. 12. The results obtained seem to contradict

the hypothesis. 13. The method created is not considered to have any advantages over the old one. 14. These two phenomena do not appear to have anything in common.

Ex. 3. Use sentences 1, 2, 4, 5, 6, 11, 14, 15, 17, 19 of Ex. 1 for saying the same thing in a different way. Observe the rules for the Sequence of Tenses.*

- a) T.: Everybody is (was) expected to know those rules.
St.: It is (was) expected that everybody knows (knew) those rules.
b) T.: They seem (seemed) to have enough time.
St.: It seems (seemed) that they have (had) enough time.

Ex. 4. Ask a direct question following the model.

T.: Find out whether everything has been arranged.
St.: Has everything been arranged?

T. Find out

- ... whether the students know the law for exponents.
- ... whether he is to use parentheses.
- ... whether they have skipped the second chapter.
- ... whether they must restrict themselves to one method of control.
- ... whether they wrote the numerals in ascending order.
- ... whether the digits are written in descending order.
- ... whether it is convenient to arrange numbers in ascending order.
- ... whether the students are going to need the law for exponents.
- ... whether this definition can be stated with respect to algebra.

Ex. 5. a) Read the text (1) of the lesson; b) Analyse the sentences you find difficult to understand. Pay special attention to sentences 1, 2, 3, 5, 10, 11, 13, 14, 17, 20.

Ex. 6. Write down a plan of the text (1) reflecting its main points to help you while speaking on the subject in class.

Polynomials

1. In many of the problems in the preceding chapters you found that one of the unknowns has to be represented by an expression containing two terms, such as $x+5$ or $2x-3$. 2. Any expression of this kind consisting of two or more terms is known to be called a polynomial, which means an expression with many parts. 3. However, polynomials with only two terms are often referred to as binomials to classify them more specifically. 4. Similarly, polynomials with three terms are usually referred to as trinomials and single terms are called monomials.

5. You are sure to remember rules for signs, laws of exponents, definitions of term, like terms, factors, coefficients and exponents.

* Sequence of Tenses — согласование времен

6. You are going to need * all these to develop ways of combining, multiplying, and dividing polynomials. 7. Here we shall skip combining polynomials and shall only restrict ourselves to multiplying by a polynomial.

8. The product of one polynomial by another is usually indicated by writing each expression in parentheses with no sign of operation between the expression. 9. You have already learned to multiply each term within a parenthesis by the multiplier outside it. 10. Therefore, a pair of parentheses written in this way means that each term in one set of parentheses is to be multiplied by each term in the other parentheses. 11. For example, $(x+2)(x+5)$ may be thought of as * $x(x+2)$ and $5(x+2)$. 12. Multiplying we get $x^2+2x+5x+10$ and combining like terms, $x^2+7x+10$. 13. However, when all the steps of the multiplication are to be shown, it is more common to write a polynomial multiplier under the multiplicand and multiply by each term in the multiplier in much the same way * as you have done in arithmetic.

$$\begin{array}{r} x^2 + 2x - 3 \\ x - 2 \\ \hline x^2 + 2x^2 - 3x \\ - 2x^2 - 4x + 6 \\ \hline x^3 - 7x + 6 \end{array}$$

14. Writing the multiplier at the left end of the multiplicand and multiplying from left to right, as shown in the given example proves to be more convenient than from right to left as you used to * do in arithmetic. 15. You will also find it possible to arrange both the multiplier and the multiplicand in the same order. 16. In this case all terms with powers of the same letter are to be written in order with respect to * the exponents, as x^3, x^2, x . 17. If the terms of a polynomial are arranged in order from the highest exponent of a given letter to the smallest, it is said to be arranged in descending order (x^3, x^2, x). 18. If they are in the order from the smallest to the highest exponent, they are arranged in ascending order (x, x^2, x^3). 19. As in the case of multiplication, the division of polynomials is merely a series of divisions by monomials. 20. Therefore, we find the division of any algebraic expression by another to be based on the same rules for signs and exponents as those used with monomial terms.

Classwork II

Ex. 7. Read these groups of words. Give their Russian equivalents.

a factorable function; the necessary restrictions; restrictive measures; endless work; an inconvenient way of writing; a powerful machine; a baseless statement; the respective field of science; an indivisible particle; the sameness of their results; the uselessness of the whole operation.

Ex. 8. Ask question for which the sentences of ex. 2 provide the answers.

Ex. 9. Ask one of your classmates.

... if students are to restrict themselves to addition and subtraction at this stage.

... if numbers 6, 2, 4, 8 are to be arranged in descending or ascending order.

... if you must consider point B with respect to the axes x and y .

... if he finds this method of multiplication convenient.

... if these terms are referred to as polynomials.

Ex. 10. Translate sentences 1, 2, 3, 5, 10, 11, 13, 14, 17, 20 of the text (1).

Ex. 11. Speak on polynomials according to the plan of the text (1) you wrote at home.

Before you begin working with the text (2) read these words and guess their meaning.

quadratic, convenience, finally, reference.

Read the Note:

* as it happens to be — как это имеет место

Read the text. While reading it mark the sentences that reflect its main points.

Trinomials that are Quadratic Trinomials

1. Any trinomial containing the second power of the unknown in one term, the first power of the unknown in another term, and a term without the unknown is said to be a quadratic trinomial. 2. For example, $x^2 - 5x + 9$. 3. For convenience a quadratic trinomial is usually arranged in either descending or ascending powers of the unknown. 4. If there are two different letters in the trinomial, the terms are supposed to be arranged in descending order for one and ascending order for the other, as $a^2 + 7ab + 21b^2$.

5. Reference to the products of two binomials will show those products to be quadratic trinomials. 6. For example, $(3a - 5)(a + 2) = 3a^2 + a - 10$. 7. Therefore, the factors of a quadratic trinomial, such as $x^2 + 2x - 15$, should be two binomials. 8. Since the first term in the product is found by multiplying the first terms of the two binomials, you are supposed to reverse (обратить) this process by writing the factors of the second-power terms of the trinomial (x^2) as the first terms in two binomial factors (x) (X). 9. Likewise (подобным образом), the factors of the last term of the trinomial (15), when the trinomial is arranged in descending order, will be the second terms of the two binomial factors (x 3) (x 5).

10. In the multiplication of the binomials the product term of the trinomial happens to be the sum of the product of the "inner" (внутренних) and "outer" (внешних) terms of the factors. 11. The-

refore, this product term has the same sign as the factor that gives the larger product with its corresponding "inner" or "outer" term. 12. This need not be the larger factor, as you can see in the example above. 13. However, in $x^2 + 2x - 15$, since the coefficient of x^2 is 1, the larger factor proves to give the larger product. 14. Hence, it takes the sign of the product term of the trinomial, so the factors of the trinomial become $(x - 3)(x + 5)$.

15. Finally, if the sign of the last term of the trinomial is positive, the signs of both its factors must be alike (одинаковыми), so that 3 would be positive. 16. If the sign of the last term is negative as it happens to be in $x^2 + 2x - 15$, the signs of its factors must be different. 17. Therefore, the factors of $x^2 + 2x - 15$ are $(x - 3)(x + 5)$.

Ex. 12. Now that you have read the text, name the sentences which according to your opinion reflect its principal points.

ASSIGNMENT II

1. Exercises to be done at home 13—18.
2. Laboratory exercises. VIII—XI.

Homework

Ex. 13. In the sentences below state the form and the function of the infinitive and then translate these sentences.

1. Until quite recently people believed elementary particles to be the simplest material bodies. 2. I should like the conclusion to be drawn as soon as possible. 3. For a statement to be true it must satisfy certain conditions. 4. For greater convenience the order is likely to be reversed. 5. Both the first equation and the second one seem to be alike. 6. Gravitation does not let planets leave the solar system. Likewise, it is known to be the force that keeps material bodies including people on the Earth. 7. Like terms are expected to be arranged in the following way. 8. Reference is to be made to the system commonly accepted. 9. Little information makes it difficult to continue research. 10. The existing conditions make it impossible to speed up the process. 11. Recent scientific developments proved to be of great importance and interest. 12. He must have used the classification suggested by his science adviser. 13. We saw the particles behave in an unusual way under such conditions. 14. The procedure to be followed is rather inconvenient.

Ex. 14. Use the following adjectives in comparative constructions containing 'as ... as', 'not as ... as', 'not so ... as', ... than'.

a) T.: — long

St.: — as long as

old, young, short, good, great, wide, definite, red;

- b) T.: — large
St.: — not as large as
small, high, bad, thin, thick, interesting, flat;
- c) T.: — easy
St.: — not so easy as
difficult, important, exact, famous, careful;
- d) T.: — short
St.: — shorter than
reasonable, great, thin, flat, real, white, long, wide, old, convenient, common.

Ex. 15. Read the text (2) and analyse the sentences you find difficult to understand. Pay special attention to sentences 4, 5, 8, 10, 13.

Ex. 16. Write a few questions in connection with the text (2) in logical sequence to ask your classmates during the discussion on polynomials.

Ex. 17. Write a short summary of both of the texts of the lesson. Say whether you like the way the material is presented in these texts. You might add something of your own on the subject.

Ex. 18. Arrange these words according to the parts of speech they belong to.

to suppose — supposition — supposedly; to arrange — to rearrange; large — to enlarge — enlargement; final — finally; to negate — negative — negation; to refer — reference; to reverse — reversed — reversible — reversibility — reversion.

Classwork III

Ex. 19. Read these groups of words. Translate them.

an unexpected supposition; the rearrangement of the bodies; negative behaviour; to negate the truth; an unusual enlargement; the reversed process; reversible relations; reversion of numbers.

Ex. 20. Read the sentences to follow and state the form and the function of the Infinitive. Name the predicate in every sentence.

1. The consequences of such a change in temperature are to be foreseen. 2. The condition to be satisfied is as follows. 3. To establish a one-one correspondence one has to do the following. 4. The approach to be exercised seems to be rather unusual. 5. In this case it will therefore be sufficient to suppose the oscillation to be periodic. 6. The law no longer appears to hold for an empty continuum. 7. The reaction happened to be rather unexpected. 8. No explanation appeared to be consistent. 9. Roentgen is known to have discovered a means for photographing the inside of things. 10. The next step was to

make sure of the sign of the term, whether it was positive or negative. 11. There is no possibility for the same sort of thing to happen in the physical world. 12. The gamma rays proved to be true waves* like X-rays but of much shorter wave-length. 13. Which of the two paths the molecule is likely to take with greater probability depends on the ratio of two time intervals. 14. The chapter to follow consists of two parts. 15. The deduction arrived at will be seen to be in agreement with the observation. 16. You might expect the solution set for the equation shown above to contain any one numeral. 17. There seems to be little doubt* that the discovery is highly important. 18. Here the electrons generated from a small area of the surface to be examined are accelerated through a special arrangement. 19. Our aim is to perfect the entire process. 20. To bring a fraction to its lowest terms means to simplify it.

Ex. 21. Listen to your teacher's statement and change it according to the model.

- a) T.: — both the books and the journals
St.: — either the books or the journals
- b) T.: — either the first or the second term
St.: — neither the first nor the second term.

Ex. 22. Answer your teacher's questions using comparative constructions.

Ex. 23. Ask questions for which sentences 3, 4, 5, 8, 10, 11, 13 of the text (2) provide the answers.

Ex. 24. Listen to the following statements and say whether they are right or wrong. If you disagree with the statements say why.

Ex. 25. Ask your classmates the questions about the text (2) you wrote at home.

Ex. 26. Say the following in English.

Здесь неизвестное представлено следующим выражением; эти члены уравнения называют; произведение одного многочлена на другой; как убывающий так и возрастающий порядок; это выражение можно себе представить как; относительно линии x ; известно, что это выражение называется квадратным многочленом; поэтому; однако; следовательно; поскольку; наконец; подобные члены

* wave — волна

* doubt [daʊt] — сомневаться; сомнение

Classwork I

Grammar:

The Subjunctive Mood. Conditional sentences

EXERCISES

Ex. 1. Compare the groups of sentences (a, b, c, d) in conditional mood given below.

a) 1. If we have time tomorrow, we shall continue the discussion. 2. We shall perform all the operations required provided you help us. 3. The article will be published unless he fails to present it in time. 4. If these students attend lectures on algebra they are able to answer this kind of questions. 5. If they worked systematically they could realize the program.

b) 1. If they used this method they would come across a lot of difficulties. 2. If they needed our assistance they would ask for your opinion on the subject. 3. They would not go into detail if they did not have to know the whole situation. 4. I should not attend the conference unless they asked me to. 5. If the book were less complicated, he could write his review of it today.

c) 1. He would have read his paper provided he had been given enough* time. 2. The whole thing might not have happened provided they had been more careful. 3. He could have made that great discovery earlier if he had had better conditions for work. 4. I would not have agreed to take part in your research unless I had been sure of its being very important.

d) 1. Were I there tomorrow I should speak to him. 2. Were she here now she would tell us about the position of the head of their

* enough [i'naɪ] — достаточно

lab. 3. Had they obtained the information required they would have turned it over to us. 4. Had we not failed in our recent experiment we might have obtained some results by now.

ASSIGNMENT I

1. Exercises to be done at home 2—5.
2. Laboratory exercises I—VIII.

Homework I

1. Read these words and guess their meaning.

to oscillate ['ɒsileɪt]	to evaluate [i'vælju- eit]	story ['stɔ:ri] suc'cession
logarithm ['lɒɡərɪðm]	'standard adj	

2. Read these words.

re'quest 1. просьба, вопрос 2. просить	a'lone лишь, только один
abbreviate [ə'bri:vieɪt] сокра- щать	decrease 1. ['di:kri:z] уменьше- ние; 2. [di:'kris] уменьшать(ся)
readily ['redɪli] легко, с лег- костью	back назад, обратно
	forth вперед
	else [els] ещё, кроме

* for introducing him to the game of chess — за то, что тот по-
знакомил его с игрой в шахматы

* make use of ... — воспользоваться

* amount to — равносильно; сводится к тому, что

* well over one hundred — намного больше ста

* this is the case — так обстоит дело, это именно так

* this is not the case — это не так

* so is any — точно так же любой

* back and forth — туда сюда, взад вперед

* or else — или, или же, или, иначе

Ex. 2. Read these sentences and define whether they express pre-
sent and future or past situations. Translate them.

1. If you wished to abbreviate the expressions "geometric progression" you might write G. P. 2. If you had decreased the temperature of the gas its volume would have decreased accordingly. 3. If you made use of logarithms you could find them very helpful. 4. If you used any such succession of terms you would be using an arithmetic progression. 5. He could readily evaluate the formula provided he applied his knowledge of logarithms. 6. If your teacher had introduced the law for exponents at the previous lecture you could have made use of it for evaluating the result. 7. It would be rather unusual if they fulfilled our request immediately. 8. It would be rather unexpected if he finished the work so early and by himself.

Ex. 3. Ask questions about the sentences of Ex. 1. Begin your questions with: 'why', 'when', 'in what (which) case', 'under what condition', 'what would they (he, she ...) do ... if ..., etc.

Ex. 4. a) Read the text (1) of the lesson; b) Analyse the sentences you find difficult to understand. Pay special attention to sentences 2, 11, 16, 17, 18, 19, 24, 25, 26.

Sequences Obtained by Repeated Multiplication

1. In one of your previous lessons you have had a story about some Indian king who wished to reward his vizier for introducing him to the game of chess *. 2. You are sure to remember that the vizier asked for one grain of wheat for the first square, two for the second square, and so on, doubling the number of grains for each square on the board.

3. The sequence 1, 2, 4, 8 ... represents the vizier's request. 4. In this sequence the ratio of each term to the preceding term is a constant, 2; that is, 2:1, 4:2, 8:4, and so on. 5. Any succession of terms in which there is a common ratio is a geometric progression (abbreviated G. P.). 6. A geometric progression is a sequence of numbers obtained by repeated multiplication. 7. If a , b , and c are three numbers in a G. P. then $b : a = c : b$.

8. Consider the first three terms of a geometric sequence. Let a represent the first term, and let r represent the common ratio. 9. First term: $a = ar^0$; second term: $a \cdot r^1$; third term: $a \cdot r \cdot r = ar^2$. 10. For each term, the number of times r is used as a multiplier is 1 less than the number of the term. 11. If the total number of terms in a G. P. were n , then to find the n -th or last term, r would have to be used as a multiplier $(n-1)$ times. 12. That is, $b_n = ar^{n-1}$. 13. In the chessboard G. P. 1, 2, 4, 8 ..., the value of a is 1 and r is 2. 14. Since there are 64 squares on a chessboard, $n=64$. 15. Then $b_{64} = 1 \cdot 2^{64-1}$ or accordingly, $b_n = 2^{63}$. 16. You can readily find the value of b_{64} by making use of * logarithms; in standard form it is about 9.2×10^{18} . 16. Assuming that a bushel contains approximately 540,000 grains of wheat, the vizier's request, for the last square alone, amounted to * well over one hundred * billion bushels of wheat. 17. The chessboard G. P. is clearly understood to be an increasing progression. 18. So is any * G. P. with a positive first term in which the common ratio is a number greater than 1. 19. Any such G. P. in which r is a positive number less than 1 is said to be a decreasing sequence. 20. The common ratio may be negative. 21. If this is the case * and the terms are alternatively positive and negative like in +1, -2, +4, -8, +16 ... the sequence moves back and forth * or oscillates from positive to negative, or else * from negative to positive. 22. Such a G. P. is an oscillating sequence. 23. The formula for the last term in a G. P. can, like any formula, be evaluated for any

letter in it. 24. If you wished to find the value of a , it would be convenient to apply the formula in the form $a = \frac{b_n}{r^{n-1}}$. 25. If you wanted to find the value of r or of n , it would be well to apply it in the form $r^{n-1} = \frac{b_n}{a}$. Logarithms may prove helpful, or else *, you may be able to apply the laws of exponents.

Ex. 5. Write down the main points of the text (1) to help you while speaking on the subject.

Classwork II

Ex. 6. Read these groups of words. Give their Russian equivalents.

a new oscillator; an interesting oscillogram; a correct evaluation; valuable information; an unusual abbreviation; repetition of like terms; proximity space; progressive ideas; to make progress; in accordance with the previous statement.

Ex. 7. Read these pairs of words. State the difference between the words. Give their Russian equivalents.

'subject — sub'ject; 'progress — pro'gress; 'present — pre'sent; 'increase — in'crease; 'decrease — de'crease; 'contrast — con'trast,

Ex. 8. Ask questions about the sentences of Ex. 2. Begin your questions with: 'why', 'when', 'in what (which) case', 'under what condition', 'what would you (he) ...', 'if you (he) ...', etc.

Ex. 9. Ask questions for which the sentences below provide the answers.

1. Their request is known to have been repeated several times. 2. We understand G. P. to be an abbreviation for the geometric progression. As far as the arithmetic progression is concerned its abbreviated form is A. P. 3. A sequence like this one (+1, -2, +4, -8, +16 ...) is said to oscillate since it moves back and forth from positive to negative. 4. Students are expected to make use of logarithms. 5. The sequence 1, 2, 4, 8... is an increasing sequence, while the sequence 8, 4, 2, 1 is said to be a decreasing sequence. 6. When asked to speak at the conference he readily agreed. 7. He is unlikely to evaluate this formula without knowing these elementary rules.

Ex. 10. Translate sentences 2, 11, 16, 17, 18, 19, 24, 25, 26, 27 of the text (1).

Ex. 11. Answer questions in connection with the text.

Ex. 12. Speak on sequences obtained by repeated multiplication making use of the main points you have written down (Ex. 5).

Before you begin working with the text (2) read these words and guess their meaning.

billion, unlimited, successive, to realize.

Read the Notes:

* *go on (forever)* — продолжать (до бесконечности)

* *It is just as possible ...* — точно так же возможно

* *the value gets smaller ...* — величина становится меньше

* *the value of S_n gets closer to ...* — величина приближается к

* *no matter how ...* — независимо от того как

Read the text. While reading it mark the sentences that reflect the main things about the text.

Unending Progressions

1. When a sequence has a definite number of terms, it is said to be finite (конечный), a word meaning limited. 2. But a sequence may have an unending number of terms. 3. For example, the integers of the number system go on forever*: if you counted to one billion you might just as well count to one billion and one. 4. You can easily imagine the 10^{21} . 5. It is just as possible* to imagine the number $10^{21}+1$. 6. Such a sequence is said to be infinite; it is unlimited.

7. It is meaningless to ask for the sum of integers in the number system. 8. It would be equally meaningless to ask for the sum of the members in any other infinite arithmetic progression, whether it is an increasing A. P. or decreasing A. P.

9. Of course, a G. P. may also be infinite. 10. Here are four examples:

(1) An increasing G. P., $r=2: 1.2.4.8 \dots$

(2) An oscillating G. P., $r=-2: 1.-2.4.-8 \dots$

(3) A decreasing G. P., $r=\frac{1}{2}: 1 \cdot \frac{1}{2} \cdot \frac{1}{4} \cdot \frac{1}{8} \dots$

(4) An oscillating G. P., $r=-\frac{1}{2}: 1 \cdot \frac{1}{2} \cdot \frac{1}{2} - \frac{1}{8} \dots$

11. The first two examples show infinite geometric progressions in which the magnitude of the common ratio is greater than 1. 12. In these sequences the magnitude of each term is greater than the magnitude (величина) of the preceding term. 13. In this sense (смысле) they are like infinite arithmetic progressions, and it is meaningless to ask for their sums. 14. The third and fourth examples are different. 15. They show infinite geometric progressions in which the magnitude of the common ratio is less than 1. 16. In these sequences, the magnitude of each term is less than that of the preceding one. 17. Even though the number of terms is unlimited, it would not be meaningless to ask for the sum of infinite geometric progressions such as these. 18. Consider the infinite G. P. $1, \frac{1}{2}, \frac{1}{4}, \dots$ 19. You could continue writing the terms of this G. P. indefinitely. 20. If you did so, the number of terms would increase without limit. 21. This fact is shown in symbols thus: $n \rightarrow \infty$, the arrow meaning approaches,

and ∞ being the symbol for infinity. 22. The statement is read "n approaches infinity" or "tends to infinity".

23. As $n \rightarrow \infty$, what happens to the sum of the G. P.? 24. To answer this question, notice first that as the number of terms increases, the value of the n -th term gets smaller and smaller*. 25. It approaches zero; that is, $b_n \rightarrow 0$. 26. When you add successive terms, you are adding a smaller quantity each time,

$$n=2: S_n^* = 1 + \frac{1}{2} = 1\frac{1}{2}.$$

$$n=3: S_n = 1 + \frac{1}{2} + \frac{1}{4} = 1\frac{3}{4} \dots$$

27. If you went on like this, you would realize that with each addition, the value of S_n got closer to* 2. 28. But no matter how* many terms you added, S_n would never reach (достигнет) 2. 29. It approaches 2; that is, 2 is its limit. 30. As $n \rightarrow \infty$ in the G. P. $1, \frac{1}{2}, \frac{1}{4}, \dots$, $S_n \rightarrow 2$. 31. The limit of S_n is an infinite G. P. is called the sum of the G. P. and is written S_∞ . 32. Thus for the infinite G. P. $1, \frac{1}{2}, \frac{1}{4}, \dots$, $S_\infty = 2$.

Ex. 13. Now, that you have read the text, name the sentences which according to your opinion reflect its main points.

ASSIGNMENT II

Exercises to be done at home 14—18.

2. Laboratory exercises IX—XII.

Homework II

Ex. 14. Read the sentences below and define whether they express present, future or past situations. Translate these sentences.

1. It would be a good idea if a few more facts were used for illustrating this point of view. 2. His paper would have been read at the conference had it been sent in due time. 3. I would not take part in the discussion unless I had a definite idea on the subject. 4. It would be helpful if more detailed information were obtained. 5. It was evident that even if we went on for-ever with our discussion we would not reach any agreement. 6. If we assumed the geometric mean of two numbers to be the square root of their product what would the geometric mean between 2 and 8 be? 7. If we considered the third example we would see that the magnitude of the common ratio was less than 1.

* S_n — сумма первых членов

One could go on with the computation provided it made sense. 8. Had he not been so much interested in mathematics he would have become a musician. 9. The experiment would have given more reliable results provided it had been prepared with greater care. 10. I would try to prevent them from reaching this conclusion on the question under consideration if I were you.

Ex. 15. In the sentences below note the various uses of 'as'. Translate the sentences.

1. The measurements are to be as precise as possible. 2. The rules applied are true for arithmetic as well. 3. As a result of certain modifications the energy reached the required magnitude. 4. The atmospheric pressure decreases as altitude increases. 5. We consider this term as being constant.

Ex. 16. Read the text (2) and analyse the sentences you find difficult to understand. Pay special attention to sentences 1, 3, 8, 17, 20, 21, 23, 27, 28.

Ex. 17. Write a short summary of both of the texts of the lesson.

Ex. 18. Arrange these words according to the parts of speech they belong to.

finite — infinite — infinity — infinitely; definite — define — definition — indefinite — definitely — definable; system — systematize — systematic; imagine — imaginable; unlimited — limitless; great — greatly — greatness; different — differential — to differentiate — differentiation — differentiable — differentiability; to reach — unreachable.

Classwork III

Ex. 19. a) Read the words of Ex. 18; b) Give their Russian equivalents.

Ex. 20. Translate these sentences.

1. If it were not for this particular advantage, the new system would hardly be accepted. 2. But for the assistance of this group of scientists no decision would have been reached on the problem under consideration. 3. Provided one knows the length of two sides of a triangle and the measure of the angle between them one can readily find the length of the third side. 4. Could I speak to him now I should give him my point of view concerning their suggestion. 5. Unless otherwise stated, the values used are taken in the decimal system. 6. Were there no computers we would not be able to do a lot of things we are capable of doing today. 7. If it had not been for their unlimited assistance the program of research would not have been realized. 8. No matter how hard you tried you would not be able to find the required magnitude without making use of logarithms.

Ex. 21. Ask questions for which sentences 2, 11, 16, 17, 18, 19, 24, 25, 26 of the text (2) provide the answers.

Ex. 22. Say whether the statements you are going to hear are true or false.

Ex. 23. Answer the questions you will hear in connection with the text.

Ex. 24. Speak of various kinds of sequences and progressions.

Ex. 25. Say the following in English.

Точно так же возможно; величина приближается к бесконечности; независимо от того как (где, когда, что, кто, почему); продолжать до бесконечности; воспользоваться; в этом случае; именно так обстоит дело с данной величиной; в этом смысле; иначе мы не можем ожидать.

Classwork I

Grammar:

More about the Subjunctive Mood

EXERCISES

Ex. 1. Read these sentences. Pay special attention to the predicate of the subordinate clause. Translate these sentences.

a) 1. It is necessary that the pressure (should) be further increased. 2. It is essential that the behaviour * of these particles (should) be carefully studied. 3. It is desirable that they (should) give a proper explanation. 4. It is important that you (should) find a means for carrying out this work. 5. It is unlikely that atomic power (should) have been used for these purposes.

b) 1. He suggested that during the experiment the direction of light (should) be slightly altered. 2. Professor insisted that we (should) first hear everybody's opinion on the subject. 3. It is required that the procedure (should) be slightly reversed. 4. The head of our laboratory insisted that the materials to be used in constructing the machine (should) be carefully tested. 4. They suggested that we (should) use the data obtained at once.

c) 1. He speaks about computers as if he were an expert on them. 2. The Earth behaves ** as though it were a large magnet. 3. I wrote down the translation of the words lest I should (so that I should not) forget what they mean. 4. In order that the relation might be valid two conditions should be observed. 5. We ought to discuss every detail lest there should be (so that there should not be) a misunderstanding.

* behaviour — поведение

** to behave — вести себя

Exercises to be done at home 2—6.
2. Laboratory exercises I—IX.

Homework I

1. Read these words and guess their meaning.
'Certainty, 'normal adj., reali'zation, expec'tation.
2. Read these words.

probability [prəbə'biliti] вероят-
ность
finger ['fiŋgə] палец
оссуа [ə'kæ:] иметь место, про-
исходить
occurrence [ə'kʌrəns] случай,
событие
white белый
in'deed в самом деле
suc'ceed добиться успеха
trial ['traɪəl] попытка, проба
failure ['feɪljə] неудача, провал,
неблагоприятный исход

toss подбрасывать
favour 1. польза, интерес 2.
благоприятствовать
odds(pl) разница, преимуще-
ство, шансы
e'vent событие
a'gainst против
coin монета
heads pl (зд.) орёл
tails (зд.) решка
chance шанс

NOTES

* in all — всего

* the odds are S to f in favour of success (against success) —
шансы S < f в пользу успеха (против успеха)

* there is no reason why — нет причины, почему бы

* rather than — а не, скорее чем

Ex. 2. Translate these sentences.

1. It is desirable that cooperation among various research centers be stimulated. 2. It is natural that the head of a scientific institution should control research carried on in the laboratories. 3. It is important that the program to be introduced should be carefully examined. 4. They suggested that the possibilities of obtaining the material required be considered immediately. 5. They recommended that measures be taken against the possible failure of the control system. 6. In order that scientific information may reach the researchers concerned, there should be a wider distribution of articles and papers. 7. I insist that the reason for the failure of the experiment be carefully analysed. 8. The temperature must be increased in order that the process should reach its normal state. 9. The required conditions are to be observed so that the reaction may occur. 10. My research adviser spoke as though he were in favor of another

trial. 11. However important the idea may seem, it is impossible to consider it at the present moment. 12. Whatever be the nature of the phenomenon described, it ought to be discovered. The sooner we do it the better. 13. He insisted that every possible chance be taken into consideration. 14. We explained everything lest they should speak against our suggestion.

Ex. 3. State the part of speech the italicised words belong to. Translate these groups of words.

1. The *number* of events; a *number* of trials; room *number* two; a rational *number*; a *number* name; *number* the objects in the room. 2. An unexpected *result*; as a *result* of these *trials*; the experiment *resulted* in a failure. 3. All the students were *present*; *present* day science; he *presented* him with an old coin; the data were *presented*; I gave him a set of pens as a *present*; the new material *presents* certain difficulty.

Ex. 4. Ask questions for which the sentences of Ex. 1. provide the answers.

Ex. 5. a) Read the text (1) of the lesson. b) Analyse the sentences you will find difficult to understand. Pay special attention to sentences 4, 5, 8, 15, 19, 22, 23, 26, 27, 29, 30.

Probability of Occurrence



1. Here are nine circles. 2. Look at them. 3. Five are black; four are white. 4. If you were told to cover one circle with your finger, you might choose any one of the nine. 5. But you are more likely to choose a black circle than a white, because there are more black circles than white ones. 6. Indeed, the probability that you will cover a black circle is $\frac{5}{9}$, the ratio of the number of black circles to the total number of circles.

7. In mathematical language the choice, the probability of success is the ratio of the number of ways in which the trial can succeed to the total number of ways in which the trial can result. 8. Here nothing favors the choice of any particular circle; they are all on the same page, and you are just as likely to cover one as another. 9. The trial can succeed in five ways; there are five black circles. 10. The trial can succeed in nine ways; there are nine circles in all *. 11. If p represent the possibility of success, then $p = \frac{5}{9}$.

12. Similarly, the probability of failure is the ratio of the number of ways in which the trial can fail to the total number of ways

in which it can result. 13. If q represents the probability of failure, in this case $q = \frac{4}{9}$. 14. Notice that the sum of probabilities of success and failure is 1. 15. If you put your finger on a circle, it is certain to be either a black circle or a white one, for no other kind of circles is present. 16. Thus $p + q = \frac{5}{9} + \frac{4}{9} = 1$. 17. The probability an event will occur cannot be more than 1. 18. When $p = 1$, success is a certainty. 19. When $q = 1$, failure is sure.

20. Let S represent the number of ways in which a trial can succeed. 21. And let f represent the number of ways in which a trial can fail.

$$p = \frac{S}{S+f} \quad q = \frac{f}{S+f} \quad p + q = \frac{S}{S+f} + \frac{f}{S+f} = 1$$

22. When S is greater than f , the odds are S to f in favor of success *; thus the odds in favor of covering a black circle are 5 to 4. 13. Similarly, when f is greater than S , the odds are f to S against success *. 14. And when S and f are equal, the chances are even; success and failure are equally likely. 25. Tossing a coin illustrates a case in which S and f are equal. 26. There are two sides to a coin, and there is no reason why* a normal coin should fall one side up rather than * the other. 27. So if you toss a coin and call heads, the probability that it will fall heads is $\frac{1}{2}$.

28. Suppose you toss a coin a hundred times, For each of the hundred trials. the probability that the coin will come down heads is $\frac{1}{2}$. 29. You might expect fifty of the tosses to be heads. Of course, you may not get fifty heads. 30. But the more times you toss a coin, the closer you come to the realization of what you expect.

31. If p is the probability of success on one trial, and K is the number of trials, then the expected number is Kp . Mathematical expectation in this case is defined as Kp .

Ex. 6. Write a short plan of the article above outlining the main points of the article.

Classwork II

Ex. 7. Read these groups of words. Translate them.

a realizable program; the realizability of the method suggested; normalization of relations; an improbable result; unfavorable conditions; the whiteness of the paper; an uncertain answer; unlike terms; their likeness; to dislike a person.

Ex. 8. Read these pairs of words. Explain the change of pronunciation and stress.

a) production — produce; reduction — reduce; introduction — introduce; induction — induce; deduction — deduce; b) combination — combine; division — divide; precision — precise.

Ex. 9. Ask questions the answers to which are contained in the sentences of Ex. 2. Leave out sentences 11, 12.

Ex. 10. Ask questions the answers for which are provided by the sentences below.

1. When we try to do something several times we say that we have had several trials. 2. If you failed in your examination you would have to take it again. 3. Obviously he failed to come in time. 4. He asked me if I would do him a favor. 8. If man did not have ten fingers people might have a different system of numeration. 9. Under these conditions the probability of occurrence is not very high. 10. The number of times an event will occur is unknown. 11. Whether this event will occur nobody knows with certainty. 12. He asked to be given another chance.

Ex. 11. Translate sentences 4, 5, 8, 15, 19, 22, 23, 26, 27, 29, 30 from the text (1).

Ex. 12. a) Answer your teacher's questions in connection with the text (1). b) Ask your classmates the questions about the text you wrote at home.

Before you begin working with the text (2) read these words and guess their meaning:

independent adj, dependent adj.

Read the Notes:

* in either case — в любом случае

* distinguish between — делать различие между

* mutually exclusive — взаимно исключают

Read the text below. You will have to answer a few questions in connection with the text.

Dependent, Mutually Exclusive, and Independent Events

1. Sometimes one event is dependent on another. 2. Consider a group of your classmates drawing (вытягивать) slips (листки) of paper numbered from 1 to 20. 3. Suppose that anyone drawing a number exactly divisible by 5 is rewarded; that is there are four ways of succeeding and twenty possible results. 4. X draws first, you draw next. 5. If X were successful, your chances of success would be decreased; if X were unsuccessful your chances would be increased. 7. Probability of X's trial succeeding: $p = \frac{4}{20}$. 8. Probability for you,

if X succeeds: $p = \frac{3}{19}$. 9. Probability for you if X fails: $p = \frac{4}{19}$. 10. Some

events are mutually (взаимно) exclusive (исключающие). 11. Thus, there might be a penalty (штраф) attached to (в связи с) drawing the number 13 in the situation described above. 12. But no one can draw both the number 13 and at the same time draw a number divisible by 5; drawing one excludes (исключает) the possibility of drawing the other. 13. Of course, the probability of X's getting either a reward (награду) or a penalty is $\frac{5}{20}$; if she got neither, the proba-

bility that you would get one or the other is $\frac{5}{19}$. 14. When two events are mutually exclusive the probability that either one or the other will occur is the sum of the separate probabilities. 15. Many events with which people must deal are independent; they occur without affecting each other in any way. 16. Thus if two coins were tossed at the same time or one after the other, the fact that one fell (упала) heads would not affect the way the other fell. 17. Suppose you toss two coins. 18. If you call them coin A and coin B, it is easy to see that the trial can result in four ways.

18. (1) Both coins, A and B, might come down heads.

(2) Both coins, A and B, might come down tails.

(3) Coin A might show heads and coin B might show tails.

(4) Coin A might show tails and coin B might show heads.

19. Since there are four possible results, the probability of any one result is $\frac{1}{4}$. 20. This probability is the product of the separate probabilities in each case. 21. For instance (например), take the first case.

For coin A to come down heads: $p = \frac{1}{2}$.

For coin B to come down heads: $p = \frac{1}{2}$.

For both coins to show heads: $p = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$.

22. When two events are independent, the probability that one as well as the other will occur is the product of the separate probabilities.

23. Of course, you might not be able to distinguish (различать) between the third and the fourth result; perhaps you could observe only that one coin shows heads and the other tails. 24. Since there are two ways in which this situation can occur, out of four possible results, $p = \frac{2}{4}$

Ex. 13. Now answer a few questions in connection with the text.

1. Slips of paper numbered 1, 2, 3, 4, and 5 are placed face down * on the table. The slip is chosen at random *.

a) What is the probability that the number of the slip is 4?

* face down — лицом вниз

** at random — беспорядочно, произвольно

- b) What is the probability that the number of the slip is odd?
 c) What is the probability that the number of the slip is even?
 2. Suppose you are shown 10 boxes, one of which contains something while others are empty. You are allowed to choose one box. What is your mathematical expectation? Why? 3. Four coins are tossed. What is the probability that all will fall tails? 4. There are two questions on a test*** whose answers you do not know. One is a true-false case; the other has three choices. You point to both of them at random. What is the probability that you got both answers correct?

ASSIGNMENT II

Exercises to be done at home 14—18.

2. Laboratory exercises X—XIII.

Homework II

Ex. 14. Translate the sentences given below.

1. I suggest that you should choose the other alternative. 2. It is necessary that the advantages of the procedure suggested be made evident. 3. It looks as if they were not sure of the consequences. 4. It is important that the statement be consistent. 5. I suggest that both operations be designated with the letters A and B accordingly. 6. It is essential that the mutually exclusive events be considered. 7. He insisted that we should exclude the description of the elementary process from the book. 8. He behaved as though he did not know the entire situation. 9. I wish you distinguished between these two facts. 10. However sure of the result you may be, it is desirable that you check the operation. 11. No matter what the order of the addends may be, the sum is always the same. 12. Whatever the disadvantages of this machine may be, it is the only one we have. 13. If Leibnits had not created the binary system, it would have had to be invented at our time. 14. Unless you were given other instructions you might consider Y, X, or Z as the unknown quantity and solve it in terms of any other letter in the problem. 15. Radicals of the same order may be multiplied or divided, whether real or imaginary. 16. It is essential that you attach greater importance to this event.

Ex. 15. Note the various meanings of the italicized words. Translate the sentences below:

1. All the students *but* one worked independently. 2. *But for* the atmosphere, life on the Earth would be impossible. 3. An electron seems to be nothing *but* electricity. 4. I have *but* one request. 5. The

*** on a test — в испытании, в тесте

article is *ready*. He *readily* agreed to write the article. 6. The work is *nearly* over. These points lie *near* each other. 7. It is a *great* discovery. I am *greatly* interested in it. 8. We had a *short* lesson. He came *shortly before* (after) the lesson.

Ex. 16. Read the text (2) and analyse the sentences you will find hard to understand. Give special attention to sentences 5, 11, 12, 13, 16, 18, 23.

Ex. 17. Write a short summary of both of the articles of the lesson. Give your own example on the subject as an illustration.

Ex. 18. Arrange the words given below according to the parts of speech they belong to.

depend — dependence — dependently; mutually — mutual; divisible — divisibility; succeed — successful — unsuccessfully; to exclude — exclusive; — occur — occurrence; to separate — separate — separation — inseparable — inseparability; to distinguish — distinguished.

Classwork III

Ex. 19. a) Read the words of Ex. 18. Use them in word combinations of your own.

Ex. 20. Translate these sentences.

1. However great the development of science and technology may have been, we are facing the beginning of another technical revolution. 2. Whichever of these methods you may choose, you are unlikely to obtain a different result. 3. Whatever be the reaction, we ought to clearly express our point of view. 4. It is essential that students should be allowed to carry out independent experiments. 5. He suggests that scientists representing various branches of science be asked to take part in the research. 6. I wish you could draw an appropriate conclusion from the failure. 7. We have arranged the conference so that the scientists may meet and discuss problems of common interest. 8. The computer should be operated with great care lest it should go out of order. 9. The machine behaved as though something had gone wrong with it. 10. I wish a reference were made to the article concerning the same scientific developments.

Ex. 21. Translate sentences 5, 11, 12, 13, 16, 18, 23 from the text (2).

Ex. 22. Say whether the statements you are going to hear are true or false. If you disagree with the statement begin your answer with: 'to my mind'; 'in my opinion'; 'I am afraid you are wrong', 'as far as I know'; 'on the contrary'.

Ex. 23. Answer the questions you are going to hear.

- Ex. 24. a) *Speak on Probability of Occurrence;*
b) *Speak on Dependent Events;*
c) *Speak on Mutually Exclusive Events;*
d) *Speak on Independent Events.*

In every case think of your own illustrations of various kinds of events.

Ex. 25. Give English equivalents for.

Отношение числа черных кругов к числу белых кругов; вероятность успеха; вероятность неблагоприятного исхода; равные шансы; количество попыток; вероятность того, что событие произойдет, равна 1; шансы в пользу неблагоприятного исхода; математическое ожидание; взаимоисключающие явления; зависимые (независимые) явления; в любом случае; либо одно, либо другое; как в первом, так и во втором случае.

PART III

LESSON TWENTY SIX

ASSIGNMENT I

1. Laboratory exercises I—III.
2. Exercises to be done at home 1—6.

Homework I

Ex. 1. Translate these sentences and groups of words. The italicised words are new to you.

The amended program was ... The question is sure to arise. The research being carried out seems ... These circumstances necessitated a certain change ... He demanded that the instructions be followed. The digital computers enabled them to ... Even a small error may cause ... They supplied us with the required data. On this major occasion ... The "brain" of the computer ... The computer obeys the program. A mistake in print. Reliable equipment. Subconscious behaviour. The error caused misunderstanding.

Ex. 2. Read these groups of words. Guess the meaning of the italicised words.

an absurd situation; administrative buildings; a new aeroplane; chemical reaction; to detect an error; the culmination point; A difficulty in detecting a mistake; a popularly accepted law; scrupulous preparatory work; all sort of materials; a large section of population.

Ex. 3. Ask questions for which these sentences provide the answers.

1. This process demands special attention. 2. The teacher doubts the accuracy of our calculation. 3. Sometimes the operator detects errors only with difficulty. 4. Everybody was to obey this law. 5. He foresees all the details. 6. There are a number of digital computers here. 7. There are a lot of difficulties to be foreseen. 8. There were

some major errors in the instructions. 9. The solution was obviously absurd. 10. On that occasion the operator carried out complicated preparatory work. 11. The instructions caused the operator to perform certain operations. 12. They supplied us with all sort of programmes. 13. Preparatory work seemed very difficult and slow. 14. The computer's memory stores a lot of information. 15. The first step is to write explicit instructions. 16. They carried out scrupulous work. 17. This problem arose only recently. 18. The new equipment is expected to be reliable. 19. A computer cannot foresee possible mistakes. 20. The scientists were supplied with significant information.

Read this text and try to understand its central idea without consulting the dictionary.

Computers

1. A little over a decade ago computers were small, not very reliable and comparatively slow in operation. 2. Since then, several generations of complex electronic computing equipment have been developed, each being significantly better than the one before it. 3. The most important property of a computer, the property which distinguishes it from all other kinds of machine constructed by man, is its many-sidedness. 4. Almost every day a new use is found for these devices to help man. 5. One and the same computer may be required on different occasions to help in the design of aeroplane wing sections, to detect errors in the design of a computer, to calculate the production of some large factory, to control the mixture of ingredients in some chemical process, or even to play a game of chess. 6. In fact, a computer may be said to perform any task provided that the method of performance can be described in complete detail. 7. It is important, however, to realize at the outset that the term "electronic brain" popularly applied to an automatic electronic digital computer is a misnomer. 8. The computer is only automatic in the sense that it can deal with explicit instructions which tell it exactly what to do: it cannot in itself, take steps, deal with difficulties which have not been foreseen by the person who presents the problem. 9. The computer must therefore be supplied with a complete and detailed set of operating instructions to solve a given problem together with the numerical values of the quantities which are to be operated upon. 10. A set of such operating instructions causing the computer to perform a particular calculation on any values of numerical data presented to it, and to print the results of the calculation, is called a programme. 11. The great merit of computers, that they will accept and obey any programme presented to them, is lessened by the fact that they will interpret their instructions with a scrupulous accuracy even, when, as a result of a small mistake in the programme, the results produced are obviously absurd. 12. Such mistakes will often be of the sort which would be corrected, perhaps even in-

tuitively, by an intelligent operator. 13. We would therefore stress that the programme must be written in such a way that the computer carries out the desired operations in the right sequence, and that it must specify exactly what must be done under every circumstance that may arise in the computation. 14. The preparation of the problem for the solution by an electronic digital computer thus involves the following tasks: 15. a) The precise definition of the problem to be solved. 16. This aspect may easily form the major part of the preparatory work. 17. b) The planning of the sequence of operations required for the solution of the problem. 18. The culmination of these tasks in the writing of the programme demands great attention to detail on the part of the programmer. 19. Once a programme has been written the computer is made to read it and store it in its memory. 20. After the complete programme has been read and stored, the computer starts to obey it. 21. Some of the instructions of the programme will require the computer to read additional data, and others to print the results of its calculation; these results are then returned to the programmer. 22. If the programme is correct the results will give the correct answers to the original problem; otherwise, the programme will have to be amended and presented again to the computer. 23. The latter occurrence is a very common one, and many programmers find that more time is spent in correcting their programmes than in writing them.

Now that you have got the general idea of the text, read it again. This time look up the dictionary whenever you find it necessary to understand the text in detail.

While reading it analyse the sentences you find difficult to understand and translate them. Pay special attention to sentences 1, 6, 9, 10, 15, 19, 21.

Write down in your vocabulary book the new words and learn them.

Ex. 4. Write down the most important things about computers as far as the text is concerned. Shorten the text by leaving out the unimportant details.

Ex. 5. Write a few questions about computers to ask your classmates during the lesson.

Ex. 6. Translate these sentences. Note the use of the Infinitive (a) and the ing-forms (b).

a) 1. Until recently only few of the mathematically interesting numbers could be shown to be transcendental. 2. This scientist was the first to use this method of investigation. 3. The general problem to be solved is to find the dependence between these phenomena. 4. When a new number is under investigation, for example $3^{\sqrt{2}}$, it may sometimes be important for a mathematician to determine if it is irrational, and especially if it is transcendently so.

b) 1. By studying the relationships between points moving on two separate straight lines with different velocities, Napier originated logarithms. 2. A little earlier we noticed how one may check the divisibility of a number by nine without actually doing the division. 3. Squaring both sides of the equation and clearing the fraction we obtain $2b^2 = a^2$. 4. Squaring both sides of the equation and clearing the fraction gives $2b^2 = a^2$. 5. The research program being carried out is to be described in complete detail.

Classwork I

Ex. 7. Read the following words.

arise, occasion, memory, major, via; absurd, circumstance, interpret, return, occurrence; accuracy, carry, factory, establish, latter, otherwise, instruction, among, love, mother; cause, normal, small, four, automatic; outset, allow, encounter, how, amount; brain, tape, contain, necessitate, major; apply, supply, arise, realize, type; move, scrupulous, choose, group; aeroplane, variation, various, prepare, area.

Ex. 8. Read these words. Use the italicised ones in combinations of your own.

to amend — *amendment*; able — to enable — *ability*; occasion — *occasionally*; accuracy — accurate — *inaccurate*; administrative — *administration*; to detect — *detection*; explicit — *explicitly*; brain — *brainless*; instruction — instructive; to mix — *mixture*; to form — formal — *formulate* — *formalize*; to perform — *performance*; absurd — *absurdity*; popular — popularly — *popularize* — *popularity*; to interpret — *to misinterpret*; memory — *memorize* — memorial; less — *to lessen*; wide — *to widen*.

Ex. 9. Answer your teacher's questions.

Ex. 10. Translate sentences 1, 6, 9, 10, 15, 19, 21 from the text (1).

Ex. 11. Say whether the following statements are true or false. If you do not think they are true, say why.

1. The most important property of a computer is its manysidedness. 2. On every occasion a different program is required. 3. The method of performance must not be described in detail. 4. It is quite correct to call an automatic digital computer an electronic brain. 5. The programmer should not foresee all the possible difficulties. 6. The great merit of a computer is its ability to produce instructions. 7. If there is a small mistake in the program the computer will correct it. 8. The program must specify exactly what must be done under every circumstance that may arise. 9. The precise definition of the problem to be solved forms the major part of the preparatory work. 10. The writing of the program does not demand great atten-

tion on the part of the programmer. 11. The computer does not store the program in its memory. 12. If the original program is not correct it has to be amended.

Ex. 12. a) Answer questions in connection with the text (1). b) Ask your classmates questions you wrote at home concerning computers.

Ex. 13. Read these sentences. State the form and the function (a) of the Infinitive and (b) of the ing-forms.

a) 1. The consideration of more complex and less understood phenomena does not seem to have much clarified the situation. 2. Pascal is known to have made considerable use of binomial series. 3. In the case of binomials, the first thing to look for in a trinomial to be factored is a binomial factor contained in each term. 4. The result of this operation has been to change the original equation in two ways. 5. First of all read the given statement from the beginning to the end to get the general idea of the problem and to decide what you are asked to find. Then choose an appropriate letter to represent the unknown in the problem. 6. The next problem to arise concerns the conditions under which the experiment is to be carried out. 7. However "complete", the sequence is supposed to be, we are always able to write a new number. 8. It does not require much mental effort to recognize a common fraction as a rational number. 9. The theory of ideals turned out to be of great importance for several parts of mathematics. 10. The scientist made an approximate calculation of the result to be expected.

b) 1. In his investigation of the equation $X^p + Y^p = Z^p$ p being an odd prime, he applied the theory of the algebraic field $K(\eta)$. 2. This fact caused great difficulties when applying the theory to Fermat's equation. 3. The real difficulty consists in deciding whether the decimal fraction is periodic or not. 4. Instead of inventing special signs for all the numbers, the Greeks used letters of their alphabet. 5. When either one thing or another can happen, but not both at the same time the events are said to be mutually exclusive, the occurrence of one thing excluding the occurrence of the other.

Read the text (2) silently. While reading guess the meaning of these words.

fully, administrative, card, coding, finally, code, output, typewriter, connect, individual, preparation, to transcribe, normally, to necessitate, variation, formulation.

After you have read the text you will have to answer questions in connection with its contents'

An Introduction to Algol 60

1. Digital computers

1. The fully automatic computers, produced in great number all over the world during recent years, may differ widely from one ano-

ther, but one feature is common to all: a program must be prepared and stored in the computer before the machine is capable of performing any calculations. 2. A program consists of a set of instructions, where each instruction causes the computer to carry out a certain operation. 3. The instructions that may be used during the preparation of a program depend on (зависеть от) the kinds of operations built into the particular computer for which the program is intended (предназначена). 4. The built-in operations fall into (распадаются на) two groups: arithmetic and administrative operations. 5. Among the former (среди первых) are normally found operations allowing the computer to add, subtract, multiply, and divide. 6. The latter allow the computer to carry out the input (входные) and output functions, that is, to read in data — for example, from a paper tape or a card — and to print the results on a typewriter connected with the computer. 7. Other administrative operations may be used to move numbers from one part of the computer to another, etc. 8. The differences encountered (встречающиеся) in electronic computers are often due to (обусловлены) the variation in the kind and number of the built-in operations.

II. Coding

9. To enable (чтобы дать возможность) a computer to “understand” a program, the instructions have to be written in a code which is especially designed for the computer in question. 10. Each individual instruction consists of a special group of code signs, and when this group of code signs is transferred (передается) to the computer via (посредством) a paper tape or a set of cards, a certain physical condition is established in a given place in the machine. 11. This condition enables the computer to carry out the operations as required by that particular instruction. 12. The preparation of the computer code which makes it possible for the computer to solve a given problem is for various reasons a complicated and time-taking process. 13. First, the calculations are to be performed according to formulas of very simple structure because the computer will usually be able to carry out only the four basic arithmetic operations mentioned above (упомянутых выше). 14. This condition often requires that each of the formulas contained in the original formulation of the problem be transcribed into a series of simpler formulas. 15. Second, the performance of a single arithmetic operation often necessitates the use of several administrative operations. 16. Finally, the whole procedure is complicated by the fact that everything must be expressed by means of the code symbols.

Now that you have read the text, say:

1. Which feature is common to all automatic computers? 2. Into how many groups do the built-in operations fall? 3. Why is the preparation of the computer code a complicated process? What are the

reasons? 4. How many basic operations is a computer able to carry out? 5. What information concerning digital computers can one obtain from the article?

ASSIGNMENT II

1. Laboratory exercises IV—VI.
2. Exercises to be done at home 14—16.

Homework II

Read the text (2). Analyse and thranslate sentences you find difficult to understand. Pay special attention to sentences 1, 2, 5, 6, 9, 11, 12, 13, 14.

Ex. 14. a) Write a few questions about the text (2) so that in answering these questions your classmates might give a detailed review of the text. b) Compress the text leaving out the unimportant details.

Ex. 15. Write a short summary of both of the articles of the lesson. You must be prepared to speak on computers in class.

Ex. 16. Write down in your vocabulary book the words that are new to you. You are expected to know them. Practise using them in short sentences of your own.

Classwork II

Ex. 17. Form words with the help of prefixes. Read and translate them. Mind the stress.

un — natural, prepared, popular, necessary, reliable;
in — accurate, significant, correct, adequate, sufficient;
ir — regular, rational, reducible, reversible;
dis — to connect, to prove, to cover, to like, to continue;
mis — to understand, to take, to interpret, to use;
non — empty, classic, commutative, symmetric, existence.

Ex. 18. Use each of these words in short phrases of your own.
 absurd — absurdity; brain — brainless; to detect — detector; error — erroneous; intelligent — intelligently; memory — memorial; to obey — obedient; program — programmer; sense — senseless; wing — wingless; able — ability; final — finality; to encounter — an encounter; administrative — administration; to code — to decode; to connect — to disconnect; to transfer — transference.

Ex. 19. Translate sentences 1, 2, 5, 6, 9, 11, 12, 13, 14 from the text (2).

Ex. 20. Ask your classmates the questions concerning computers you wrote at home (Ex. 14).

Ex. 21. Read your summary of both of the articles of the lesson and let other students comment on it.

ASSIGNMENT I

1. Laboratory exercises I—III.
2. Exercises to be done at home 1—5.

Homework I

Ex. 1. Translate these sentences and groups of words. The italicized words are new to you.

The great achievement of this astronomer, to clarify the situation, the Earth's revolution, the mean distance, compatible results, to possess a certain rate of revolution, the law of action and reaction, an induced force, to alter the direction, inversely proportional, the mutual acceleration experienced by these bodies, a body at rest, near the Sun, toward the Sun, the weight of the body.

Ex. 2. Guess the meaning of these words.

universal, gravitation, to examine, astronomer, focus, vector, elliptic, periodic, generalization, to induce, to weigh, uniform adj, momentum, to impress.

Ex. 3. Ask questions for which the sentences below provide the answers.

1. All planets obey the law of universal gravitation. 2. His statement has to be clarified now. 3. The process needs further generalization. 4. Many details were clarified in the course of work. 5. Galileo was Newton's predecessor in the field of gravitation. 6. Everybody was greatly impressed by their achievement. 7. A falling body possesses acceleration. 8. Professor's reaction to the error was quite unexpected. 9. The rate of revolution can be foreseen. 10. The circumstances compelled them to alter their original plan. 11. The program was fulfilled due to their mutual support. 12. He is an experienced operator. 13. He was compelled to agree and obey the order. 14. The detection of this error necessitated further scrupulous work. 15. The astronomers were supplied with detailed information. 16. The final results are not compatible with the results we expected to obtain. 17. The mean velocity is to be calculated. 18. These angles must be preserved.

Read this text without consulting the dictionary to get its main points.

Isaak Newton

1. Newton's theory of universal gravitation and his formulation of the principles of mechanics are known to be his two great achievements. 2. It is very important for us to examine, in some detail, the concepts which he introduced and clarified in the course of his work. 3. Ever since Galileo had invented his telescope men had been studying the motions of the planets with ever increasing interest and accuracy. 4. In particular, a great deal of observed data had been collected by Tycho Brahe, a Danish astronomer (1546—1601), and from this Kepler had deduced his famous three laws describing the motion of the planets about the sun. 5. These amounted to:

(1) The planets describe ellipses with the sun being at a focus. (2) The radius vector joining the sun with a planet describes equal areas in equal times, i. e. the rate of description of sectorial area is constant.

(3) The cubes of the mean distances of the planets from the sun are proportional to the squares of their times of revolution, i. e. if $2a$ is the major axis of the elliptic orbit and t is the periodic time then $t^2 \propto a^3$.

6. Newton was able to show that these laws were compatible with the assumption that each planet possesses an acceleration towards the sun which is inversely proportional to the square of their distance from it. 7. Furthermore, he saw this acceleration as being of the same nature as that experienced by bodies falling near the Earth's surface. 8. This generalization led him to the concept that all bodies taken in pairs, induce in each other mutual acceleration. 9. Translating this into terms of force required a new principle and Newton supplied this in his law of "action and reaction" — and this in its turn provides us with a view of mass not possessed by any of Newton's predecessors, a concept which distinguishes between mass and weight. 10. The laws of motion which Newton published in his *Principia* amount to the following:

11. Law I — Every body preserves in its state of rest or of uniform motion in a straight line unless it is compelled to alter that state by impressed force.

12. Law II — Change of momentum is proportional to the impressed force and takes place along the line of action of that force.

13. Law III — Action and reaction are always equal and opposite; that is to say, the actions of two bodies upon each other are equal and directly opposite.

Read the same text again. Look up the dictionary whenever you find it necessary. Analyse sentences you find difficult to understand paying special attention to sentences 1, 2, 5(1), 7, 9.

Write the new words in your vocabulary book and learn them.

Ex. 4. a) Write questions about the text (1) for your classmates to answer. Observe logical sequence in asking your questions. b) Compress the text leaving out the excessive information.

Ex. 5. Translate these sentences paying special attention to the *ing-form*, the *Infinitive* and the function of "do".

a) 1. According to school arithmetic the necessary and sufficient condition for a real number to be rational is that its decimal expansion is finite or periodic. 2. Ordinal numbers were necessary to translate events into the language of mathematics. 3. To simplify matters let us first try to prove $(-1)(-1) = (+1)$. 4. The type of symbols to be introduced and the principles upon which these symbols are to be combined are basic to every number system. 5. In this discussion the second number of each pair is assumed to differ from zero.

b) 1. In fact, any irrational number which is a solution of a quadratic equation with integral coefficients can be represented by a periodically repeating continued fraction. 2. Multiplying $a+bi$ by i to obtain $-b+ai$ also has a simple geometric interpretation. 3. Only those forces giving rise to rotation are considered, others being assumed as not essential. 4. In the given illustration you can see that an increase or decrease in the replacement for S causes a corresponding increase or decrease in the value for p . Hence p is said to vary directly.

c) 1. That greatest common factors do exist can be proved by using Euclidean algorithm. 2. The planet Mars rotates on an axis in about the same time as does the Earth. 3. Some of the same algebraic laws do hold for the situation under consideration. 4. You can add a number to any expression without changing its value provided that you also subtract the same value. Usually you have no reason to add and subtract a number from an expression but occasionally you will do the expression factorable by doing so. 5. To make sure that the result you have obtained does agree with the expected one check it.

Classwork I

Ex. 6. Read the following words.

universal, observe, further, preserve, early; achievement, increase, deal, between, economical; clarify, realize, describe, require, design; weigh, great, aid, data, straight; fall, course, orbit, law, proportional; usual, induce, view, due, suitable; require, square, equal, adequate, question; major, logic, generalize, join, change; motion, machine, coefficient, session, artificial.

Ex. 7. a) Read these words, guess the meaning of the italicised ones. b) Use the words in combinations of your own.

gravitation — *gravitational*; achievement — *to achieve*; astronomer — *astronomy*; to clarify — *clarification*; to support — *supporter*; revolution — *to revolve*; periodic — *periodicity*; acceleration — *accelerator*; to induce — *induction*; mutual — *mutually*; force — *to force*; mass — *massive*; rest — *to rest* — *restful*; uniform — *uniformity* — *uniformly*; to alter — *alternation* — *alternating*; to impress — *impression* — *impressive*.

Ex. 8. Answer your teacher's questions.

Ex. 9. Translate sentences 1, 2, 5 (1), 7, 9 from the text (1).

Ex. 10. Say whether the following statements are true or false. Why?

1. The theory of universal gravitation was formulated by Galileo. 2. Tycho Brahe, a German astronomer collected a great deal of observed data about the motion of the planets. 3. Kepler had formulated his three famous laws before Galileo invented the telescope. 4. The rate of description of sectorial area is not constant. 5. The cubes of the mean distance of the planets from the sun are proportional to the squares of their time of revolution. 6. Not every planet possesses an acceleration towards the sun. 7. All bodies taken in pairs, induce in each other mutual acceleration. 8. Some of Newton's predecessors had their own view of mass. 9. A body continues its uniform motion in a straight line even if it is compelled to change its state by impressed force. 10. Action and reaction are always equal and opposite.

Ex. 11. Answer questions in connection with the text.

Ex. 12. Read these sentences. State the function of a) the *Infinitive*; b) the *ing-forms* and explain the use of 'do'; c) Translate the sentences.

a) 1. A single instruction in the autocode language shall condition the computer to perform several operations. 2. Since ALGOL is to be used for the formulation of calculation processes it is natural that numbers, variables and functions are included as elements of the language. 3. The Englishman Thomas Harriot (1560—1621) was the first mathematician to give status to negative numbers. 4. Many theorems, of which Fermat left no proof, have later been proved to be correct. 5. It appears that practically no positive statement which Fermat made has been shown to be incorrect. 6. To illustrate, let us test the fact that zero added to any integer leaves the integer unchanged.

b) 1. We have seen that $\sqrt{2}$ for example, cannot be expressed as $\frac{a}{b}$ with a and b being integers. 2. Kummer was the first to succeed in proving Fermat's last theorem for $p=11,13$ and for some other larger prime exponents. 3. In number pair notation to say that (a, b) and (c, d) are to be symbols for negative numbers amounts to conditioning that $b > a$ and $d > c$. 4. Newton defined the force acting on an object as the rate of change of its momentum, the momentum being the product of its mass and velocity. 5. The task now becomes one of showing that if (a, b) and (c, d) are two integers then $(a, b) (c, d) = (c, d) (a, b)$.

c) 1. A mass equal to that of Jupiter in orbit close to the Sun's surface would have about the same angular momentum as does the Sun. 2. We can and do reduce the fraction to its lowest terms. 3. A few fields of mathematical research do sometimes require long manipulations. 4. Let us see what would happen if we did permit zero to become part of our fraction.

Read the following text (2). Say which properties of a body are discussed in it.

Guess the meaning of these words.

proportionality, balance, furthermore, unfortunately, economical, deductively, accurately, logically, experimental.

More about Newtonian Laws

1. Newton realized that a body possesses an invariable (постоянный) property known as mass and that, when it possesses an acceleration f then the force acting on the body will be $P = kmf$, where k is a constant of proportionality. 2. In modern notation Law II will be written as follows: Force $\propto \frac{d}{dt}(mv)$ or $m \frac{dv}{dt}$. when the mass m does not artificially (искусственно) change with time. 3. Thus we see that the weight of a body being the force mg , it can vary if g varies, whereas (тогда как) the mass m will at the same time remain constant. 4. Furthermore, the masses of two bodies can be accurately compared by weighing them in the two pans (чашах) of a balance and the weight of any one body will be found by weighing it with a spring (пружина) balance. 5. If we suppose the unit of measurement to be suitably (правильно) chosen we can write $k=1$ and Law II as

$$\boxed{\text{Force} = \text{mass} \times \text{acceleration.}}$$

6. Then Law III, applied to two bodies A and B of masses m_1 and m_2 respectively (соответственно) (see below), says that the mutual forces P and Q are equal.



7. If A possesses acceleration f_1 and Bf_2 we get

$$P = m_1 f_1 = m_2 f_2 = Q \quad \text{and hence} \quad \frac{m_1}{m_2} = \frac{f_2}{f_1}.$$

8. Unfortunately Newton defined mass as density (плотность) \times volume, and since density involves the idea of mass this "definition" is clearly inadequate (не годится). 9. Since Law II attempts (пытается) to relate mass to force it is necessary to have a logically independent view of the one before we can talk about the other. 10. Law III also involves the idea of mass. 11. Considering also the rather obvious fact that Law I is an immediate (непосредственный) deduction from Law II it is clear that these laws are not the most economical. 12. A set of propositions (суждений) designed to reduce Newton's laws to their simplest and most economical form was given by E. Mach at the beginning of this century. 13. These emphasise (подчеркивают) the experimental nature of the foundations (основ) of mechanics and are as follows:

14. *Experimental proposition I.* Two bodies set opposite each other induce in each other opposite acceleration in the direction of their line of junction (соединения).

15. *Definition.* The mass-ratio of any two bodies is the numerical value of the inverse ratio of their mutually induced accelerations.

16. *Experimental proposition II.* The accelerations which any number of bodies $A_1 A_2 \dots$ induced in a body B, are independent of each other.

17. The definitions of mass and force lead deductively to Newton's law of action-reaction and, of course, include Law II and I. 18. The second experimental proposition implies the parallelogram of forces which was itself explicitly stated by Newton in a corollary (следствие) to his three laws of motion.

Ex. 13. You have read the text above. Now,

a) 1. What do the following formulas mean: $\frac{d}{dt}(mv)$ or $m \frac{dy}{dt}$?

2. In what way can one accurately compare the masses of two bodies? 3. What does Law III, applied to two bodies A and B of masses m_1 and m_2 say? 4. What is Newton's definition of mass? 5. What was the first experimental proposition given by E. Mach? 6. What can you say about the second experimental proposition?
b) Look through the text again.

1. State the three laws as defined by Newton. 2. What is the difference between the two approaches to the above problem?

ASSIGNMENT II

1. Laboratory exercises IV—VI.
2. Exercises to be done at home 14—16.

Homework II

Read the text (2). Analyse and translate sentences you find difficult to understand. Pay special attention to sentences 2, 3, 4, 5.

Ex. 14. Write a few questions about the text (2) that might help one in speaking on the subject.

Ex. 15. Write a short summary of both of the articles of the lesson. You must be prepared to discuss Newtonian laws.

Ex. 16. You are expected to know the new words. Practise using them in short sentences or word combinations of your own.

Classwork II

Ex. 17. Form words with the help of prefixes. Read and translate them.

inter — national, change, action;

auto — code, oscillation;

counter — action, balance, example;

super — man, critical, structure, natural;

sub — division, normal, program, sequence, set, conscious;

hemi — sphere, group;

en — large, able, close, circle;

re — union, to construct, to build, to produce, to group.

Ex. 18. a) Read these words. b) Use the second member of each pair of words in a short sentence of your own.

constant — constancy; suitably — suitability; invariable — invariability; respectively — respective; proportional — disproportional; to balance — unbalanced; compatible — compatibility; inadequate — inadequacy; economical — economics; thought — thoughtless; to design — designer; motion — motionless; simple — simplification; change — changeless; compare — comparable; proposition — to propose; logic — logician.

Ex. 19. Translate sentences 2, 3, 4, 5 from the text (2).

Ex. 20. Ask your classmates the questions you wrote at home (Ex. 14) in logical sequence.

Ex. 21. a) Read your summary of both of the articles of this lesson. Let your classmates comment on it and add whatever they find necessary. b) Speak of Newton's contribution to mechanics.

ASSIGNMENT I

1. Laboratory exercises: I—III.
2. Exercises to be done at home 1—5.

Homework I

Ex. 1. Translate these groups of words and sentences. The italicised words are new to you. Note the use of the words in italics*.

Due to a slight deviation; because of the great significance of the question; owing to great precision; thanks to their aid; to devise a highly efficient system; to be greatly impressed by the advances of nuclear physics; the intense radiation is readily explainable; to be ready to cope with the problem; shortly before the moon comet passed near the Earth; on these frequent occasions; this discredited; a short period of rotation; nearly every source of light; the theory permitted a certain prediction; planets are heavenly bodies.

Ex. 2. Read these groups of words. Guess the meaning of the italicised ones.

planetary motion; extremely popular; correlated results; elementary particles; a combined function; for simplicity; electromagnetic radiation; gravitational forces; potential difference.

Ex. 3. Ask questions about the italicised words.

- a) 1. We were able to cope with our task thanks to this aid.
2. We discussed the application of certain classical laws of mechanics yesterday.
3. He gave us a lecture on gravitational attraction last week.
4. These two mathematical expressions are to be combined.

* italics — курсив

5. *The deviation of the comet* was rather significant. 6. *Newtonian* gravitational theory is known for *its simplicity and precision*. 7. *Galileo's* observation of planets allowed him to *advance some very essential ideas on planetary motion*. 8. This deviation is explainable in terms of *Newtonian gravitational theory*. 9. These elementary particles move *in various* directions. 10. *On certain occasions* the application of the above observation is impossible. 11. *This source of particle emission* is extremely intense. 12. *The gravitational field* is known to be irrotational. 13. *Solid state* physics became the subject of our discussion. 14. *A few days ago* we heard a lecture *on the role of the relativity theory in modern science*. 15. We frequently come across *the application of certain physical laws*.

Read the following text without consulting the dictionary.

Gravitational Attraction and Potentials

1. Newton's deduction of the universal law of gravitation stands as one of the greatest achievements in all physics. 2. Newton's law $F=ma$, when combined with the gravitational force law, provides an extremely successful method for calculating the motion of planets, moons, comets, etc. 3. Thousands upon thousands of such computations have been precisely correlated with observations of heavenly bodies. 4. Only one small deviation from the predictions of Newtonian theory has ever been found as far as the planetary motion is concerned. 5. This is the advance of the perihelia of the planets (of significance only in the case of Mercury). 6. The effect is quite small and is explainable in terms of relativity theory. 7. Apart from this one deviation, we may assert that Newtonian theory gives essentially a perfect description of planetary motion.

8. Because of its simplicity and precision, Newtonian gravitational theory became a subject of intense interest to many outstanding mathematicians of the 18th and 19th centuries. 9. Out of these investigations grew the theory of potentials and an extraordinary amount of mathematics was developed to cope with these problems. 10. We have frequent occasion to meet much of this mathematics (e. g. Laplace's equation, Legendre polynomials, Bessel functions, etc.) in many fields of physics both classical and applied. 11. The concept of the potential arises in the following way. 12. The Newtonian gravitational law specifies the force F that will be experienced by a particle at any point in space due to the gravitational attraction of another particle. 13. That is, we may say that a gravitational force field is created by a certain source mass and that any particle in this field experiences a gravitational force. 14. Since the force on the particle has both definite direction and definite magnitude at any point in space, the gravitational field is a vector field and may therefore be described by a certain field vector $F(r)$, where r is the position vector that specifies the particular point in space. 15. Now,

the gravitational field has the property that it is irrotational, i. e. $\text{curl } F=0$. 16. This is just the condition that permits F to be represented by the gradient of a scalar function. 17. This scalar function is called the potential of the vector field; the potential itself defines a scalar field. 18. In many applications it is considerably easier to manipulate the scalar potential than to deal directly with the vector force. 19. Although potentials were originally devised as an aid to solving problems in gravitational attraction, the potential concept became even more important with the development of electromagnetic theory. 20. In modern physics, potentials play important roles in discussions of nuclear phenomena, elementary particles, and solid state physics.

Now that you have read the text, look through it again consulting the dictionary for the words whose meaning you do not know. Analyse the sentences you find difficult to understand. Pay attention to sentences 2, 4, 10, 14, 16.

Write the new words in your vocabulary book and learn them.

Ex. 4. a) Shorten the text retaining the most essential information. b) Write questions concerning the most important points in the text to ask your classmates during the lesson.

Ex. 5. Translate these sentences. a) Concentrate on Participle II.

1. The concept of addition is the same regardless of the numeration system used, but the numerals are different. 2. Since most of the concepts dealt with are already somewhat familiar to you the stress placed on this particular problem is easy to understand. 3. Neptune is small as compared with the Earth. 4. This new kind of irrational number suggested by Lagandre could not be thought of as a root of an algebraic equation. 5. This type of equation commonly referred to as a polynomial equation presents certain difficulties for the beginner.

b) Note the use of "one".

1. One would think that this deviation is easily explainable. 2. So here are five statements of which four, on the face of them, seem to be absolutely true and one absolutely false. 3. If the number is named in decimal notation change to fractional one and proceed as we did before. 4. This means that to locate the geometric image of a complex number one would again start from arbitrarily selected zero point, called the origin. 5. The reason we use these symbols is one of convenience.

c) Concentrate on the Absolute Principle Construction.

1. Multiplication by one is similar regardless of the numeration system used, the number one being the identity element of multiplication. 2. To solve the mathematical sentences given in this section one must understand the meaning of these symbols, the symbol indicating not less than, that is either $=$ or $>$. 3. Newton's in-

terest in the subject of gravitation being extremely great, he started a new set of calculations. 4. Parentheses and brackets can be viewed as another part of mathematical symbolism, these symbols being quite different from those previously used by you. 5. The deviation being extremely small, we may consider it of no significance for the purpose of our investigation.

Classwork I

Ex. 6. Read the following words. Note the stress.

a) deduction, another, function, just; combined, provide, devise, arise; explainable, deviation, aid, play, weight; certain, concern, provide, apart; potential, mathematician, pressure, expression;

b) success, accept, occasion, precisely, concern, significance, scalar, science, assert, physics, philosophy, phenomenon, enough, lough;

c) deduction — deduce; production — produce; introduction — introduce; induction — induce; combine — combination; divide — division; precise — precision.

Ex. 7. Read these words. Use the italicised ones in combinations of words or short sentences of your own.

to apply, application, *applicable*, inapplicable; to attract, attraction, *attractive*; certain, certainly, certainty, *uncertain*; directly, *indirectly*; to explain, explainable, *inexplainable*; extremely, *extremity*; frequent, frequently, *frequency*; intense, *intensify*, *intensity*; to permit, *permission*, *permissible*; solid, *solidify*; simple, simplicity, *simplify*, *simplification*; precise, precision, *precisely*.

Ex. 8. Answer your teacher's questions.

Ex. 9. Translate sentences 2, 4, 10, 14, 16 from the text (1).

Ex. 10. Say whether the following statements are true or false. If you believe they are false, say why.

1. Newton's law $F=ma$ being combined with the gravitational law proves extremely successful in calculating the motion of planets. 2. A number of deviations from the predictions of Newtonian theory have already been found. 3. The effects of the advance of the perihelia of the planets is rather significant in the case of all planets. 4. Newtonian gravitational theory was studied intensely in the seventeenth century. 5. The theory of potentials grew out of the investigations connected with the Newtonian theory. 6. This theory does not find application in the field of applied physics. 7. A gravitational force field is created by a certain source mass. 8. The gravitational field is rotational. 9. The scalar function is called the potential of the vector field. 10. In many applications it is considerably easier to deal directly with the vector force than to

manipulate the scalar potential. 11. Potentials were originally devised as an aid to solving problems in gravitational attraction. 12. The force acting on the particle has definite direction but has no definite magnitude.

Ex. 11. Answer your teacher's questions in connection with the text.

Ex. 12. Ask your classmates questions you wrote at home.

Ex. 13. a) State the function of Participle II in the sentences below.

1. The above definition is actually a statement of the method used to find the sum of the rational numbers whose fractional names have different denominators. 2. Given any relation we can immediately form another relation by reversing the components of each ordered pair. 3. The variable in each open sentence given below is to be replaced with the value suggested. 4. The reader will have recognized that (a, b) signifies what is generally thought of as $a-b$. For example, $(5, 3)$ would represent the integer of 2. 5. In solving equations we are often required to simplify such expressions as the ones given below.

b) Combine the two given sentences into one by using the Absolute Participle Construction.

1. The result was wrong. The scientists had to check the calculation again. 2. The first equation has been solved. We can proceed to the next one. 3. Newton published his *Principia*. The publication made his name famous.

c) State the function of "one".

1. May one be sure that the order of adding is insignificant as far as natural numbers are concerned? 2. By means of logarithms every arithmetic task of multiplication or division may be reduced to one in addition or subtraction. 3. One can hardly expect to obtain any information under such conditions. 4. One and the same sign is used on both sides of the equation. 5. Numbers are one of the most basic of the great ideas of mathematics.

Read the following text and try to get its principle points. Guess the meaning of these words.

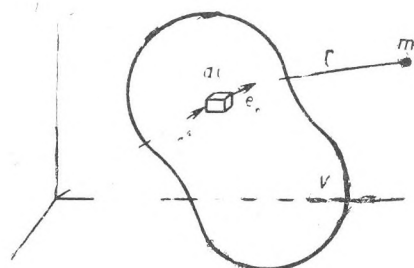
attractive, continuous distribution, integral, integration, per unit mass, identically, dependence, additive.

The Gravitational Potential

1. Newton's universal law of gravitation states that at a distance r from a particle of mass M a second particle of mass m experiences an attractive gravitational force.

$$F = -\gamma \frac{mM}{r^2} e_r \quad (1)$$

where e_r is the unit vector from M toward m . (With this definition of e_r , the minus sign ensures (обеспечивает) that the force is attractive). 2. In the form of Eq. (1) the law strictly (строго) applies only to point particles. 3. If one or both of the particles is replaced by a body which has a certain extension, we must make an additional



hypothesis before we can calculate the force. 4. We must assume the gravitational force field to be a linear field. 5. That is we assume that it is possible to calculate the resulting gravitational force on a particle due to many other particles by simply taking the vector sum of all of the individual forces. 6. For a body which consists of a continuous distribution of matter, the sum becomes an integral.

$$F = -\gamma m \int_v \frac{\rho(r') e_r}{r^2} dv' \quad (2)$$

where $\rho(r')$ is the mass density and dv' is the element of volume at the position defined by the vector r' .

7. If both the body of mass M and the body of mass m have extension, then a second integration over the volume of m will be necessary in order to compute the total gravitational force. 8. The gravitational vector g is defined to be the vector representing the force per unit mass exerted on (действовать на) a particle in the field of a body of mass M . 9. Thus

$$g = \frac{F}{m} = -\gamma \frac{M}{r^2} e_r \quad (3)$$

or

$$g = -\gamma \int_v \frac{\rho(r) e_r}{r^2} dv'. \quad (3a)$$

10. The quantity g has the dimensions of force per unit mass or acceleration. 11. In fact, near the surface of the Earth, the magnitude of g is just the quantity that is called the gravitational acceleration constant. 12. A measurement with a simple pendulum (маятник) is sufficient to show that (g) is approximately 980 cm/sec^2 at the surface of the Earth. 13. Now, as has already been mentioned in a previous article, the necessary and sufficient condition that a vector field may be represented by the gradient of a scalar function is that the curl of the field vector vanishes (исчезает) identically, i. e. the field is irrotational. 14. The curl of a vector which has only $1/r^2$ radial dependence, will vanish identically; in particular $\text{curl } g = 0$. (4)

15. Therefore, we may write $g \equiv -\text{grad } \Phi$ (5) where Φ is called the gravitational potential and has dimensions of (force per unit mass) \times (distance) or energy per unit mass. 16. Since g has only a radial variation the potential Φ can have at most (максимум) a variation with r . 17. Therefore using Eq. (3) for g we have

$$\text{grad } \Phi = \frac{d\Phi}{dr} e_r = \gamma \frac{M}{r^2} e_r.$$

18. Upon integrating we obtain

$$\Phi = -\gamma \frac{M}{r}. \quad (6)$$

19. The possible constant of integration has been suppressed (сокращена) since the potential is undetermined to within the additive constant. 20. That is, only differences in potential are meaningful, not particular values. 21. We usually remove the ambiguity (неясность) in the value of the potential by arbitrary (произвольно) requiring that $\Phi \rightarrow 0$ as $r \rightarrow \infty$; then Eq. (6) correctly gives the potential for this conditions.

Ex. 8. Now that you have read the text above, answer a few questions in connection with the text.

1. What does the text deal with? 2. Look at the first equation of the article we are discussing and say what it means. 3. Does the law in the form of the given equation (1) apply only to point particles or also to a body which has a certain extension? 4. In what way is it possible to calculate the resulting gravitational force on a particle? 5. Suppose, both the body of mass M and the body of mass m have extension, then how is it possible to compute the total gravitational force (see Eq. 3 or 3a). 6. See equation (2) and explain its meaning. 7. What do we call the gravitational acceleration constant? 2. What is the necessary and sufficient condition for a vector field to be represented by the gradient of a scalar function? 9. Could you possibly explain the equation $\Phi = -\gamma \frac{M}{r}$ 10. Are particular values as well as differences in potential meaningful as far as the above equation (6) is concerned?

ASSIGNMENT II

1. Laboratory exercises IV—VI.
2. Exercises to be done at home 13—15.

Homework II

Read the text (2). Analyse and translate sentences you find difficult to understand. Pay special attention to sentences 4, 8, 13, 19, 21.

Ex. 13. Write a few questions on gravitational potential so that in answering these questions your classmates might give a detailed review of the material.

Ex. 14. Write a short summary of both of the articles of the lesson. You must be prepared to speak on gravitational attraction and gravitational potential.

Ex. 15. Write down in your vocabulary book the words of the lesson that are new to you and practise using them in short sentences of your own.

Classwork II

Ex. 16. Read the following words. While reading them bear in mind that some of the letters are not pronounced.

know, knew, knot, knife, knee, walk, talk, chalk, often, listen, fasten, whistle, sign, design, light, flight, night, bright, though, although, through, thought, brought;
unique, cheque, technique, distinguish, guess, guilty, guest;
physics, photography, philosophy, telephone, phrase, phase, physiology, phenomenon.

Ex. 17. Read the words below. Use the italicised ones in short phrases of your own.

manipulate — manipulation; correlate — correlation; irrotational — rotational; to suppress — suppression, ambiguity — ambiguous — unambiguous; frequent — infrequently; arbitrary — arbitrarily; extremely — extremist; dependence — dependent — independence; to remove — removal; strictly — strict — strictness; integration — integrity; extension — extensive; unit — unity — united; identically — identical — identity; previous — previously; place — replacement; magnitude — magnify; quantity — quantitative.

Ex. 18. Translate sentences 4, 8, 13, 19, 21 from the text (2).

Ex. 19. Ask your classmates questions you wrote at home (Ex. 13).

Ex. 20. Read your summary of the articles and let your classmates comment on it.

ASSIGNMENT I

1. Laboratory exercises I—III.
2. Exercises to be done at home 1—6.

Homework I

Ex. 1. Translate these sentences and groups of words. The italicised words are new to you.

an implicit thought; an object of perception; mental work; a football team; a chess match; a hockey player; an entirely new entity; scattered particles; we must gain time; the list of all the students in the group; we turn to a new subject; they display certain interest; the method yielded unexpected results; insert the omitted word.

Ex. 2. Read these groups of words. Guess the meaning of the italicised ones.

an association of teachers; president of the Academy of Sciences; normally, the behaviour of these elementary particles; a convention of mathematicians; to display concreteness; to decode mysterious signs; to characterize a person; forming a superset we...

Ex. 3. Ask questions about the sentences below.

1. This statement is to be abbreviated since it is too long. (what, why) 2. The association of scientists advanced an interesting idea. (what kind of) 3. The motion of this body is characterized by a small deviation. (what) 4. This method of computation is expected to be extremely efficient. (which method) 5. Particles are scattered in various directions. (what, where) 8. We were able to see two distinct groups of people in the distance. (who, where, what) 7. One has to insert braces around this list of objects to distinguish it from

the other list. (why) 8. There are five players in a basketball team. (how many) 9. Having combined these two groups we produced a new entity. (in what way) 10. The purpose of the article is clear (what)

Read the following text and try to understand it without consulting the dictionary:

Sets

1. The notion of a set, which has always been implicit in mathematics, was first implicitly introduced and developed by G. Cantor in the late nineteenth century. 2. By a set Cantor meant any collection of definite, well-distinguished objects — either of perception or thought. 3. Thus a member of a set is either a physical object (for example, a pencil) or a mental object (for example, the number five). 4. By a specific set, then, we mean a definite collection of objects; thus a set is known once we know, of each objects, whether or not the object is a member of the set. 5. In other words, a set is defined if and only if we can assert of each object either that the object is a member of the set or that the object is not a member of a set. 6. It is the act of bringing together a number of distinct and separate objects that creates the set. 7. The act of “bringing together” may be carried out either physically or conceptually. 8. As an example of the former, consider the bringing together that occurs when eleven football players congregate on a football field. 9. Again, consider two football teams in a match on a football field. 10. This is an example not merely of two sets (the two football teams), but a superset — “the players in the game”. 11. Thus the two teams, when brought together, produce a new entity. 12. The act of bringing together can also be carried out conceptually. 13. For example, consider the collection of all presidents of football associations in a country. 14. Normally, these people are scattered across the face of the country; it is through the exercise of the intellect that we “bring together” this particular group of individuals, thus creating the set of all presidents of associations (of course the fully attended presidents’ convention would bring together physically the members of this set). 15. Generally as you already know we denote sets by capital letters, and members of sets by small letters. 16. The fundamental statement we can make in this connection is that a particular object is a member of a particular set or is not a member of that set. 17. Consider the statement “The object x is a member of the set A ”. 18. It is convenient to abbreviate this statement by writing “ $x \in A$ ”, where “ \in ” stands for “is a member of”. 19. Similarly, we shall denote “ x is not a member of A ”. by writing “ $x \notin A$ ”. 20. Since a set is a collection of objects, it is clear that two sets are the same if and only if (*iff*) they possess precisely the same members. 21. Thus the set whose members are 5 and 6 is the set

whose members are 6 and 5. Also, the set whose only member is the integer 2 is the set of all even integers between 1 and 3: denoting this set by “ T ” we can write $2 \in T$ and $\bar{3} \in T$ and $\bar{4} \in T$. 22. To simplify matters and to gain concreteness, we suppose for the purpose of a particular mathematical investigation that each object capable of being a member of a set has been designated in advance. 23. This set of objects is called the universal set and is denoted by “ I ”. 24. Bear in mind that the universal set of one mathematical investigation may not be the universal set of a second mathematical investigation.

25. We turn to the problem of naming sets; it is much easier to talk about a specific set if we have an efficient method of naming or denoting a set. 26. There are two widely used methods of naming a set: one is to list the members of the set and the other is to state a property which is possessed by each member of the set and not possessed by any other object. 27. As an example of the first method, consider the set S , such that $2 \in S$, $3 \in S$, $5 \in S$ while no other object is a member of S . 28. Listing the members of S , we obtain: 2, 3, 5. 29. As it stands, this will hardly do as a name of S ; we do not want to write “ $S=2, 3, 5$ ”. 30. For this reason we insert braces around the list, thereby obtaining the expression “ $\{2, 3, 5\}$ ” which we take to be a name of S . 31. Thus we have to write “ $S=\{2, 3, 5\}$ ”. 32. A definite code is being used: the braces stand for “the set”; then interpose “Whose members are”; finally, we read off the objects listed. 33. The code is displayed as follows: the set whose members are 2, 3, 5. 34. There is nothing mysterious here. 35. When decoded, the mathematical expression “ $\{2, 3, 5\}$ ” yields “the set whose members are 2, 3 and 5”. Clearly, “then, $\{2, 3, 5\}$ ” is a name of S . 36. We turn now to the second method of naming a set. The idea is to present a property which characterizes the members of the set. 37. For example, the collection of all positive primes is a set, since it is clear of any object whether it is a positive prime (we note that a prime is an integer t which has exactly four divisors; 1, -1 , t , and $-t$). 38. We shall denote this set by writing $x|x$ is a positive prime. 39. Again, a definite code is being used. 40. The two braces stand for “the set”; we then interpose “of all objects, say”; the vertical line stands for “such that”; when decoded, this mathematical expression yields “the set of all objects, say x , such that x is a positive prime”. Hence “ $\{x|x \text{ is a positive prime}\}$ ” is a name of the set of all positive primes. 41. We have said that the fundamental property of a set is that we can assert of each object whether or not it is a member of the set. 42. Consider the set constructed by asserting of each object that it is not a member of the set; this set has no members and is therefore said to be an empty set or the null set. 43. It is easy to construct names of the empty set by using the two methods given above. 44. Listing the members of the empty set, we obtain “ $\{ \}$ ” which clearly denotes that the set has no members. 45. Observing that each object has the property that it is equal

to itself, we see that we are able to characterize the empty set as the set of all objects, say t , such that t differs from t ; thus we obtain the name " $\{t|t \neq t\}$ ". 46. Because the empty set is referred to frequently, it is convenient to have yet another name for this set. 47. By convention the symbol $=\emptyset$ is used to denote an empty set. Thus $\emptyset = \{ \} = \{t|t \neq t\}$.

Now, that you have got the general idea of sets, read the text again. Look up the dictionary whenever you find it necessary to understand the text in detail. Pay special attention to sentences 1, 4, 5, 6, 8, 11, 12, 22, 30, 34, 35, 37, 41, 42, 46.

Write the new words in your vocabulary book.

Ex. 4. Shorten the text (1). Leave out all that is not essential.

Ex. 5. Write a few questions about the text to ask your classmates. Observe logical sequence.

Ex. 6. Translate these sentences. a) Concentrate on the emphatic construction.

1. It is the gravitation that makes the Earth's satellites move around the Earth. 2. It is the idea of the infinitely large with which we are concerned. 3. It is only differences in potentials that are meaningful, not particular values.

b) Note the use of 'if' and 'whether'.

1. We cannot determine whether either of these sentences is true or false until we replace "He" with the name of a person and until we replace a with a numeral. 2. In 1684 Heley asked Newton if he could prove why the orbit of a planet must be an ellipsis. 3. Whether or not the result of the operation is correct may be stated only after it has been carefully checked.

c) Note the use of the Passive.

1. Multiplication of one number by a positive multiplier may be thought of as a short way of representing addition. 2. These problems that can be determined mentally according to the type of factors given are usually referred to as special products and the quotient and divisors determined by mental division are referred to as factors. 3. Perhaps you have not thought of it recently but when you first learned to use decimals you were told that the decimal notation was only a convenient way of writing fractions whose denominators were 10 or powers of 10. 4. Let us suppose that we are called upon to solve the equation $x+a=b$, where a and b are positive numbers. 5. Statistics are facts expressed in numbers and the branch of mathematics called statistics is concerned with collecting, organizing and interpreting such facts. 6. Should a binomial factor that is not prime appear among the factors of any other expression, it ought to be factored again so that all polynomial factors are prime.

Classwork I

Ex. 7. Read the following words. a) Observe the rules for reading.

Near, hear, theory, obvious; break, brake, gain, display; first, insert, purpose, concern; source, four, thought, brought; prescribe, finite, characterize, thereby; analytic, regard, entity, explicit; convention, characterize, accidental, customary; perception, accidental, implicit, brakes.

b) Read these words paying special attention to the ending "-ed".

added, needed, complicated, abbreviated, inserted, yielded, noted, regarded; combined, used, described, obtained, scattered, characterized, considered, displayed, required, tired; worked, looked, developed, expressed, produced, typed, impressed, wished; studied, emptied, carried, accompanied.

Ex. 8. Read the words below. Use the italicised ones in short phrases of your own.

implicit — *implicitly*; to congregate — *congregation*; president — *presidency*; association — *to associate*; to scatter — *scattering*; concreteness — *concrete*; list — *to list*; to display — *a display*; mysterious — *mysteriously*; characterize — *characteristic* of.

Ex. 9. Answer your teacher's questions.

Ex. 10. Translate sentences 1, 4, 5, 6, 8, 11, 12, 22, 30, 34, 35, 37, 41, 42, 46 from the text (1).

Ex. 11. Say whether the following statements are true or false. If you believe they are false, say why.

1. By a set Cantor meant a collection of definite well-distinguished objects of perception only. 2. A set is known once we know, of each object, whether or not the object is a member of the set. 3. The act of "bringing together" may merely be carried out conceptually. 4. The two football teams, when brought together produce a new entity. 5. Generally we denote sets by small letters and members of sets by capital letters. 6. Two sets are the same if and only if they possess different members. 7. The universal set of one mathematical investigation may not be the universal set of a second mathematical investigation. 8. In naming sets we use definite codes. 9. The fundamental property of a set is that it can assert of each object whether or not it is a member of the set. 10. It is impossible to construct names of the empty set by using the two methods given in the article.

Ex. 12. a) Answer a few questions in connection with the text (1). b) Ask your classmates the questions you wrote at home (Ex. 5).

Ex. 13. Translate these sentences.

a) 1. It was about this time that Newton made interesting discoveries in optics. 2. It was the great mathematician Gauss who began the explanation of the nature of imaginary and complex quantities. 3. It was not until 1882 that Lindeemann found a procedure to prove the transcendental of π . 4. To establish the equality $(ab+bc, ac+bc)$ with (d, d) , investigate to determine whether the equality rule is fulfilled. 5. Let us see if the product of two conjugate complex numbers $a+bi$ and $a-bi$ results in a real number. 6. The description of a set must be stated so that it can be determined whether or not an object belongs to the set.

b) Note that the clauses are joined asyndetically.

1. At this point one may say all we have done is invent a new symbol. 2. You will not be able to factor all of the algebraic expressions you find in elementary algebra. 3. Many events people must deal with are independent; they occur without affecting each other in any way. 4. In solving equations one has to be very careful with the signs one uses. 5. The assumptions made for geometry we have been considering so far are essentially those made by Euclid in Elements.

Read the text (2) silently. While reading guess the meaning of the words.

partially, classifying, instinct, accompanying, demonstrate, essential, appropriately, assertion.

You are expected to give the general outline of the text.

Mappings

1. The ease with which mathematics can be applied to the world about us is partially explained by the fact that the basic concepts of mathematics are rooted in man's experience as a living and thinking being (живое, думающее существо). 2. Of course it takes genius (нужен гений) to discover which ingredients of the commonplace (банальный) are important. 3. For example, the application of the connection between man's classifying instinct and mathematics, though implicit in the work of many of the great mathematicians, was recognized (признавалась) explicitly less than a century ago.

4. Now, we shall concern ourselves with another of the important concepts of mathematics — the notion of a mapping. 5. But first let us try an experiment designed to yield some information about our mental habits (умственные привычки). 6. Visualize (зрительно представить) your best friend. 7. Of course, the image of a certain individual forms in your mind. But did you notice that accompanying this image is a name — the name of your friend? Not only did you "see" your friend, but you also thought of his name. 8. In fact, is it possible for you to visualize any individual without his name immediately emerging (возникает) in your memory? Try! 9. Furthermore,

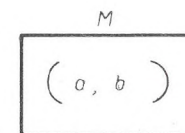
is it possible for you to think of the name of an individual without, at the same time, visualizing that individual? 10. The point (смысл) of the preceding experiment is to demonstrate that we habitually link together (обычно связываем) a person and his name; we seldom (редко) think of one without the other. 11. Let us see what there is of mathematical value in the above observation. 12. First, let us state the essentials of the situation. 13. On the one hand, we have a set of persons; on the other hand, the set of names of these persons. 14. With each member of the first set we associate, in a natural way a member of the second set. 15. It is in the process of associating members of one set with the members of another set that something new has been created. 16. Let us analyse the situation mathematically. 17. Denote the set of persons by " P " and the set of names by " N ". 18. We want to associate with each member of " P " an appropriately chosen member of N ; in fact, we want to create a mathematical object which will characterize this association of members of N with members of P . 19. We rely (полагаемся) on one simple observation: there is no better way of indicating that two objects are linked (связаны) together than by actually writing down the names of the objects, one after the other; i. e., we indicate that two objects are associated by pairing the objects. 20. Now we see the importance of ordered pairs! 21. The ordered pair (a, b) can be used to indicate that a and b are linked together. 22. Now we know how to characterize associating members of N with members of P : construct the subset $P \times N$ obtained by pairing with each person his name. 23. The resulting set of ordered pairs expresses mathematically the associating process described above, since the person and the name that belong together appear in the same ordered pair.

24. Now a definition. Let " A " and " B " denote any nonempty sets. A subset of $A \times B$, say μ , is said to be a mapping of A into B iff each member of A is a first term of exactly one ordered pair in μ . 25. Moreover, we shall say that the mapping μ associates with a given member of A , say a , the member of B paired with a . 26. Thus, iff $(a, b) \in \mu$ we shall say that ' b ' is associated with ' a ' under the mapping μ , b is also called the image of a under the mapping. 27. Note that the subset $P \times N$ constructed above is a mapping of P into N . 28. Thus our notion of a mapping of A into N permits us to characterize mathematically the intuitive idea of associating a member of B with each member of A .

Intuitive idea



Mathematical representation



29. Under the intuitive idea, b is associated with a ; this is represented by the mathematical assertion $(a, b) \in \mu$. 30. In short, the set μ characterizes the intuitive idea of associating a member of B with a member of A . 31. If μ is a mapping of A into B such that each member of B is a second term of at least one member of μ , then we shall say that μ is a mapping of A into B . 32. Furthermore, if a mapping of A into B such that no member of B is a second term of two ordered pairs in the mapping, then we shall say that this subset of $A \times B$ is *one-one mapping of A into B* . For example, $\{(1, 3), (2, 4), (3, 5), (4, 6)\}$ is one-one mapping of $\{1, 2, 3, 4\}$ into $\{1, 2, 3, 4, 5, 6, 7\}$. 33. If μ is both a one-one mapping of A into B and a mapping of A onto B , then μ is said to be a *one-one mapping of A onto B* .

Now that you have read the text, say a few words or answer a few questions in connection with mappings.

1. State a method of associating a point with a circle which produces a mapping of the set of all circles of the plane onto the set of all point of the plane. 2. Construct a mapping of the set of all points of the plane into the set of all circles of the plane. 3. Show that each mapping of A into B is also a mapping of B into A . 4. Given that B is a subset of C , show that each mapping of A into B is also a mapping of A into C . 5. a) State several methods of associating a number with a person. b) Which of the resulting mappings are "into"? Which are "onto"? Which are "one-one"?

ASSIGNMENT II

1. Laboratory exercises IV—VI.
2. Exercises to be done at home 14—16.

Homework II

Read the text (2). Analyse and translate the sentences you find difficult to understand. Pay special attention to sentences 1, 2, 5, 7, 8, 9, 15, 19, 29.

Ex. 14. Be prepared to answer these questions in class. Look through the text for the answers.

1. Why can mathematics be applied to the world about us with relative ease? 2. Is there any connection between man's classifying instinct and mathematics. When was this connection recognized? 3. Which experiment in this article is designed to yield some information about our mental habits? 4. Does the image of a man usually accompany his name? 5. Does one necessarily visualize a man when hearing his name? 6. Why do we habitually link together a person

and his name? 7. What is the best way of indicating that two objects are linked together? 8. What do we show by pairing objects? 9. How do we characterize associating members of N with the members of P ? 10. If A and B denote any nonempty set, then, what is a subset of $A \times B$, say μ , said to be? 11. Under what condition is a subset of $A \times B$ said to be a mapping of A into B ? 12. What is represented by the mathematical assertion $(a, b) \in \mu$. 13. When do we say that μ is a mapping of A into B ? 14. What do we mean by saying that the subset of $A \times B$ is one-one of A into B ?

Ex. 15. Review both articles of the lesson and write a summary.

Ex. 16. Write down the new words in your vocabulary book and use them in short phrases of your own.

Classwork II

Ex. 17. Read these words.

partial, partially, sufficient, mathematician, technician, efficient, machine, essential, intuition, initial, rational, differential, convention, perception; usual measure, pleasure, exposure, occasion, precision, division, visual, visualize.

Ex. 18. Read these words and say which part of speech they belong to. Guess the meaning of the words in italics.

to accompany, *accompaniment*; memory, *memorize, memorial*; instinct, *instinctive, instinctively*; part, *partial, partially*; to rely, *reliable, unreliable*; visualize, visual; to appreciate, *appreciation, appreciable*; to connect, *connection, to disconnect*; recognize, *recognition*; image, *to imagine, imaginary*; to demonstrate, *demonstration, demonstrative*; person, *personal*; characterize, *characteristic*; to obtain, *obtainable, unobtainable*; nature, *natural, unnatural*; name, *nameless*.

Ex. 19. Translate sentences 1, 2, 5, 7, 8, 9, 15, 19, 29 from the text (2).

Ex. 20. Say whether the following statements are right or wrong. If you think they are wrong, say why.

1. Basic concepts of mathematics are rooted in man's experience as a living and thinking being. 2. It does not take a genius to discover which ingredients of the commonplace are important. 3. The appreciation of the connection between man's classifying instinct and mathematics was recognized many centuries ago. 4. When naming a person you never visualize his name. 5. It is in the process of associating members of one set with the members of another set that some new entity has been created. 6. Ordering mathematical objects is not important in mathematics. 7. A subset of $A \times B$ is said

to be a mapping of A into B if and only if each member of A is a first term of exactly one ordered pair in μ . 8. If $(b, a) \in \mu$ we shall say that a is an image of b under the mapping. 9. μ characterizes the intuitive idea of associating a member of B with a member of A . 10. If μ is both a one-one mapping of A into B and a mapping of A onto B , then μ is said to be a one-one mapping of A into B .

Ex. 21. Answer questions in connection with the text (use Ex. 14).

Ex. 22. Read your summary of both of the articles and let your classmates comment on it.

LESSON THIRTY

ASSIGNMENT I

1. Laboratory exercises I—III.
2. Exercises to be done at home 1—5.

Homework I

Ex. 1. Translate these groups of words. The italicised ones are new to you.

domain of a function; *domain* of dependence; *domain* of integrity; *derivative* of a function; *to sketch* the graph of a function; a *lazy* student; a hard *job*; the *back* of the page; the *slope* of the *tangent* line; *to save* time; *to save* the situation; a *smooth* curve; *smooth* surface; a mysterious figure; *to accomplish* a difficult task; *to reflect* the rays of the sun; *to reflect* ideas; the *top* of the page; the *bottom* of the box; *labour* movement; the *boredom* of these *monotonous* operations; *to be content* with the job; *to plot* a number of points; some lazy people *prefer* monotonous job.

Ex. 2. Ask questions using the words in brackets.

1. They have accomplished this difficult task. (who, what kind of).
2. He must avoid discussing the situation with her. (who, with whom, what).
3. He has to come back next week. (who, when).
4. An electronic computer is known to be a complicated device. (what, what kind of).
5. These ideas were reflected in a recent article. (where, what).
6. The surface must be smooth. (what).
7. The slope was plotted on the diagram. (what, where).
8. The effect is largely explained by acceleration. (what, by what).
9. We suggest that the device should be utilized in experimental work. (what).
10. They are not content with the accomplished job. (why).

Read the following text without consulting the dictionary. Get its general idea.

The Derivative of a Function and Some Applications of the Derivative

Given a function, say f , we want to associate a number with any given number in the domain of f ; let us agree to denote this set by writing Df . 2. In effect, this means that we want to construct a Df function from the given function f . 3. The function that we shall construct from f is called the derivative of f and is denoted by writing f' (read f prime).

4. The concept of the derivative of a function has a number of important applications. 5. One of these applications is concerned with the problem of sketching the graph of a function. 6. Of course, since the graph of a function is the set of points of the plane that correspond to the members of the function, we see that there is no theoretical difficulty involved in this problem — we merely locate the points of the plane corresponding to the ordered pairs of the function. 7. The fact that there usually is an infinite number of ordered pairs in the function being graphed means that the few points actually plotted must be chosen with some care, so that a representative picture of the function is obtained;

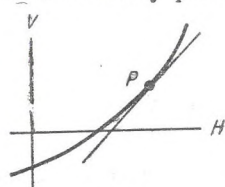


Fig. 1

even this can be avoided by the simple device of plotting many points. 8. But the mathematician is extremely lazy; rather than carry out the time taking and monotonous job of plotting many points, he prefers to sit back and think for a moment with the hope of finding, a way of avoiding such boredom.

9. He may define the function f' in such a manner that for any number a , $f'(a)$ is the slope of the tangent to the graph of f at the point $(a, f(a))$ on the graph. 10. We will proceed as follows. The tangent of a curve at point, P , on the curve is an important concept largely because a small segment of the tangent line containing P differs very little from the curve (see Figure 1). 11. This suggests to the lazy mathematician that when he plots a point on the graph he should determine the slope of the tangent line to the curve at that point (this is easily accomplished by consulting the derivative) and then draw in a short segment of the tangent at that point. 12. In this way a number of line segments is obtained, rather than points alone. 13. For instance, let us obtain the graph of the function x^2+2x-3 . 14. The ordered pairs $(-4, 5)$, $(-3, 0)$, $(-2, -3)$, $(-1, -4)$, $(0, -3)$, $(1, 0)$, $(2, 5)$ are each members of the function, and the corresponding points are easily plotted. 15. Joining these points by a smooth curve (dotted in the diagram), we obtain a sketch of the graph (see Figure 2). 16. Let us now make use of the derivative. 17. The derivative of our function is $2x+2$, and so the slopes of the tangent lines at each of the seven points plotted are: $-6, -4, -2, 0, 2, 4, 6$. 18. Short line segments having these slopes have been drawn through the corresponding points of the diagram.

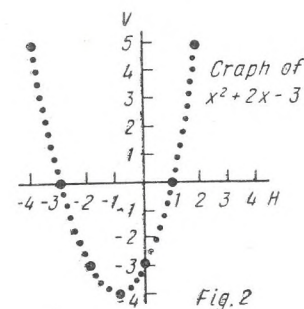


Fig. 2

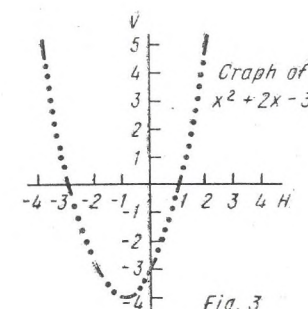


Fig. 3

19. Finally, the line segments are joined by a smooth curve (dotted in the diagram), and so the graph of x^2+2x-3 has been sketched (see Figure 3). 20. Examining Figure 2 we do not feel quite sure about the resulting graph, since so few points have been plotted, but in Figure 3 the line segments plotted scream to be joined up by a smooth curve.

The Extreme Points on a Graph

21. By utilizing the derivative of the function, we have seen how to plot entire segments of a graph rather than mere points. 22. The lazy mathematician, however, is not content with this labor-saving device alone. 23. Observing that the graph of a function usually consists of a series of ups and downs (see Figure 4) he reflects that the easiest way of sketching the graph is by first locating the top and bottom, points of the graph — P , Q , R and S in the diagram. 24. Once these have been plotted, it remains only to plot tangent segments between each top and bottom point — at A_1 , A_2 , A_3 , A_4 and A_5 in the diagram — and finally to join the plotted line segments by a smooth curve. 25. We shall call the top and bottom points of a graph its extreme points.

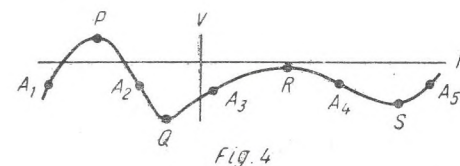


Fig. 4

Now read the text again. You may use the dictionary whenever you find it necessary. Analyse and translate sentences you find difficult to understand. Special attention should be paid to sentences 7, 8, 11, 12, 20, 23, 24.

Write the new words in your vocabulary book and learn them.

Ex. 3. Summarize the principal points of the text (1) you have just read. Write only the most essential information.

Ex. 4. Write a few questions about the text the answers to which might give a more or less detailed picture of the contents of the text.

Ex. 5. Translate the sentences below.

a) Note the use of 'for'.

1. For the problem to be solved it must be stated clearly. 2. One necessary condition for the calculation to be correct is for the student to concentrate on his work. 3. A trial is an act which makes it possible for an event to happen (a success) or not to happen (a failure). 4. It is not possible for a horizontal or a vertical line to cross a circle or an ellipse at only one point. 5. It is necessary for you to consider three elements: distance, rate and the time in each of the two situations. 6. It is evident that there is a close relationship between points on the plane and two-dimensional vectors, for both points and vectors are denoted by ordered pairs of real numbers. 7. Except for zero only positive numbers have real square roots and only negative numbers have imaginary square roots. 8. By substituting five for y we obtain the desired result.

b) Note the use of 'either', 'neither', 'both'.

1. However, a fraction is made up of two parts either or both of which may be negative expressions. 2. In each of these examples you are sure to notice that the number containing the unknown is either a monomial or a binomial square. 3. Either of these processes may be used to check the other one. 4. In either case the result will be a simple equation in one unknown. 5. The graph shows the fact that neither x nor y can be zero in an equation of the form $xy=c$. 6. The graph shows this fact, for the curve never crosses either the x -axis or the y -axis. It approaches them but it never gets there.

Classwork I

Ex. 6. Read the following words.

a) Observe the rules for reading.

allow, how, boundary, brown; area, air, various, pair; few, view, due, suitable; utilize, universal, uniform, unidirectional; neither, either, design, cycle; minute, building, determine, foreign; rough, subject, consult, cover; manner, capture, back, sand; picture, sketch, capture, future; progression, ratio, dimension, machine.

b) Recall the singular and the plural of the given words.

radius — radii; vertex — vertices; axis — axes; criterion — criteria; phenomenon — phenomena; basis — bases; analysis — analyses; nucleus — nuclei; formula — formulas; maximum — maxima; minimum — minima.

Ex. 7. Read these words. Guess the meaning of the words in italics.

derivative — to *derive* — *derivation*; lasy — *lasiness*; to prefer — *preferable* — *preference*; monotonous — *monotonously*; jobless; reflect — *reflection* — *reflexive*; to accomplish — *accomplishment*; to improve — *improvement*; smooth — *smoothly*; utilize — *utilization*; bottom — *bottomless*; top — *topless*.

Ex. 8. Answer your teacher's questions.

Ex. 9. Translate sentences 7, 8, 11, 12, 20, 23 from the text (1).

Ex. 10. Express your agreement or disagreement with the following statements. If you disagree, say why.

1. It is impossible to construct a function from a given function. 2. The concept of the derivative of a function has few applications and they are not very important. 3. The graph of a function is a set of points of the plane that correspond to the numbers of the function. 4. The problem of sketching a graph involves great theoretical difficulties. 5. It is not important to choose the points that must be plotted carefully. 6. A mathematician would carry out the monotonous job of plotting many points rather than sit back and think a little to simplify the process. 7. A mathematician should first draw in a short segment of the tangent at the point and then determine the slope of the tangent line to the curve at that point. 8. The easiest way of sketching a graph is by first locating the top and bottom of the graph.

Ex. 11. Answer a few questions in connection with the text.

Ex. 12. Read these sentences. Explain the use of 'for' (a, b) and note the word order (c). Translate these sentences.

a) 1. It is important for the student to keep this definition in mind so that he should be able to make use of it wherever necessary. 2. It is difficult for us to realize how extremely important Newton's discovery of the law of universal gravitation must have been in the 17th century. 3. There is no possibility for the same sort of thing to occur in the physical world.

b) 1. The number zero is the additive identity, for the addition of it to any other number leaves the second number unchanged. 2. To prove the addition property for inequalities, we need consider only the property of $<$, for $a < b$ implies that $b > a$. 3. If substituting a number a for x in a polynomial causes the expression to become equal to zero, then $x-a$ is a factor of the polynomial.

c) 1. It was not until 1641 that Napier published his researches on logarithms. 2. The idea of ordered pairs cannot be used for the irrational or the real number set. Nor would ordered n -tuples of rational numbers be sufficient. 3. Since $(b-a)c$ names a positive integer, so does its equivalent expression $bc-ac$. 4. A zero number is a cardinal number. It is not a positive number. Nor is it negative. 5. Only now can we make the conclusion that the set of all real numbers is uncountable.

Read the following text (2) and mark the sentences which convey its main points.

Guess the meaning of these words.

variety, critical, hold, minimum, maximum, memorize, maximize, summarize.

Max-Min Problems

1. Now that we are able to sketch roughly (приблизительно) the graph of a function, we are in a position to solve a variety of problems of the type known as "max-min" problems. 2. For example consider the problem of determining the dimensions of a rectangle that has the largest possible area, subject to restriction (при условии) that the perimeter of the rectangle is 40 ft. 3. Suppose that the dimensions of the rectangle are a and h (see Figure 5). 4. Then the perimeter is $2(a+h)$ and therefore $h=20-a$. 5. But the area of the rectangle is $a \cdot h = a(20-a)$. 6. This leads us to consider the function A , where $A = \{(a, b) | b = a(20-a) \text{ and } 0 < a < 20\}$. 7. Note that the second term of an ordered pair in A is the area of the rectangle one of whose dimensions is the first term of that ordered pair. 8. All possible rectangles, subject to the restriction of the problem have been captured (охвачены), in this sense, by the function A . 9. We want to determine the ordered pair in A with the largest second term. 10. This is accomplished by sketching the graph of the function $f = 20x - x^2$ (see Figure 6). 11. Clearly, $f' = 20 - 2x$ and $f'' = -2$. 12. By examining the first derivative we see that the function is critical at 10, and by examining the second derivative we see that the function is a relative maximum at 10. 13. Note that $f(5) = 75$, $f'(5) = 10$, $f(15) = 75$, $f'(15) = -10$, $f(10) = 0$, $f'(0) = 20$, $f(20) = 0$, and $f'(20) = -20$. 14. Using this information, we obtain the sketch of $20x - x^2$ shown in the diagram. Now we can see that the function A has its maximum value at the number at which A is a relative maximum, namely at 10, the desired rectangle therefore having dimensions 10 ft. \times 10 ft. 16. In general, the maximum value of a function is the largest of the values the function takes at the numbers at which the function is a relative maximum; but care must be taken to ensure that this value is not exceeded (превышена) by

the value of the function at a boundary (граница) of the domain of the function.

17. As another example of a max-min problem, let us determine the length and the width of a sandbox (ящик для песка) whose height is 1 ft and which will hold 25 cub. ft. of sand, in order that the

Graph of $20x - x^2$

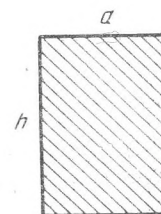


Fig. 5

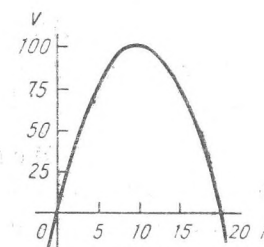


Fig. 6

minimum amount of wood (дерева) will be used in constructing it. 18. To solve this problem, we observe that if the length of the sandbox is a ft., then the width is $25/a$; hence the amount of wood required is $25 + 2a + 50/a$ sq. ft. 19. Thus we are concerned with the function W , where $W = \{(a, b) | b = 25 + 2a + 50/a \text{ and } 0 < a\}$. Note that the second term of an ordered pair in W represents the amount of wood required to construct the sandbox whose length is given by the first term of the ordered pair. 20. Therefore we want to find the number at which the function W takes its minimum value. 21. We accomplish this by sketching the function $25 + 2x + 50/x$ (see Figure 7). 22. The first derivative of this function is $2 - 50/x^2$ and the second derivative is $100/x^3$. 23. The function is critical at 5 and at -5 . 24. We conclude that the function is a relative minimum at 5 and a relative maximum at -5 . However, we are interested only in the part of the graph to the right of V : $W(5) = 45$, $W(1) = 77$, and $W'(1) = -48$, $W(10) = 50$ and $W'(10) = 3/2$. 25. Using this information, we obtain the sketch of W shown in the diagram. 26. Thus the minimum value of W is at 5, the relative minimum of W . 27. And so the length of the sandbox is 5 ft. and its width is 5 ft.

28. Summarizing, in order to solve a max-min problem, we first determine the function which we wish to maximize or minimize and then calculate the first and the second derivatives of this func-

tion. 29. The zeroes of the first derivative include all relative maxima and relative minima of the function, whereas the second derivative distinguishes (usually) between a number at which a function is a relative maximum and one at which the function is a relative minimum. 30. Finally as a check, we sketch the function.

Graph of W

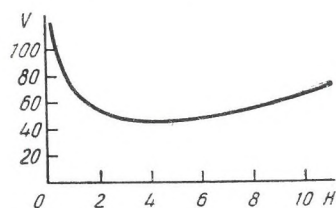


Fig. 7

Now that you have read the text (2) (a) say a few words about the max-min problems mentioned here. (b) Could you give your own examples of max-min problems? Do, please.

ASSIGNMENT II

1. Laboratory exercises: IV—VI.
2. Exercises to be done at home 13—20.

Homework II

Read the text (2) and analyse the sentences you find difficult to understand. Sentences 2, 8, 15, 16, 18 should be given special attention.

Ex. 13. While answering these questions look through the text.

1. What kind of problems are dealt with in this text? 2. See Figure 5 and say how you determine the perimeter of the rectangle.
3. What is the area of the rectangle equal to? 4. See Figure 4 and explain the meaning of the graph. 5. What is the maximum value of the function f ? 6. What are the desired dimensions of the given rectangle? 7. What is the maximum value of a function in general? 8. Is it possible for the maximum value of the function to be exceeded by the value of the function at a boundary of the domain of the function? 9. Could you determine the length and the width of a sandbox if you knew its height and volume? 10. See Figure 7 and speak on it. 11. What are we to do first if we wish to solve a max-min problem? 12. What do the zeroes of the first derivation include?

Ex. 14. Write a review of both articles of the lesson.

Ex. 15. Write down in your vocabulary book the words that are new to you and practise using them in phrases of your own.

Classwork II

Ex. 16. a) Add negative prefixes to these words and give their Russian equivalents.

rational, equal, usual, directly, dependent, rotational, to place, finite, regular, to agree, movable, necessary, important, limited, valid, correct, possible.

b) Guess the meaning of the second member of each pair given below. Use the words in short phrases of your own.

to pass — passable; to believe — believable; to think — thinkable; to use — usable; precise — precision; limit — limitation; to use — usage; to pass — passage; to continue — to discontinue; to compare — comparative; to contain — container; to include — inclusion; to invent — inventive; to construct — constructor; limited — unlimited; complex — complexity; to rely — reliability; advantage — advantageous; to use — to misuse, solvable — solubility; integral — integrity; empty — emptiness; history — historic; need — needless; to extract — extraction; comfort — comfortable; to lead — to mislead; to read — to misread; to inform — to misinform; possible — impossibility; expression — expressionless; philosophy — philosophic; to think — unthinkable, to produce — producer, explain — inexplicable; interested — disinterested; to accomplish — accomplishment; ideal — idealism; to differ — indifferently; move — movable, suitable — unsuitable, legal — illegal, purpose — purposeful.

Ex. 17. Translate these sentences.

a) Note the use of the Subjunctive.

1. In repeating the operation of multiplication, it is often helpful to multiply the multiplier in the original problem by the multiplicand so that any error in the first multiplication should not be repeated in the check. 2. Should the parenthesis be preceded by a minus sign, the resulting expression will be the product of the inclosed terms and -1 . 3. This means that to locate a geometric point of a complex number one would again start from an arbitrarily selected zero point, called the origin. 4. It is fundamental that real and complex numbers obey the same basic laws of arithmetic. 5. Although there is, of course, a conceptual difference between the complex number $z = a + bi$ and the point (a, b) of the complex plane, we shall often refer to them as if (though) they were one and the same thing. 6. If β were again replaced by $-\beta$, we would have the inequality $|\alpha + \beta| \geq |\alpha| - |\beta|$ which would provide a lower bound for $|\alpha + \beta|$.

b) Note the use of 'that (those)'.

1. You may have noticed that the fractions with numerator one ordered by magnitude were put in the first line, those with numerator two in the second line and so on. 2. The reasoning process which proves the denumerability of algebraic numbers orders them by successively listing the roots of the equations of height 1, then those of height 2, and so on. 3. The problem is that of obtaining a measure for the length of the diagonal of a square whose side measurement is given. 4. The results obtained agree with those obtained by the old classical mathematics. 5. The rules for dealing with algebraic fractions are very much the same as those for common fractions. 6. In either of these cases a new fraction must be formed whose value is the same as that of the original but whose form is different. 7. In

order to establish a correspondence between these planes we add the following conventional values to those defined by the equation just mentioned.

c) *Note the use of 'as'.*

1. The device under consideration is to be as precise as possible. 2. The rules mentioned above apply in algebra as well. 3. As a result of universal gravitation we are attracted to the earth by the force known as weight. 4. The atmospheric pressure decreases as altitude increases. 5. We think of this problem as being solved.

Ex. 18. Translate sentences 2, 8, 15, 16, 18 from the text (2).

Ex. 19. Speak in connection with the text.

a) 1. Find the two numbers whose sum is 16 and such that their product is as large as possible. 2. How must we divide number a so that the sum of the squares of its parts should be a minimum? 3. Find the distance on the graph x^2 whose distance from (0.1) is least.

b) Use Ex. 13 for questioning.

Ex. 20. Read your summary of both of the articles of the lesson and let your classmates comment on it or add whatever they find necessary.

РАЗДЕЛ ЛАБОРАТОРНЫХ ЗАДАНИЙ

УРОК 1

I. Прослушайте и повторите вслед за диктором 1 упражнение урока.

II. Прослушайте и повторите данные пары слов. Обратите внимание на восходящий и нисходящий тон.

[i: — i]	[i — e]	[æ — e]	[ai — ei]	[t — d]
he — hit	till — tell	land — lend	site — same	bit — bid
be — bit	miss — mess	man — men	rice — race	bet — bed
see — sit	pin — pen	and — end	wide — wade	hit — hid
Pete — pit	lid — led	sat — set	wine — wane	hat — had

[k — g]	[s — z]	[w — v]	[f — v]
back — bag	rice — rise	wine — vine	fine — vine
lack — lag	caps — cabs	went — vent	fan — van
Dick — dig	backs — bags	wise — vice	life — dive
pick — pig	hence — hens	west — vest	safe — save

III. Прослушайте и повторите. Обратите внимание на произношение окончаний множественного числа.

[z] — pens, pencils, sides, times, tables, bags, hunds, names, planes, ideas, films, plans;

[s] — sets, maps, types, helps, lengths, facts, tests, planets, lamps, effects;

[iz] — places, ellipses, sizes, dishes, catches, masses.

IV. Прослушайте и повторите вслед за диктором: а) слова урока; б) упр. 2.

V. Измените в соответствии с образцом.

T.: This plan

St.: These plans

This pen, this pencil, this side, this time, this table, this bag, this hand, this idea, this film, this set, this map, this type, this length, this fact, this test, this planet, this lamp, this effect, this size, this ellips, this place.

VI. Измените в соответствии с образцом.

T.: The man's hand.

St.: The hand of the man.

The film's idea; these pencils' length; the plane's width; the child's table; the children's help; these patents' sizes; this lamp's type.

T.: — The child of this man.

St.: — This man's child.

The size of the map; the place of these children; the type of the ellipsis; the time of the test; the bag of this child.

УРОК 2

I. Прослушайте и повторите вслед за диктором упр. 1.

II. Прослушайте и повторите.

[ɔ — ou]	[ɔ — ɔ:]	[ɔ — ɔ: — ou]
rob — rope	hot — hord	not — north — note
not — note	cot — cort	lot — lord — lone
hop — hope	pot — port	cock — cork — cone
dot — dote	sot — sort	cod — cord — code

[e — ə:]	[ʌ — a:]	[ɪ — ɪk]	[ʌ — ju:]
ten — term	hut — hart	bring — brink	cut — cube
det — dirt	cut — cart	bang — bank	duck — duke
bent — burnt	bud — bard	ring — rink	pup — pupil
get — girl	bug — bargin	thing — think	hug — huge

[n — ɪ — ɪk]
sin — sing — sink
pin — ping — pink
win — wing — wink
ran — rang — rank

III. Прослушайте и повторите упр. 7 1-го урока (сводное упражнение).

IV. Прослушайте и повторите, обращая внимание на произношение окончаний множественного числа.

Stops, notes, students, cuts, results;
atoms, methods, problems, lines, curves, girls, homes, boys;
studies, families, colleges, classes.

V. Повторите вслед за диктором: а) слова урока 2; б) упр. 2; в) упр. 3.

VI. Прослушайте реплику диктора и измените в соответствии с образцом. Действие должно быть произведено лицом, указанным в скобках.

T.: — Take it. (she)

St.: — Let her take it.

1. Hold the table. (he) 2. Make a plan. (they) 3. Study the problem. (I) 4. Open the note. (she) 5. Help that girl. (he) 6. Go home. (we) 7. Give them the data. (she) 8. Show us the result. (they) 9. Make a stop. (he) 10. Go to college. (she) 11. Close the bag. (he) 12. Cut the short curve. (we) 13. Try this method. (we)

VII. Действие не должно быть произведено.

T.: — Take it.

St.: — Do not take it.

1 Give her the long pencil. 2. Show them the same place. 3. Open these notes. 4. Cut those lines. 5. Study the same problems. 6. Send him home.

1. Let them take the data. 2. Let him go to college. 3. Let her help the boy. 4. Let them try this method. 5. Let the girl send this note. 6. Let the boy open the bag. 7. Let the man close it. 8. Let the student study the result.

VIII. Измените в соответствии с образцом.

T.: — Show me that boy's home.

St.: — Show me the home of that boy.

1. Open that girl's note. 2. Help this man's family. 3. Study these students' results. 4. Find this girl's home. 5. Close that boy's bag. 6. Hold that man's child. 7. Show us this student's film.

УРОК 3

I. Прослушайте и повторите вслед за диктором упр. 1.

II. Прослушайте и повторите: а) данные группы слов, сравнивая противопоставляемые звуки:

[ɔ: — ə]	[wɔ: — wə:]	[ɔ: — ou]
torn — term	war — work	halt — hole
form — firm	warm — worst	fall — fold
for — fur	water — world	call — cold
horn — hurt	warn — worm	ball — bold
born — burn	ward — word	salt — sold
short — shirt	warp — worth	wall — wold

[e — ə: — ɔ:]
ten — tern — torn
det — dirt — dorm
bent — burnt — borne
fen — fern — form
get — girl — gorge
met — myrtle — mortal

б) Обратите внимание на произношение буквосочетания 'wh'.
whale, while, whim, whip, white, whelm, what, when, why;
who, whom, whose, whole.

в) Прослушайте упр. 6 (урок 2) и повторите слова вслед за диктором.

III. Прослушайте и повторите: а) слова урока 3; б) упр. 2.

IV. Выразите удивление, сомнение в возможности (необходимости) совершения действия, используя при этом слово 'really' «действительно».

T.: — You may take these data.

St.: — May I *really* take these data?

1. She can do this work. 2. You must tell him about it. 3. You may ask that girl. 4. He can write these words. 5. She could do this work yesterday. 6. You must rise early. 7. She can hold that box. 8. They may change their plans. 9. You must write that paper now.

V. Дайте краткие утвердительные или отрицательные ответы.

T.: — Must I go?

St.: — No, you need not. (Yes, you must.)

T.: — May I take another pen?

St.: — Yes, you may. (No, you must not.)

1. Must he help that man? (yes) 2. May I ask her about her family? (no) 3. Must she rise early? (no) 4. May I try his method? (yes) 5. Must they study this paper? (yes) 6. Must he find another place? (no) 7. May the student open the bag? (no) 8. Must they change their plan? (no)

VI. Ответьте на вопрос, используя слово, данное в скобках.

a) T.: — Who can make this change? (I)

St.: — I can make this change.

1. Who can tell us his name? (she) 2. Who must study the students' papers? (he) 3. Who could give them another idea? (I) 4. Who must give us the data? (they) 5. Who can hold these ends? (we) 6. Who must write every word of the lesson? (the students)

б) T.: — What can you do? (work)

St.: — I can *work*.

1. What must he write? (the man's name) 2. When may I take that paper from him? (now) 3. When must they do this work? (at the lesson) 4. What must she ask the boy? (his name) 5. When could he find time for this work? (yesterday) 6. What must we find? (the size of it) 7. What must they study? (the result of his work)

УРОК 4

ЗАДАНИЕ I

I. Прослушайте и повторите вслед за диктором упр. 1.

II. Прослушайте и повторите: а) данные пары слов, сравнивая противопоставляемые звуки:

[i: — i]	[ei — ai]	[ei — ai]	[ou — ʊ]	[ɔ: — ou]
seat — sit	mail — mile	slay — sly	road — rod	law — low
seen — sin	chain — chime	lay — lie	coat — cod	saw — sow

beat — bit	vail — vile	way — why	coast — cost	awful — own
deem — dim	pain — pine	bay — buy	soap — sob	draw — throw
eat — it	main — mine	clay — clime	load — lot	raw — row

б) out, house, brown, flower, fallow, now, double, young, moon, say, hood, seam, steady, health, lean, beat, quite, quote, seed, ready, queen, look, aim, raw, hook, sail, lay, coat, law, fault, row, slowly.

в) Сводное упражнение (б) в чтении к уроку 3.

III. Прослушайте и повторите: а) слова урока 4; б) упр. 2, 3, 4.

IV. Дополните данное высказывание после того, как диктор произнесет два предложения.

T.: — He is a student.

Ann is a student too. (They)

St.: — *They are students.*

1. She is young. This man is young too. (They) 2. I am in the room. You are also in the room. (We) 3. The boy was at home. The girl was at home too. (The boy and the girl) 4. I am ready. She is ready (We) 5. He will be late. The girl will also be late. (They) 6. The small box is on the table. The large box is also on the table. (The boxes) 7. My lesson was over. Your lesson was over too. (Our lessons) 8. This text will be short. That text will also be short. (These texts) 9. He was ready to translate. I was also ready to translate. (We) 10. This method is old. Their method is also old. (These methods)

V. Ответьте утвердительно или отрицательно.

T.: — Is the student ready? (Yes, no)

St.: — Yes, the student is ready.

No, the student is not ready.

1. Is the desk black? (yes) 2. Is that book old? (no) 3. Are these rooms large? (yes) 4. Was the boy at home yesterday? (no) 5. Were the men at the lesson last week? (yes) 6. Will they be here tomorrow? (yes) 7. Will she work next week? (no) 8. Were they at the University yesterday? (yes) 9. Is he young? (yes) 10. Was the teacher old? (no) 11. Am I late? (no) 12. Are you ready? (yes) 13. Is his room in that house? (no) 14. Is their method good? (yes) 15. Was her task easy? (no).

ЗАДАНИЕ II

VI. Сравните следующие пары слов, повторяя их за диктором.

[i: — i]	[e — ə:]	[e — æ]
keen — kin	ten — turn	set — sat
reel — rill	Bess — birth	wreck — rack
seek — sick	ness — nurse	then — than
least — list	best — burst	treck — track
scene — sin	debt — dirt	wretch — ratch

[æ — a:]	[a: — ʌ]	[ɔ: — ɒ]
back — bark	stark — stuck	chalk — chock
badge — barge	bark — buck	forks — fox
chat — chart	harm — hum	dawn — don
mash — marsh	march — much	hawk — hock
shack — shark	charm — chum	your — lost

VII. Прослушайте текст урока, следя за диктором по книге.

VIII. Прослушайте текст, в паузах повторяя отрезки текста, произнесенные диктором.

IX. Прослушайте текст, не глядя в книгу, стараясь понять его со слуха.

X. Переспросите, выразив сомнение. Используйте слово 'really'.

T.: — They are at the University.

St.: — Are they really at the University?

1. They are in the classroom. 2. The classroom is large. 3. They are at the lesson. 4. This is an English lesson. 5. They must study English at the University. 6. Their teacher is in the classroom. 7. She is young. 8. They are post-graduate students. 9. Last year they were students. 10. The students are ready for the lesson. 11. They can read English. 12. They can write English. 13. This young girl can speak English. 14. This is an English text. 15. The students must translate it. 16. It is easy. 17. This young man is a post-graduate. 18. He will be a teacher next year.

XI. Выразите несогласие с услышанным и уточните. При этом замените существительное соответствующим местоимением.

T.: — *The boy* is a student. (post-graduate)

St.: — *The boy* is not a student. *He* is a post-graduate.

1. *The girls* are at home. (at the University) 2. *These students* are in our classroom. (their) 3. *The girl's pencil* is short. (long) 4. *The desk* was red. (black) 5. *The children* were ready. (late) 6. *The test* will be over tomorrow. (next week) 7. *The boy* could speak English. (read) 8. *The girl* must translate this text. (those texts) 9. The students may take our data. (the old) 10. *The table* was in the room. (the desk)

XII. Прослушайте и измените в соответствии с образцом, производя необходимые замены.

T.: — The lesson is easy. (the texts)

St.: — The texts are *also* easy.

1. He is in the room. (they) 2. She was at home. (the girls) 3. The boy will be a student. (Pete and Bob) 4. I was ready. (you) 5. You were late. (he) 6. The book is on the desk. (the pens) 7. The boys were there. (the girl) 8. The children were in the house. (she) 9. I shall be a teacher next year. (they) 10. My lessons were over. (their lesson)

УРОК 5

ЗАДАНИЕ I

I. Прослушайте и повторите упр. 1.

II. Сравните данные группы слов, повторяя их вслед за диктором.

[ɛə — eɪ]	[ɛə — a:]	[ə: — ɛə]	[ɛə — aɪə]
chair — chain	care — cart	fir — fair	tare — tire
fair — fail	fare — farm	furs — fares	hair — hire
hair — hail	bare — barn	earn — air	ware — wire
air — aim	stare — start	curl — care	spare — spire
stair — stain	dare — dark	stir — stair	dare — dire

[ju: — juə]	[ai — aɪə]	[ɪə — ɛə — aɪə]
few — fury	fine — fire	mere — mare — mire
dew — during	time — tired	here — hair — hire
pew — pure	spine — spire	dear — dare — dire
Euclid — Europe	type — tyre	spear — spair — spire
cue — cure	lie — lyre	pear — pair — perspire

III. Прослушайте и повторите: а) сводное упражнение в чтении (7) к уроку 4; б) слова урока 5; в) упр. 2, 3.

IV. Услышав вопрос, произнесенный диктором, подтвердите или возрадите.

T.: — Was there an English lesson yesterday? (yes, no)

St.: — Yes, there was

No, there was not.

1. Is there a pencil in your bag? (yes) 2. Was there a lecture yesterday? (yes) 3. Were there children in the room? (yes) 3. Will there be an easy text? (yes) 5. Will there be a seminar in mechanics today? (no) 6. Was there a book on the teacher's table? (no) 7. Were there students at the desk? (no) 8. Is there paper in the box? (no) 9. Are there new branches of mathematics now? (yes) 10. Will there be a new department here? (no)

V. Выразите ту же мысль, используя иную форму отрицания.

T.: — There is *no* time for it.

St.: — There is *not any* time for it.

1. There are no pencils on the desk. 2. There were no children there. 3. There were no seminars last week. 4. There are no lectures today. 5. There will be no classes tomorrow. 6. There are no easy texts in this book. 7. There is no large room in this house. 8. There will be no changes in my plan.

VI. Ответьте на вопрос, используя слово в скобках.

T.: — What is there in the box? (a pencil)

St.: — There is a pencil.

1. How many students are there? (seven) 2. What is there in your bag? (some papers) 3. Whose note-books are there on the table? (the boy's) 4. What lesson will there be tomorrow? (an English lesson) 5. Who is there at the desk? (a teacher) 6. What books were there on his table? (French books)

ЗАДАНИЕ II

VII. Сравните данные группы слов, повторяя их за диктором.

[iə — эə]	[i: — iə]	[ou — ʊ:]	[ʌ — ə:]
rear — rare	she — shear	loan — lawn	tun — turn
here — hair	gee — year	choke — chalk	luck — lurk
deer — dare	pea — pear	low — law	bud — bird
hear — hare	he — here	cold — called	bust — burst
mere — mare	queen — queer	so — saw	tun — term

VIII. Возразите и уточните.

T.: — There are boys in the room. (girls)

St.: — No, there are not. There are girls in the room.

a) 1. There are students at the desk. (teachers) 2. There were pens in the box. (pencils) 3. There will be lectures tomorrow. (seminars) 4. There was a man in the house. (a child) 5. There are bags on the table. (boxes) 6. There is a department for cybernetics there. (for mathematics).

b) 1. There are many lectures this week. (few) 2. There were many rooms in this house. (few) 3. There are a few children there. (few) 4. There will be few scientists at this seminar. (many) 5. There is much work for him. (little) 6. There was little time for the test. (much)

IX. а) Прослушайте текст урока, следя за диктором по книге.

б) Повторите за диктором, в паузах, отрезки текста. в) Прослушайте текст еще раз, не глядя в книгу.

X. Ответьте на вопрос в связи с текстом урока. Запишите ваши ответы с помощью знаков + или — или некой цифры.

1. How many departments are there at the University of Moscow? 2. How many departments for sciences are there? 3. Was there a department for cybernetics here eight years ago? 4. Are there seminars every week? 5. Is cybernetics an important branch of mathematics? 6. Must you study German at this department? 7. Is English easy? 8. Can you read and write English?

УРОК 6

ЗАДАНИЕ I

I. Прослушайте и повторите упр. 1.

II. Сравните группы слов, повторяя их за диктором.

[ai] — sight — site; might — mite; bright — bride; right — ride; light — lime; fight — fine; night — nine; line — align; sine — sign.

[ɔ:] — born — bought; torn — taught; orgy — ought; door — daughter; for — fought; sord — sought.

[r] — write — right; wrist — risk; writ — rid; wring — ring; wretch — rent; wrote — rot; wry — rye.

[e — ei — æ]	[e — æ — ʌ]	[i — e — æ]
pen — pain — pan	beg — bag — bug	sit — set — sat
less — lace — lass	flesh — flash — flush	lid — led — lad
men — main — man	hern — ham — hum	did — dead — dad

III. Прослушайте и повторите сводное упражнение в чтении.

Retire, 'Europe, due, hair, case, cart, hare, large, ac'quire, secure, charm, worm, view, sheer, tyre, air, scare, starlet, was, hurt, hue, cure, hairy, stern, curl, wire, conspire, tired, skirt, shire, inspire, dirty, whirl, lyre, prepare, bird, spiral, burn, ad'mire, new, world, bard, bare, here, short, review, word, fork, wiry, year, vary, Euclid.

IV. Прослушайте и повторите: а) слова урока 6; б) упр. 2, 3.

V. Услышав вопрос, ответьте на него.

T.: — Have you a black pencil? (yes) (no)

St.: — Yes, I have.

St.: — No, I have not (haven't).

1. Have you any idea about it? (no) 2. Has she a family? (no) 3. Had they a teacher of English? (no) 4. Will you have time for this lecture? (yes) 5. Shall I have the plan tomorrow? (yes) 6. Will they have an important seminar today? (yes) 7. Have they a department for cybernetics there? (no) 8. Has this work various aspects? (yes) 9. Had he a reasonable answer? (no) 10. Has this machine automatic control? (yes)

VI. Прослушайте и повторите, обращая внимание на структуру вопросительного предложения.

He has an interesting lecture on mathematics at the University today.

Has he an interesting lecture on mathematics today?

Who has a lecture on mathematics today?

What	has he today?
What	lecture has he at the University today?
What kind of	lecture has he at the University today?
Where	has he a lecture today?
When	has he a lecture at the University?

А теперь задайте вопросы, воспользовавшись словами в скобках.

1. She has some work (who). 2. They had an important paper. (what). 3. We have a department of mathematics here. (where). 4. He had a good idea. (what kind of — какую). 5. We shall have various computers. (who). 6. I have two weeks for the answer. (how)

many). 7. This man has a logical plan. (what kind of). 8. We have control of atomic energy. (who). 9. They will have a seminar tomorrow. (when). 10. You have interesting information. (what kind of).

ЗАДАНИЕ II

VII. Сравните данные группы слов.

[ei — ai]	[æ — ʌ]	[ʌ — ju:]
late — light	batter — butter	tub — tube
rate — right	ran — run	hug — huge
whale — while	sang — sung	hum — human
knaves — knives	gnat — nut	fun — fume
sane — sign	lack — luck	duck — duke
[æ — ʌ — a:]	[ʌ — ɔ — ɔ:]	
bat — but — bart	chuck — chock — chalk	
stack — stuck — stark	nut — knot — naught	
jag — jug — jar	rut — rot — wrought	
ham — hum — harm	cul — cot — caught	
lack — luck — lark	tuck — tock — talk	

VIII. Ответьте на вопрос и уточните.

T.: — Ann has two black pencils, and *you*? (one)

St.: — I have one black pencil.

1. I have only one answer, and *he*? (three) 2. We have two programs, and *they*? (four) 3. I shall have a seminar, and *he*? (lecture) 4. We had an English lesson yesterday, and *she*? (French) 5. He has few problems, and *you*? (many) 6. We have little time, and *she*? (much)

IX. Ответьте на вопрос.

T.: — How many computers have you? (2)

St.: — We have two computers.

1. How many students are there in the room? (15) 2. How many texts can the students read this week? (6) 3. How many pencils may I take? (12) 4. How many English books have you at home? (25) 5. How many papers could you find? (11) 6. How many of these words can you translate? (13) 7. How many problems must they solve? (3) 8. How many operations can this machine perform? (10)

X. Прочтите каждое данное число, а затем сравните сказанное вами с дикторским образцом.

93, 100, 102; 14—40, 15—50, 16—60;

а) Количественные числительные: 17, 29, 37, 44, 58, 62, 71, 86,

б) порядковые: 9, 5, 8, 7, 11, 13, 21, 22, 33, 44, 55, 120;

в) даты: 1972 г., 1948 г., 1793 г., 1412 г., 1156 г., 1927 г., 1950 г.

XI. Прослушайте текст урока 6: а) следя за диктором по книге; б) повторяя в паузах отрезки текста; в) не глядя в книгу.

XII. Прослушайте вопросы по тексту и ответьте на них; утвердительный ответ запишите с помощью знака +, отрицательный с помощью знака —.

1. Can man capture atomic energy now? 2. Can modern machines perform reasonable operations? 3. Was the First Industrial Revolution in the nineteenth century? 4. Has the Second Industrial revolution various aspects? 5. Is a modern computer an electronic machine? 6. Can a computer store information? 7. Must every computer have an automatic program? 8. Are there automatic computers at your department?

УРОК 7

ЗАДАНИЕ I

I. Прослушайте и повторите упр. 1 и 2.

II. Вспомните правила чтения буквы 'а'. Прослушайте и повторите.

[æ]	[ei]	[a:]	[eə]	[ɔ:]
at	lame	ask	bare	call
mass	able	pass	pair	talk
began	painter	father	stare	always
matter	play	after	stair	law
as	same	farm	vary	author

III. Прочтите и повторите, обращая внимание на чтение окончаний: а) 3 лица единственного числа глагола:

[s] — wants, lasts, likes, puts, makes, marks, helps, starts, hopes, notes;

[z] — controls, answers, solves, attends, words, tries, tells, studies, sends, fails, sides, shows, goes, changes, programs;

[ɪz] — places, closes, crosses, finishes, rises, passes, traches.

б) прошедшего времени глагола:

[t]	[d]	[ɪd]
like — liked	call — called	divide — divided
hope — hoped	change — changed	end — ended
help — helped	enter — entered	record — recorded
ask — asked	handle — handled	select — selected
cross — crossed	perform — performed	result — resulted

IV. Прослушайте и повторите: а) слова урока; б) названия месяцев:

January, February, March, April, May, June, July, August, September, October, November, December.

а) Упр. 3 (a—g).

V. В следующих предложениях замените действующее лицо.

а) Т.: — I speak English. (he)

St.: — He also speaks English.

1. We translate easy texts. (she) 2. They study physics. (he) 3. You do math (he) 4. I work in the library (my brother) 5. You live in Kiev (the man)

б) Т.: — He takes English lessons. (we).

St.: — We also take English lessons.

1. He reads and writes English. (I). 2. She gives us information. (they). 3. This student attends seminars. (we). 4. This girl wants to go to the University. (you). 5. Our teacher speaks English during the lesson. (we).

VI. Ответьте на вопрос.

Т.: — Do you read English? (yes, no)

St.: — Yes, I do.

No, I do not (don't).

1. Do you attend lectures? (yes) 2. Do you come to the University every day? (no) 3. Do they go there in the morning? (yes) 4. Does she speak English? (no) 5. Did you translate that text? (yes) 6. Did he pass his exam yesterday? (no) 7. Did they give you the information? (yes) 8. Does he study algebra? (no) 9. Will he live in Moscow? (yes) 10. Will they discuss it? (no)

VII. Переспросите, выразив сомнение.

Т.: — He works well.

St.: — Does he really work well?

1. He entered the University. 2. She hopes to see him. 3. They will get that information. 4. He failed in his examination in physics. 5. I wanted to live there in winter. 6. She will finish school next year. 7. The boy reads well. 8. The girl takes French lessons.

VIII. Ответьте на вопрос отрицательно и уточните.

Т.: — Does he speak German? (French)

St.: — He does not speak German. He speaks French.

1. Does she study cybernetics? (physics) 2. Do they live in Moscow? (in Kiev) 3. Will you come today? (tomorrow) 4. Did he pass his exam two days ago? (yesterday) 5. Does she work in the library? (at home) 6. Did they attend the lecture? (the seminar)

ЗАДАНИЕ II

IX. Прослушайте и повторите.

а) Winter months are: December, January, February.

Spring months are: March, April, May.

Summer months are: June, July, August.

Autumn months are: September, October, November.

б) Прослушайте данные слова и повторите их. Постарайтесь понять их значение и напишите перевод этих слов. Затем проверьте правильность перевода по словарю.

technical, instrument, doctor, oval, actively, practical, formal, reactor, secretly, classical, position, timeless, orbital, transformation, generator, transportation, controller, occupation, endless.

X. Прослушайте вопрос диктора и ответьте, что сказанное правильно и в отношении другого лица.

Т.: — On Monday I have two lectures, and you?

St.: — I also have two lectures on Monday.

1. I was late for my English class this morning, and Ann? 3. We speak English at the lesson, and she? 4. They can help her, and you? 5. I must translate two texts, and he? 6. He could find those data, and she? 7. He works at the Academy of Sciences, and they? 8. You work at the language lab, and he? 9. He came early today, and she? 10. He will pass his exam tomorrow, and she? 11. She takes French lessons, and he? 12. They will answer all these questions, and you?

XI. Ответьте на вопрос.

Т.: — Where does he live? (in Moscow).

St.: — He lives in Moscow.

1. Where do you work? (at the University). 2. What do you translate? (a text). 3. When did they discuss it? (yesterday). 4. Where did she live last year? (in Leningrad). 5. When will the boy come? (in the morning). 6. How does he speak English? (well). 7. What kind of books do you read? (books on mathematics). 8. Whom did they help? (my brother).

XII. Прослушайте, скажите, что сказанное не относится к другому лицу, и уточните.

Т.: — She lives in Leningrad, and you? (Moscow).

St.: — I do not live in Leningrad. I live in Moscow.

1. He teaches mechanics, and you? (mathematics). 2. I shall live here till May, and you? (April). 3. She failed in mathematics, and he? (in physics). 4. I want to study English, and you? (French). 5. He got that book last week, and she? (yesterday). 6. He always comes at 9 o'clock, and she? (at 10). 7. I saw this film on Sunday, and you? (on Monday). 8. I gave him my paper two days ago, and you? (this morning). 9. We took German lessons last year, and they? (now). 10. We held a conference in December, and you? (last October).

XIII. Прослушайте и повторите слова урока.

- XIV. а) Прослушайте текст урока, следя за диктором по книге.
б) Прослушайте текст, повторяя его отрезки в паузах.

XV. Прослушайте вопросы к тексту и запишите ваши ответы с помощью знаков + или —.

1. Does Lena's family live in Moscow? 2. Is her family rather small? 3. Is Lena's mother a physicist? 4. Does her father work at an Institute? 5. Has she a brother? 6. Is she a schoolgirl? 7. Did Lena pass her exams well enough a few years ago? 8. Did she try again the following year? 9. Does the academic year begin in October? 10. Does each term last 6 months? 11. Must students attend lectures and seminars? 12. Do students study English at the mathematics department?

XVI. а) Прослушайте диалог, следя за диктором по книге. (см. стр. 49).

б) Повторите диалог вслед за диктором.

УРОК 8

ЗАДАНИЕ I

I. Прослушайте и повторите упр. 1.

II. Вспомните правила чтения буквы *e*, прослушайте и повторите.

[e]	[i:]	[ə:]	[iə]	[ei]
felt	legal	certain	hear	eight
head	seem	search	here	grey
ready	easy	early	period	they
method	even	heard	steer	weight
breath	recent	mercy	serious	con'vey

III. Прочтите, обращая внимание на чтение согласных 'c', 'g'.
scene, cure, cat, coil, crook, choice, scent, scant, cow, cycle, crowd, cent;

change, brig, bridge, globe, glide, gym, glad, age, gypsy, gold, page.

IV. Прослушайте и повторите: а) названия дней недели:

Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday.

б) Упр. 2 и 3/а; в) Слова урока 8.

V. Измените предложения в соответствии с образцом.

а) T.: — Come early and we shall do it.

St.: — If you come early we shall do it.

1. Give me your pen and I shall write the translation. 2. Hold

my bag and I shall take the box. 3. Go there and you will see the film. 4. Pass your exam and you will go home. 5. Come in the morning and we shall speak to professor.

б) T.: — Let him come and I shall help him.

St.: — If he comes I shall help him.

1. Let him open the bag and he will take the note. 2. Let them find a place and we shall stay. 3. Let Ann come and I shall ask her that question. 4. Let him rise early and he will be in time for the lecture. 5. Let me stay and I shall show you the data.

VI. Соедините два предложения в одно в соответствии с образцом.

T.: — I'll finish my work. We'll go home.

St.: — If I finish my work we shall go home.

1. He'll be ready. They'll begin the lesson. 2. You'll come. We'll show them the place. 3. She'll stay. You'll discuss your plans for the summer. 4. He'll give me his dissertation. I'll read it. 5. They'll help him. He'll pass his exam.

VII. Ответьте на вопросы.

T.: — Do you want to read *this book*?

St.: — Yes, *it is this book that* I want to read.

1. Are you going to translate *the text*? 2. Is he going to give them *those data*? 3. Does he expect to see *the new film*? 4. Are they going to hold the conference *in Moscow*? 5. Are you going to help *these students*?

ЗАДАНИЕ II

VIII. Прослушайте и повторите.

а) There are seven days in a week. They are: Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday.

Sunday is the first day of the week, Monday is the second day of the week, Tuesday is the third day of the week, Wednesday is the fourth day of the week, Thursday is the fifth day of the week, Friday is the sixth day of the week, Saturday is the seventh day of the week.

Monday, Tuesday, Wednesday, Thursday, Friday and Saturday are week-days, Sunday is our day off (выходной).

б) Прослушайте и повторите. Постарайтесь догадаться о значении данных слов.

elliptic, symbolic, metric, cubic, gravitation, ideal, an assistant, actively, an experiment, universal, elastic.

в) Напишите перевод данных слов.

IX. Прослушайте и повторите диалог (см. стр. 56).

X. Прослушайте вопрос диктора и ответьте, что сказанное справедливо и в отношении другого лица.

T.: — He graduated from the Institute last spring, and you?

St.: — I also graduated from the Institute last spring.

1. She is afraid of her exam in mathematics, and you? 2. He is sure he will pass his exam, and she? 3. I thanked him for the information, and you? 4. We decided to hold the conference next month, and they? 5. She was going to speak to her science adviser, and they? 6. They dealt with very important problems, and he? 7. He usually worked in the library, and you? 8. He gave them his article, and she? 9. She took English lessons in summer, and you? 10. She spoke French to that foreign scientist, and he? 11. She looked through my dissertation, and you? 12. They will come exactly at 7 o'clock, and he?

XI. Ответьте отрицательно.

T.: — Can you help him now?

St.: — I am afraid I cannot.

1. May I take your article this morning? 2. Do you speak German? 3. Have you any interesting books? 4. Did you come exactly in time for the lesson? 5. Do you know a foreign language? 6. Do you usually get up early? 7. Are there many journals in the library? 8. Were there many students at the seminar?

XII. Прочтите даты вслед за диктором: 1/I 1947, 3/II 1919, 15/III 1927, 22/IV 1906, 17/VI 1895, 12/VIII 1716, 11/X 1972.

УРОК 9

ЗАДАНИЕ I

I. Прослушайте и повторите упражнение 1 (см. урок 9).

II. Вспомните правила чтения буквы 'i', прослушайте и повторите.

[ɪ]	[aɪ]	[ə:]	[aɪə]	[i:]
since	mine	firm	fire	field
middle	find	first	tired	piece
assist	mild	circle	giant	brief
till	night	bird	violet	thief
simple	final	chirp	quiet	believe

III. Прочтите, обращая внимание на сочетания согласных 'sh', 'ch'.

shelf, wish, which, witch, shine, flash, shame, chime, cheek, sheep, ship, chalk, watch, chance; mechanics, chemical, character, technical, mechanism, school, machine.

IV. Повторите вслед за диктором. а) упр. 2, 3/a, b, c; б) слова урока 9.

V. Измените в соответствии с образцом.

T.: — The man asks ... (asked, will ask)

St.: — The man is asked (was asked, will be asked)

а) 1. The student helps ... 2. He knows ... 3. She likes ... 4. I give ... 5. They tell ... 6. We take ...

б) 1. You showed ... 2. He found ... 3. She met ... 4. We gave ... 5. I told ... 6. They knew ...

в) 1. I shall meet ... 2. He will find ... 3. The lesson will begin ... 4. They will take ... 5. He will make ... 6. We shall see ...

VI. В следующих предложениях выразите ту же основную мысль, не называя субъекта действия.

T.: — I use this combination. (used, will use)

St.: — This combination is used (was used, will be used).

1. He does this kind of research. 2. They developed a new system. 3. He will learn a few words today. 4. We added these numerals. 5. She will tell us about her exam. 6. He studies such things. 7. They attended the seminar. 8. I showed them our department. 9. She gave another example. 10. I grouped these digits. 11. She wrote that sentence. 12. We shall discuss a lot of things. 13. I found the sum. 13. He multiplies these numerals. 15. He will read that page.

VII. Ответьте на вопрос. Замените существительное местоимением и начните ответ с: 'Yes, (no) I am sure...'

T.: — Will the new method be used? (yes).

St.: — Yes, I am sure it will be used.

1. Is the combination changed? (no). 2. Was the article finished? (yes). 3. Will his lecture be attended? (yes). 4. Will that seminar be held? (no). 5. Was the child stopped? (no). 6. Will his abstract be presented in time? (yes). 7. Is this system of numeration used now? (yes). 8. Were the students shown our hostel? (no). 9. Will that girl be asked? (yes). 10. Were those questions answered? (no).

VIII. Выразите несогласие с услышанным.

T.: — I suppose the work was finished

St.: — No, I am afraid the work was not finished.

1. I suppose the text will be translated. 2. I expect the equation was solved. 3. I suppose they were told about the lecture. 4. I expect the operation was performed. 5. I expect we shall be given that information. 6. I suppose these results were known.

IX. Переспросите. В ответе используйте Passive в соответствующем времени.

T.: — He *will defend* his dissertation.

St.: — Will his dissertation *be defended*?

1. In computers we use base-two system. 2. He found the difference. 3. I grouped the numerals. 4. He added these three digits. 5. We usually check the result. 6. We attend these seminars. 7. They will hold a conference. 8. He always gives good examples.

ЗАДАНИЕ II

X. а) Прослушайте и повторите. Постарайтесь догадаться о значении незнакомых вам выделенных слов.

б) Напишите перевод данных слов и затем проверьте по словарю.

to graduate — *graduation*; use — *useless, useful*; digit — *digital*; to represent — *representation*; word — *wordless*; difference — *to differentiate*; to differ; except — *exception*; to contain — *container*; meaning — *meaningless, meaningful* — to mean; to generate — *generation*; popular — *popularity*; equal — *equality*.

XI. Выразите ту же основную мысль, не называя субъекта действия.

T.: — I can do it (could, may...)

St.: — It can be done.

1. He could find the value. 2. I must write a combination of these digits. 3. You may ask him this question. 4. I could show them our computer. 5. She might change the subject of her dissertation. 6. He must write three equations. 7. We can make all these things. 8. He must deal with these problems. 9. I must look through the journal. 10. You must speak about the exception.

XII. Переспросите, уточните интересующую вас подробность.

T.: — Those five students were asked yesterday. (who, how many, when)

St.: — Who was asked yesterday?

How many students were asked yesterday?

When were those five students asked?

1. We were given easy text. (who, what kind of). 2. The conference was held in May. (what, when). 3. She will be shown his abstract. (who, what). 4. These changes are made by our professor. (what, by whom). 5. The new combination is studied by him. (what, by whom). 6. This examination will be taken tomorrow. (what, when). 7. Three examples of it were given at the lecture. (how many, when). 8. Various simple equations will be written by the teacher. (what kind of, by whom).

XIII. а) Прослушайте текст урока, следя за диктором по книге.

б) Прослушайте текст еще раз. На этот раз закройте книгу и постарайтесь понять текст со слуха.

XIV. Прослушайте вопросы к тексту и запишите ответ с помощью знаков + или —. Если в ответе должно быть названо число — напишите его.

1. Can we live without numerals? 2. How many digits do we use in our Hindu-Arabic system? 3. What is the base of this place-value system? 4. How much is eight minus three? 5. How much is ten minus five? 6. How much is six multiplied by zero? 7. How much is ten+two? 8. How much is twenty divided by five? 9. Which numeral is the difference in the expression $7-5=2$. 10. Which numeral is the product in the expression $8 \times 2=16$. Which numerals are the factors in the mathematical sentence $7 \times 3=21$. 12. What shall we get if we subtract five from twelve? 13. Is subtraction the inverse operation of addition? 14. Is division the inverse operation of addition? 15. Is the product the result of subtraction? 16. Is the difference the result of multiplication? 17. Can you multiply three or four numbers? 18. Will there be a remainder if we divide $30:6$? 19. Will there be a remainder if we divide $21:4$? 20. How many basic operations of arithmetic do you know?

УРОК 10

ЗАДАНИЕ I

I Прослушайте и повторите упражнение 1 (см. урок 10).

II. Вспомните правила чтения буквы 'y', прослушайте и повторите.

[ɪ]	[aɪ]	[j]
system	try	yet
navy	type	yes
duty	rely	young
symbol	supply	year
crystal	buy	beyond

III. Прочтите вслед за диктором, обращая внимание на произносимые буквы.

Knife, night, highly, wrong, ought, table, knee, flight, wrist, chalk, often, knit, eight, straight, wrote, listen, wrinkle, bright, who, whole, height, weight, through, sign, thought, written, half, should, align, foreign, doubt.

IV. Повторите вслед за диктором: а) упражнения 2, 3; б) слова урока.

V. Ответьте на вопросы.

а) T.: — Have you got any English books? (yes, no).

St.: — Yes, I have got some.

No, I have not got any.

1. Have you got any pencils? (no). 2. Are there any girls there? (yes). 3. Where there any children in the room? (no). 4. Did you see any films last week? (yes). 5. Does he read any scientific articles? (yes). Were there any foreign scientists at the conference? (no).

6) T.: — Have you *any journals* at home? (books).

St.: — No, I have not any journals, but I have *some books*.

1. Are there any students in the room? (post-graduates). 2. Have you any newspapers in your bag? (periodicals). 3. Were there any lectures last week? (seminars). 4. Will you have any information this evening? (tomorrow). 5. Have you any friends in Moscow? (in my home-town).

VI. Переспросите.

T.: — I have *some foreign journals*. (books).

St.: — Have you *any foreign books*?

1. He will go somewhere in summer. (in winter). 2. I must do something on Monday. (Sunday). 3. I see somebody in the corridor. (in the room). 4. I gave someone my article yesterday. (dissertation). 5. She can say something during the seminar. (discussion).

VII. Выразите ту же мысль, не называя субъекта действия.

T.: — You must *not do anything* now.

St.: — *Nothing* must be done now.

1. He must *not tell anybody* about it. 2. You may *not give any* one this information. 3. He must *not show* his abstract to *anybody* now. 4. She could *not give any* examples. 5. I *cannot use anything* for my article. 6. We must *not report anything* on the subject.

VIII. Ответьте на вопросы.

a) T.: — Who is reading your thesis? (my professor).

St.: — My professor is.

1. Who is checking the result? (the students). 2. Who was performing that operation? (a post-graduate). 3. Who is developing these ideas? (a group of scientists). 4. Who was asking you all these questions? (my father and mother). 5. Who will be speaking next? (you). 6. Who was showing them the new machine? (we).

6) T.: — Are you reading or *writing*?

St.: — I am *writing*.

1. Are you teaching English or *studying* it? 2. Are you having a lecture or *a seminar* now? 3. Was he speaking *English* or German to that foreign professor? 4. Were they having a discussion on philosophy or *cybernetics*? 5. Will you be using *binary system* or some other system? 6. Will he be checking addition by division or *by subtraction*?

в) T.: — What are you reading? (his abstract).

St.: — I am reading his abstract.

1. Where is he attending the conference? (at the Institute of Mechanics). 2. What is she speaking about? (her dissertation). 3. When

are you going to begin research? (next month). 4. How will they be performing this operation? (with the help of a computer). 5. What will you be doing this time tomorrow? (showing them the town). 6. Whom were you speaking to when I saw you? (a foreign scientist).

IX. Выразите несогласие с услышанным. Замените существительное местоимением.

T.: — Your sister is reading. (write).

St.: — No, she is not. She is writing.

1. The children are answering questions. (ask). 2. The students were having an English lesson at that time. (a seminar). 3. The boy is speaking to a friend. (work). 4. The girl was translating a text when they came. (reading a journal). 5. The post-graduates are writing the program. (operate the machine).

ЗАДАНИЕ II

X. а) Прослушайте и повторите слова. Постарайтесь догадаться о значении незнакомых вам выделенных слов.

б) Напишите перевод данных слов. Проверьте правильность перевода по словарю.

Structure, *temperature*, culture, *future*, capture, lecture; ready — *readiness*; great — *greatness*; black — *blackness*; same — *sameness*; exact — *exactness*; to divide — *divisible*; use — *usable*; *concentration* — *to concentrate*; advantage — *advantageous*; to attend — *attendance*; problem — *problematic*; union — *unity*; father — *fatherless*; familiar — *familiarity*; to indicate — *indication*; power — *powerful*.

XI. Ответьте на вопросы диктора.

a) T.: — What are you doing? (to have a seminar).

St.: — We are having a seminar.

1. What is he writing? (his abstract). 2. Where are you going? (to the University). 3. Whom were you speaking to when I saw you? (to a friend). 4. Where is the machine standing? (in the lab). 5. What were they discussing when you came? (the advantages of their position). 6. Whom was he examining at that moment? (one of his students). 7. Why are you asking this question? (I find it important). 8. Where are they holding the conference? (at the Institute).

б) T.: — Did you see this book anywhere? (где-то).

St.: — I saw the book somewhere.

1. Do you know anything about this system of notation? (кое-что). 2. Is there such a museum anywhere? (где-то). 3. Did she see anybody in the house? (кого-то). 4. Did he give his abstract to anyone? (кому-то). 5. Will you speak to anyone about the results?

- (с кем-нибудь). 6. Does anybody in his class study English? (все). 7. Can you find these newspapers anywhere? (повсюду). 8. Does he know anything about electronics? (ничего). 9. Will they go anywhere in the evening? (никуда). 10. Who helped that man? (никто). 11. What can you tell me about this mathematician? (ничего). 12. What must they change in their plans? (всё).

XII. а) Прослушайте текст урока, следя за диктором по книге. б) Прослушайте текст, не глядя в книгу и стараясь понять его со слуха.

XIII. Прослушайте вопрос диктора к тексту. Ваша реакция на вопрос должна быть записана с помощью знаков +, — или цифры.

1. Was Leibnits doing his research in the twentieth century?
2. Did he develop a base-five system?
3. Did he use the binary system in his machine?
4. How many symbols did he use?
5. Was the machine made by him used in the nineteenth century?
6. What does 'off' correspond to?
7. What does 'on' correspond to?
8. Are there many complicated electronic computers in use now?
9. Does the expression $0 \times 1 = 0$ hold for every numeration system?
10. Must every numeration system have symbols that represent zero and one?

УРОК 11

ЗАДАНИЕ I

I. Прослушайте и повторите упражнение 1 (см. урок 11).

II. Вспомните правила чтения буквы 'o', прослушайте и повторите.

- [ɔ] — office, hot, job, bottle, possible, copper;
- [ou] — stone, over, local, show, cold, road, load, total, slow, moment, open, own;
- [ɔ:] — form, more, ought, your, door, shore, four, thought, course, normal, order;
- [au] — found, out, about, mount, down, allow, now;
- [auə] — power, our, shower, flower;
- [ʌ] — above, some, other, a'mong, become, young, country, mother, e'nough;
- [u] — look, hook, could, book;
- [u:] — moon, hoof, choose, prove, group;
- [ə:] — work, worse, world, worm.

III. Прочтите вслеп за диктором: а) упражнение 2; б) слова урока.

IV. Выразите согласие с услышанным.

- а) T.: — I suppose this method is being changed. (they).
St.: — Yes, they are changing this method.

1. I suppose these students are being given a lecture. (this scientist).
2. I suppose the experiment was being made when you came. (the students).
3. I suppose these books are being read. (everybody).
4. I suppose they were being shown the new computer at that moment. (he).
5. I suppose the dissertation was being defended at 11 o'clock. (she).

б) Дайте утвердительный ответ.

T.: — Is the machine being built? (they).

St.: — Yes, they are building the machine.

1. Is English being studied at the University? (we).
2. Are these digits being multiplied? (he).
3. Is this numeral being divided? (I).
4. Are these children being helped (the teacher).
5. Is this system being used? (they).
6. Was the box being opened when you entered? (he).

V. Ответьте на вопросы, помня о неправильных глаголах.

1. Where did you find this article? (in your journal).
2. When did you hold the conference? (two days ago).
3. When did he take his exam in physics? (last week).
4. What did you see at their laboratory? (very interesting tests).
5. What did his research adviser tell him? (to present his thesis).
6. What kind of research did he do? (important).
7. To whom did he speak about the advantages of their plan? (some foreign scientist).
8. When did professor read the abstract of your dissertation? (yesterday).
9. Where did they build the new computer? (at our Institute).
10. What did she teach you? (German).
11. When did he write his abstract? (last month).
12. When did you begin the lesson? (at 9 o'clock).
13. What did they deal with? (philosophy).
14. Whom did you meet at the conference? (a friend).

ЗАДАНИЕ II

VI. а) Прослушайте и повторите. Постарайтесь догадаться о значении незнакомых вам выделенных слов. б) Напишите перевод данных слов. Проверьте по словарю правильность перевода.

To consider — *consideration* — *considerable*; natural — *naturally* — *nature*; general — *to generalize* — *generality*; statement — *to state*; to solve — *solution* — *solvable*; product — *to produce* — *production*; to imply — *implication*; unique — *uniqueness* — *uniquely* — *to unify*; notice — *noticeable*; to follow — *follower*; element — *elemental*; to accept — *acceptable*; to prove — *provable*; axiom — *axiomatic*; effect — *effective* — *effectively*; minimum — *to minimize*; special — *specialize*.

ЗАДАНИЕ I

VII. Ответьте на вопрос в соответствии с образцом. Существительное замените соответствующим местоимением.

T.: — Is the *problem* being solved? (tomorrow).

St.: — No, *it* is not. It will be solved tomorrow.

1. Are both these facts being discussed? (in the next article).
2. Are students being taught algebra now? (next term).
3. Are both definitions being considered? (during the next seminar).
4. Is the machine being built now? (next year).
5. Is the nature of the property being studied (during the test).

VIII. Дайте краткий утвердительный или отрицательный ответ.

- a) 1. Is three a natural number? (yes). 2. Is zero a natural number? (no). 3. Was his statement long? (yes). 4. Were these operations meaningless? (no). 5. Will his help be useful? (yes).

- b) 1. Could he find any solution? (no). 2. May I give a general definition? (no). 3. Can we accept this axiom without proof? (yes). 4. Must he follow your example? (no). 5. Must we define the value? (yes).

- c) 1. Are there three basic operations of arithmetic? (no). 2. Were there any definitions in that article? (yes). 3. Is there any natural number in this expression? (yes).

- d) 1. Was his statement accepted? (yes). 2. Are these elements defined correctly? (yes). 3. Will the existence of this property be proved? (yes). 4. Were these differences noticed by anybody? (no). 5. Will he be given the necessary information? (no).

- e) 1. Did he point out this fact? (yes). 2. Did that book appear only recently? (no). 3. Does he find such a result impossible? (no). 4. Did you use one symbol instead of two? (yes). 5. Shall we multiply both pairs of natural numbers? (yes). 6. Did he make a statement at the press conference? (no).

- f) 1. Are you dividing these numerals? (yes). 2. Were you giving a lecture when she entered? (yes). 3. Will they be testing both elements at 9 o'clock in the morning? (no). 4. Was he having his English lesson when you came? (yes).

IX. a) Прослушайте текст урока, следя за диктором по книге

b) Прослушайте текст не глядя в книгу и стараясь понять его.

X. Прослушайте вопрос диктора к тексту и запишите ответ с помощью знаков — или +.

1. Is 25 a natural number? 2. Is the sum of two natural numbers also a natural number? 3. Is the set of natural numbers closed under addition? 4. Does the sum of any two natural numbers exist? 5. Is the sum of any two natural numbers unique? 6. Is the property of existence implied in the definition of closure? 7. Is the set of natural numbers closed under subtraction? 8. Has every pair of natural numbers a unique product? 9. Is the closure property under multiplication an axiom? 10. Can we accept it without proof?

I. Прослушайте и повторите упражнение 1.

II. a) Вспомните правила чтения буквы 'u', прослушайте и повторите.

[ʌ] — cut, utter, plus, subject, result, under;

[ju:] — use, tutor, music, unit, huge, produce, cube, due, human, humid, nude;

[u:] — true, rule, blue;

[u] — put, pull, push;

[ə:] — turn, curl, murder, burn, surface, burst, further;

[juə] — during, curious, impure, cure, fuel;

b) Прочтите, обращая внимание на чтение буквы 'x' и сочетания 'ph'.

[ks] — next, text, expect, except, complex, mix, explain, axis;

[gz] — exam, examine, example, exact, exist;

[ph] — philosophy, physics, telephone, sphere, phase, atmosphere, phenomenon, photography.

III. Прочтите вслед за диктором: a) упражнение 2; б) слова урока.

IV. Выразите предположение, что действие может произойти в другое время.

T.: — She *cannot* give you the journal *now*. (next week).

St.: — I *hope*, she *will be able to do it next week*.

1. He cannot operate the machine. (in a few days).
2. She cannot translate scientific articles. (next year).
3. I cannot begin my work today. (tomorrow morning).
4. They cannot produce such complicated computers now. (in future).

V. Спросите, может ли (могло ли) действие произойти при иных обстоятельствах.

a) T.: — I *cannot* use these data *now*. (in your article).

St.: — *Will you be able to use these data in your article?*

1. He cannot get an appointment *now*. (in a few days).
2. She cannot attend her classes now. (next week).
3. I cannot look through your abstract *today*. (on Tuesday).
4. They cannot give us any information. (on Wednesday).

б) T.: — I am not able to do research *now*. (last year).

St.: — I *suppose* you were able to do it *last year*.

1. She is not able to speak English *now*. (a few years ago).
2. I am not able to help him *now*. (some time ago).
3. She is not able to leave *now*. (early in the morning).
4. I am not able to work at home *now*. (on Sunday).

VI. Ответьте на вопрос и уточните.

T.: — Did you (do you, will you) have to change the whole system? (the method).

St.: — No, I did not (do not, will not). I had (have, will have) to change *the method*.

1. Do you have to study the closure property? (uniqueness). 2. Do they have to speak to your teacher? (science adviser). 3. Does he have to work in the lab? (in the library). 4. Does she have to translate only one text? (both texts). 5. Did you have to tell them about it? (my father). 6. Did they have to control the operation? (to check the result). 7. Did he have to leave so early? (at 11 o'clock). 8. Did she have to answer one question? (a few). 9. Will you have to help the boy? (the girl). 2. Shall we have to go now? (tomorrow). 11. Will he have to perform many operations? (only one). 12. Will she have to see him? (his mother).

VII. Выразите согласие с услышанным.

T.: — You *ought to* study a foreign language.

St.: — Yes, I *suppose I should*.

1. He ought to help his mother. 2. She ought to get up early this morning. 3. You ought to work much at your English. 4. She ought to see a doctor. 5. They ought to attend their classes regularly.

VIII. Ответьте на вопросы.

a) T.: — Were you allowed to attend the lecture? (yes, no).

St.: — Yes, I was allowed to attend the lecture.

No, I was not allowed to attend the lecture.

1. Was he allowed to take that journal? (yes). 2. Were they allowed to work in the lab? (no). 3. Will he be allowed to come? (yes). 4. Are you allowed to hold the seminar here? (yes). 5. Were you allowed to change the method? (no).

б) T.: — When are you to meet? (after classes).

St.: — We are to meet *after classes*.

1. Where are you to meet? (at home). 2. What were you to show them? (our new data). 3. When are you to present your abstract? (on Friday). 4. When was he to speak to his science adviser? (after the seminar). 5. What was she to do that morning? (to take her exam).

ЗАДАНИЕ II

IX. а) Прослушайте и повторите. Постарайтесь угадать значение выделенных слов. б) Напишите перевод этих слов.

To place — to replace — *replacement* — *displacement* — *to displace*, nature — natural — naturally — *unnatural* — *unnaturally*; single — *singular*; common — commonly — *uncommon*; to prove —

to disprove; product — *productive* — *productivity*; whole — *wholly*; notice — *unnoticeable*.

X. Измените в соответствии с образцом.

a) T.: — The book *is written* by him.

St.: — The book *is to be written* by him.

1. These numbers are added. 2. Those digits were multiplied. 3. The seminar is held in this room. 4. These equations are solved. 5. He is asked many questions. 6. This question was answered. 6. The exercise is written.

b) T.: — The book must be translated.

St.: — The book has to be translated.

1. The work must be finished. 2. These elements must be examined. 3. The order must be changed. 4. They must be told about the results. 5. He must be given that information.

c) T.: — He had to do it.

St.: — It had to be done.

1. They will have to discuss it. 2. They had to hold the conference in January. 3. You have to close the bag. 4. We had to send the boy home. 5. We shall have to inform his family about it. 6. They have to change their system.

d) T.: — You should do this work.

St.: — This work should be done.

1. They ought to help the boy. 2. You should find that paper. 3. He should follow your example. 4. You ought to write another program. 5. They should build a new machine.

e) T.: — They were allowed to take exams.

St.: — Yes, they were able to take exams.

1. He is allowed to attend lectures. 2. She was allowed to work with him. 3. They will be allowed to use the new computer. 4. I will be allowed to leave soon. 5. They were allowed to open the box.

XI. Переспросите, выразив сомнение в справедливости услышанного.

T.: — Subtraction is associative.

St.: — Is subtraction really associative?

1. I was able to form an idea of their work. 2. This news concerns everybody. 3. He is concerned with cybernetics. 4. These machines have something in common. 5. They have to follow a certain order. 6. The lesson began just in time. 7. The child was allowed to turn the switch. 8. He agreed with me. 9. The exercise is easy. 10. They were allowed to find the solution themselves.

XII. а) Прослушайте текст урока, следя за диктором по книге.

б) Прослушайте текст, не глядя в книгу, стараясь понять его.

XIII. Прослушайте вопросы диктора к тексту и запишите ваши ответы с помощью знаков + или —.

1. Is the set of numbers like 2, 4, 6 and so on called a set of even numbers? 2. Can odd numbers be divided by two? 3. Is it possible to divide even numbers by two? 4. Is the result of multiplication called a difference? 5. Can you say that 20 is the product of two whole-number factors? 6. When you multiply 0 by 7 is the product equal to 7? 7. Can more than two factors be used in multiplication? 8. Can we say that 100 is a product of four factors? 9. Is division associative? 10. Is 1 a factor of every whole number? 11. Is the order in one set of numbers important? 12. Can the factors in the equation $2 \times 3 \times 3 = 18$ be factored further? 13. Is 0 a prime number? 14. Is 25 a composite number?

УРОК 13

ЗАДАНИЕ I

I. Прослушайте и повторите данные слова, обращая внимание: а) на чтение буквы 's'.

[s] — side, size, looks, clocks, hopes, rots;
[z] — sides, clubs, days, studies, finishes, watches, logs, toys;
[ʃ] — sure, ensure, pressure, mission, expression, Russian;
[ʒ] — usual, provision, measure, closure, division, exposure, television, treasure.

б) на чтение букв и сочетаний букв, передающих звуки [a:], [ɔ:], [a:].
[a:] — arm, fast, father, rather, article, partial, mark, answer, fast, last, ask, half, example, farmer, pass, card, mask, path, after, army;
[ɔ:] — form, or, cause, law, fall, brought, order, inform, more, saw, water, ball, ought, your, quarter, hall, draw, thought, course, door, four, author, always, also, automation, borne, orbit.

II. Прочтите вслед за диктором: а) упражнение 1; б) следующие группы слов:

1. as short as	2. not as good as	3. not so important as
as long as	not as bad as	not so bad as
as easy as	not as nice as	not so easy as
as interesting as	not as sure as	not so high as

3. Прослушайте и запишите перевод.
the more... the better; the easier... the better; the longer... the more difficult; the bigger... the worse; the higher... the more interesting; the larger... the better; the sooner... the easier.

III. Прослушайте и повторите упражнение 2.

IV. Прочтите вслед за диктором слова урока.

V. Ответьте на вопросы.

а) T.: — Who is younger: the boy or the girl?

St.: — The girl is younger than the boy.

1. Which is longer: the pen or the pencil? 2. Which is easier: to read or to translate? 3. Who is older: your brother or you? 4. Which is bigger: Moscow or Leningrad? 5. What is larger: the box or the bag? 6. Which is more: 25 or 16? 7. Which is less: 19 or 38? 8. Which is shorter: February or January? 9. Who is nicer: the girl or her mother? 10. Which is worse: to be late or to be early?

б) T.: — Is football as popular as hockey?

St.: — Football is more popular than hockey.

1. Is his article as interesting as that one? 2. Are their results as important as the previous ones? 3. Is the new element as powerful as the old one? 4. Was our work as essential as the work of their group?

с) T.: — Who is the best student in your English class? (Nina).

St.: — Nina is the best student.

Which is the easiest exercise in this lesson? (the second). Who made the best report at the conference? (professor N.). Which is the biggest town in England? (London). Who is the youngest in your family? (my sister).

VI. Подайте реплику в ответ на услышанное.

а) T.: — Leningrad is not so old as Moscow.

St.: — Yes, Moscow is older.

1. The red pencil is not so long as the black one. 2. In summer the days are not so short as in autumn. 3. The first text is not so easy as the second one. 4. Tennis is not so popular as hockey. 5. This scientist is not so famous as Einstein.

б) T.: — I shall come soon.

St.: — The sooner you come the better.

1. The text is easy. 2. The system is simple. 3. He will come early. 4. The computer is small. 5. His room is big.

ЗАДАНИЕ II

VII. а) Прослушайте и повторите. Помните, что в существительных с суффиксами '-ion', '-sion', '-tion', '-ity' и в прилагательных с суффиксами '-ic' ('-ical') ударение падает на гласную, предшествующую суффиксу: ad'dition, di'mension, 'unity, problem'atic.

В словах, имеющих приставки ex-, ex-, pre-, a-, be-, dis-, en-, com-, con-, in-, ir- и пр., ударение падает на слог, следующий за префиксом: en'large, ex'pect, pre'pare, dis'like, etc.

В глаголах с суффиксами -ize, -fy основное ударение падает на суффикс: ,specia'lize, ,simpli'fy.

Постарайтесь угадать значение выделенных слов.

б) Напишите перевод слов и затем проверьте правильность перевода по словарю.

Part — *partly* — *party*; false — *falsify* — *falsification* — *falsifier*; satisfy — *satisfaction*; to direct — *direction* — *directly* — *indirect* — *director* — *directness*; conventional — *convention*; correct — *incorrect* — *correctly* — *correction* — *correctness* — to correct; symmetric — *symmetry*; opposite — *opposition*; essential — *essentially*; equal — *equality* — *equalize* — *unequal* — *inequality*.

VIII. Прослушайте вопрос и уточните.

а) Т.: — Is it a good book? (I have).

St.: — It is the best book I have.

1. Is it an easy text? (the teacher gave us). 2. Was it a long story? (she told us). 3. Was it an interesting report? (there was at the conference). 4. Is it a complicated computer? (I know of).

б) Т.: — Is Leningrad as old as Moscow?

St.: — No, it is not, Leningrad is not as old as Moscow.

1. Is his article as interesting as the one they published? 2. Are these problems as important as those they solved last year? 3. Did he give as many lectures as he did last year? 4. Is this property as important as the one we discussed at the previous seminar?

IX. Прослушайте слова диктора и выразите иначе ту же мысль.

Т.: — Pushkin and Lermontov are famous Russian poets.

St.: — Pushkin as well as Lermontov is a famous Russian poet.

1. Mathematics and mechanics are important fields of science. 2. The new and the old systems are quite conventional. 3. The first equation and the second one are complicated. 4. His thesis and the abstract will be ready next month.

X. Услышав слова диктора, переспросите.

1. The given relation contains both x and y . 2. This mathematical sentence is false. 3. These mathematical expressions are true. 4. There is a non-equality sign between those numbers. 5. These symbols are called ordering signs. 6. You could replace x with y . 7. This is the most essential feature of the computer. 8. His statement is to be concise. 9. We expect a direct answer from him. 10. The result must be checked either today or tomorrow. 11. Everybody understands these conventional symbols. 12. His understanding of the problem is rather unusual.

V. а) Прослушайте текст урока, следя за диктором по книге;

б) Прослушайте текст, не глядя в книгу, стараясь понять его.

XI. Прослушайте вопрос диктора к тексту и запишите ваши ответы с помощью знаков + или —.

1. Is every mathematical sentence called an equation? 2. Are the

two parts of the equation called its members? 3. Can a mathematical sentence be both true and false? 4. Does the expression $a=a$ satisfy the transitive axiom? 5. Does the expression if $a=b$ then $b=a$ satisfy the symmetric axioms? 6. Does every branch of mathematics deal with numbers? 7. Will the meaning of the expression be changed if you replace the plus with the minus? 8. Is it incorrect to write a false sentence? 9. Is mathematical language direct and concise? 10. Must we have a good understanding of each symbol used?

УРОК 14

ЗАДАНИЕ I

I. Прослушайте и повторите, обращая внимание на чтение букв и буквосочетаний, передающих звуки [ʌ], [ə:], [ou], [au].

[ʌ] — month, young, trouble, result, discover, other, some, rough, done, enough, mother, sum, above, just, country, among, sun, love, become, double, subject, jump, gudge, ton, come.

[ə:] — work, serve, dirty, early, world, search, burn, vertical, hurt, word, circuit, worse, firm, earn, term, were, firm, burst, journal.

[ou] — know, hold, open, so, process, told, own, note, road, approach, boat, motion, cold, slow, low, bold, grow.

[au] — about, stout, allow, house, count, amount, power, brown, countable, down, without, allow, how.

II. Прослушайте упражнение 1 (урока), мысленно сравнивая данные группы предложений.

III. Выслушайте просьбу и ответьте, что действие уже совершено кем-то.

Т.: — Open the box. (he).

St.: — But he has opened the box.

1. Write that translation. (I). 2. Speak to professor Pavlov about it. (she). 3. Take that journal from him. (I). 4. Show him their data. (she). 5. Ask the student to come (he). 6. Tell her about it. (he).

IV. В ответ на реплику скажите, что данное действие уже кем-то совершено. Помните о неправильных глаголах.

Т.: — I am reading this book. (he).

St.: — He has read it.

1. She is writing the text. (I). 2. They are having an English lesson. (we). 3. She is making the experiment. (he). 4. He is giving them a lecture. (I). 5. She is speaking to our research adviser. (he).

V. Спросите, справедливо ли сказанное в отношении другого лица.

T.: — I have not seen him. (you).

St.: — Have you seen him?

1. I have not been there. (he). 2. He has not told me anything. (she). 3. They have not come yet. (he). 4. I have not taken that bag. (she). 5. You have not done the work. (he). 6. He has not spoken to me yet. (they). 7. We have not found any data on the subject. (they). 8. They have not given me any help. (she).

VI. Ответьте на вопросы.

T.: — What did he bring? (thesis).

St.: — He said he had brought his thesis.

1. Where did she see him? (in the lab). 2. How did he find that book? (quite easily). 3. What did he give them? (his abstract). 4. Where did he write it? (in his note-book). 5. What did they show him? (their hostel). 6. What did he ask her about? (her exams).

VII. Ответьте на вопросы, уточнив, к какому моменту будет совершено действие.

T.: — Have you done it? (by 5 o'clock).

St.: — No, I have not. But I shall have done it by 5 o'clock.

1. Has he told her about the conference? (by tomorrow). 2. Have you read his paper? (before the seminar begins). 3. Have they discussed it? (before we come). 4. Has she solved the problem? (before she sees her research adviser).

ЗАДАНИЕ II

VIII. а) Прослушайте и повторите. Постарайтесь угадать значение выделенных слов. Проверьте по словарю. б) Отметьте принадлежность каждого слова к той или иной части речи с помощью условных обозначений: существительное — 1, глагол — 2, прилагательное — 3, наречие — 4.

Fraction — *fractional*; equivalent — *equivalence*; relative — *relativity*; rational — *rationalize*; to reduce — *reduction*; to determine — *determination*; divisible — *indivisible*; proper — *properly*; prime — *primary*; valid — *validity*; integer — *integral*.

IX. Ответьте на вопросы диктора, уточнив время действия.

T.: — Have you seen him? (yesterday).

St.: — Yes, I have. I saw him yesterday.

1. Has he written to you about it? (yesterday). 2. Have they told you about the conference? (at 3 o'clock). 3. Has she shown you her paper? (last week). 4. Have you found a proper solution? (only yesterday).

X. Прослушайте слова диктора и (а) подайте уточняющую реплику. Существительное замените местоимением.

T.: — They have not seen the program. (last week).

St.: — As far as * I know they saw it last week.

* As far as I know — насколько мне известно

1. He has not written his paper. (a few days ago). 2. She has not given her test work to the teacher. (two days ago). 3. They have never taken English lessons. (last year). 4. He has not yet begun the experiment. (this morning). 5. He has not sent his article to the journal yet. (last month).

б) Подтвердите услышанное.

T.: — He did the same exercise. (I was told).

St.: — I was told he had done the same exercise.

1. They studied various aspects of the problem. (I knew). 2. They produced important information. (he said). 3. They discussed the advantages of the modern computer. (I was told). 4. He only gave a general definition. (I remembered).

XI. Соедините данные пары предложений с помощью 'when', 'why' и пр.

T.: — I want to know... you did it. (why).

St.: — I want to know *why* you have done it.

T.: — I wanted to know... he came. (when).

St.: — I wanted to know *when* he had come.

1. I want to know... she spoke to him. (how). 2. I asked him... he liked the book. (why). 3. He wants to know... I found his note. (where). 4. She wanted to see... they did the exercise (how). 5. They asked me... I presented my paper. (when). 6. She wants to know... they produced the information. (how).

XII. Услышав слова диктора, переспросите.

1. These are rational numbers. 2. The system is relatively new. 3. You can reduce the fraction. 4. This integer is divisible. 5. It happened yesterday. 6. He has chosen a correct answer. 7. I am determined to go. 8. His conclusion was right. 9. I have brought my bag. 10. The process is being changed now.

XIII. а) Прослушайте текст урока, следя за диктором по книге. б) Закройте книгу и прослушайте текст еще раз, стараясь понять его со слуха.

XIV. Прослушайте вопросы к тексту и выразите свое согласие или несогласие знаками + или —.

1. Is this chapter concerned with fractions? 2. Is the fraction $\frac{61}{2}$ an improper fraction? 3. Are there mixed fractions? 4. Is it possible to reduce the fraction $\frac{2}{3}$ to lower terms? 5. Could you change the fraction $\frac{2}{4}$ to higher terms? 6. Is 20 divisible by 5? 7. Shall we change a fraction if we multiply it by 1? 8. Shall we change a fraction if we divide it by 0? 9. Is $\frac{1}{2}$ a rational number? 10. Are principles of arithmetic valid in the case of mathematics?

ЗАДАНИЕ I

I. Прослушайте и повторите, обращая внимание на чтение букв и буквосочетаний, передающих звуки [e], [i:], [u:], [ju:].

[e] — end, head, fell, else, heavy, very, ready, question, guess, friend, measure, pleasure.

[i:] — seem, recent, meat, meet, receive, sea, see, seat, field, even, machine, piece, people, believe, peace.

[u:] — moon, June, proof, too, through, rule, choose, soon, tooth, move, true, prove.

[ju:] — unique, uniform, news, use, knew, cube, few, due, dew, Europe, Euclid, human, compute.

II. Прослушайте упражнения 1, 2.

III. а) Выслушайте вопрос и ответьте, уточнив, кем именно было совершено действие.

T.: — Has the result been defined? (I).

St.: — Yes, I have defined the result.

1. Have these fractions been reduced? (the student). 2. Has the given quantity been divided? (they). 3. Has any conclusion been drawn from these facts? (we). 4. Have the diagrams been chosen? (I). 5. Has the situation been already discussed? (they). 6. Has a proper solution been found? (she). 7. Have these integers been added? (he). 8. Has the first chapter of the book been written? (we).

в) Ответьте на вопросы. Замените существительное местоимением.

T.: — How has the work been done? (well).

St.: — It has been done well.

1. By whom has the experiment been made? (by a scientist). 2. How has the process been controlled? (easily). 3. Where has this article been published? (in some journal). 4. By whom has this method been chosen? (the worker).

IV. Выслушайте вопросы и ответьте, что действие должно совершиться.

T.: — Has the article been rewritten?

St.: — No, but it has to be rewritten.

1. Has the fraction been reduced? 2. Have these concepts been discussed? 3. Have the students been examined yet? 4. Have these integers been multiplied?

V. Ответьте на вопросы, уточнив время действия.

T.: — Have you been told about it? (yesterday).

St.: — Yes, I was told about it yesterday.

1. Has his idea been discussed? (at the previous seminar). 2. Has she been asked to present her thesis? (last week). 3. Has the second

chapter of his book been written? (a long time ago). 4. Have these definitions been changed? (during the conference yesterday). 5. Have various aspects of the procedure been defined? (during the lecture yesterday). 6. Has any information on the subject been obtained? (a few days ago).

VI. Ответьте на вопросы, используя слова в скобках.

1. Where have you been working since last year? (at the University). 2. What has he been speaking about for such a long time? (his thesis). 3. Which one of you has been studying English since May? (nobody). 4. For how long have they been considering the new method? (for many hours).

ЗАДАНИЕ II

VII. а) Прослушайте и повторите. Постарайтесь угадать значение выделенных слов. Проверьте по словарю. б) Отметьте принадлежность слова к той или иной части речи с помощью условных обозначений.

To separate — *separation*; period — *periodic*; indefinitely — *definitely* — *definition*; to introduce — *introduction*; identify — *identical*; to repeat — *repetition*; care — *careless* — *careful*; correspond — *correspondence*; appropriate — *appropriately*; observe — *observer*.

VIII. Переспросите.

а) 1. The procedure has been discussed. 2. Proper periods have been observed. 3. The expected data have been obtained. 4. New methods have just been introduced. 5. The points have been placed to the left of the vertical line. 6. An appropriate solution has just been found. 7. They have been separated for a long time. 8. They have been given the pattern.

б) 1. They have been controlling the situation for some time. 2. I have been repeating English words over and over again. 3. We have been following this procedure since February. 4. Professor has been considering the diagram for half an hour.

IX. Выразите несогласие с услышанным.

T.: — The book has been brought.

St.: — The book has not been brought.

1. The quantity has been divided. 2. The result has been checked. 3. Opposite signs have been used. 4. The previous chapter has been discussed. 5. The general pattern has been accepted.

X. Переспросите, уточнив интересующую вас подробность.

1. I read the fourth chapter yesterday. (where). 2. He is able to obtain any book. (how). 3. You are to repeat all these words. (when). 4. He has to place the points on the left of number 5. (why).

5. The diagram is lying on the teacher's desk. (what). 6. We discussed each step carefully. (why). 7. The students have to write the exercise given below. (how). 8. It was difficult to change the situation. (why). 9. He keeps all his books at home. (why). 10. There is a comma between the two numerals. (what).

XI. Прослушайте текст урока, следя за диктором по книге.

XII. Прослушайте вопросы к тексту и выразите свое согласие или несогласие знаками + или —.

1. Are there five digits in the decimal system of notation? 2. Does the position of the digit affect its value? 3. Does a point separate each period? 4. Do all the digits to the right of the decimal point represent whole numbers? 5. Do you obtain a tenth by dividing 1 by 10? 6. Can rational numerals be named by decimal numerals? 7. Must we have a common denominator before we add decimal numerals? 8. Is division in decimal form difficult? 9. Can we express rational numbers as decimal numerals? 10. Is zero the identity element of addition?

УРОК 16

ЗАДАНИЕ I

I. Прослушайте и повторите, обращая внимание на чтение букв и буквосочетаний, передающих звуки [i], [ai], [ei], [ɔi]:

[i] — duty, till, ready, did, language, film, determine, examine, 'knowledge, 'damage, daily, 'symbol, 'cynic.

[ai] — right, try, mile, light, fly, by, mild, hide, flight, bind, dry, 'analyse, why, wine.

[ei] — main, game, eight, day, straight, 'agent, a'gainst, grey, stay, way, fame, rain, away, play.

[ɔi] — boy, oil, spoil, loyal, employ, point, foil, avoid.

II. Прослушайте и ответьте на вопрос, воспользовавшись предложением в скобках. Не забудьте произвести необходимые изменения в связи с переходом из прямой речи в косвенную.

a) T.: — What does she say? (I read much).

St.: — She says she reads much.

1. What does she say? (I am writing an exercise). 2. What does he say? (I shall find this journal). 3. What does she say? (I have used this combination). 4. What does he say? (I saw this film yesterday). 5. What does she say? (I had an English lesson). 6. What does he say? (I like English better than German). 7. What does she say? (There are a lot of students in the room). 8. What does he say? (I have given them information).

б) T.: — What does she say? (I do not work).

St.: — She says (that) she does not work.

1. What does he say? (I do not speak English.) 2. What does

she say? (I am not going to stay.) 3. What does he say? (I have not seen her.) 4. What does she say? (I did not know the man.) 5. What does he say? (I am not a post-graduate.) 6. What does she say? (I shall not repeat it again.)

в) T.: — What did he say? (I study English.)

St.: — He said that he studied English.

1. What did he say? (We have some time.) 2. What did you say? (I like the lecture.) 3. What did he say? (I understand all these words.) 4. What did she say? (We know this scientist.) 5. What did you say? (I read books on mathematics.) 6. What does she say? (I give lectures on cybernetics.)

г) T.: — What did she say? (I saw him.)

St.: — He said she had seen him.

1. What did he say? (We took English lessons.) 2. What did she say? (I spoke to him.) 3. What did you say? (I found this article.) 4. What did she say? (I brought that paper.) 5. What did she say? (We told him about it.) 6. What did he say? (I made the experiment yesterday.)

д) T.: — What did she say? (I shall come.)

St.: — She said she would come.

1. What did he say? (I shall do it.) 2. What did they say? (We shall finish the work.) 3. What did you say? (I shall hold the end.) 4. What did you say? (I shall stay.) 5. What did she say? (We shall write the text.) 6. What did you say? (I shall change the procedure.)

III. Ответьте на вопрос. Помните об изменении местоимений и о согласовании времени.

a) T.: — What did she tell you. (I am ready.)

St.: — She told me she was ready.

1. What did he tell you? (I have used their result.) 2. What did she tell you? (I shall live in the hostel.) 3. What did he tell you? (I often see my friends.) 4. What did she tell you? (I am going home.) 5. What did she tell you? (I can translate easy texts.) 6. What did he tell you? (I have to do it.) 7. What did she tell you? (I was able to see the film). 8. What did he tell you? (I have attended the seminar.) 9. What did she tell you? (I took the book from him.) 10. What did he tell you? (I shall speak at the conference.)

б) T.: — What did she ask you? (Are you ready?)

St.: — She asked me if I was ready.

1. What did she ask you? (Will you come?) 2. What did she ask you? (Did you see him yesterday?) 3. What did they ask you? (Have you written the words?) 4. What did he ask? (Has the article been published?) 5. What did he ask? (Do you understand French?) 6. What did she ask? (Will he help them?) 7. What did she ask you? (Are you having a lesson?). 8. What did he ask? (Have you seen their new lab?)

IV. Вставьте союз там, где считаете это необходимым.

T.: — Give me the book you have just brought.

St.: — Give me the book *which* you have just brought.

1. He showed me the article he has written. 2. She asked me a question nobody could answer. 3. Give me the information I need. 4. They showed us the machine the workers had built. 5. She knew the book her teacher wanted to give her.

ЗАДАНИЕ II

V. а) Прослушайте и повторите. Постарайтесь угадать значение выделенных слов. Проверьте по словарю. б) Отметьте принадлежность слова к той или иной части речи с помощью условных обозначений.

Popular — popularity — popularize — unpopular; constantly — constant; alternative — alternate; count — counter; empty — emptiness; rapid — rapidly — rapidity; to desire — desirable; remain — remainder; to invent — inventor — invention.

VI. Услышав слова диктора, переспросите, задав вопрос в прямой речи.

T.: — He asks me if the grain is good.

St.: — Is the grain good?

1. He asks me if I read popular books. 2. He asks me when the radio was invented. 3. I want to know if the production of atomic energy is constantly increasing. 4. I want to know when we shall play chess. 5. He asked me if she would remain at the University. 6. I wanted to know if they had covered all the problems. 7. He asked me if I usually kept my word. 8. She asked me if he was in debt. 9. I asked him what his desire was. 10. He asked me where I had put the chessboard.

VII. Ответьте на вопрос, выразив неуверенность в том, что действие совершится (может совершиться). Помните о согласовании времен.

T.: — Will he come? (I do not know, I am not sure).

St.: — I do not know if he will come.

1. Has he fulfilled his desire? (I do not know). 2. Did she tell them the legend? (I am not sure). 3. Does he play chess well? (I was not sure). 4. Have they increased the production of wheat? (I am not sure). 5. Are they inventing new machines? (I do not know). 6. Has she counted correctly? (I was not sure). 7. Did she remain at the Institute after graduation? (I did not know). 8. Did they double the production of electric energy? (I do not know). 9. Does he constantly live in the hostel? (I do not know).

VIII. Измените в соответствии с образцом.

T.: — This is the laboratory about which I have told you.

St.: — This is the laboratory I have told you about.

Give me the note at which you are looking. She gave me the data about which I had asked her. I know the problem about which he is thinking. Where is the man to whom you must speak?

IX. а) Прослушайте текст урока, следя за диктором по книге. б) Закройте книгу и прослушайте текст еще раз.

X. Прослушайте вопросы к тексту, выразив свое согласие или несогласие знаками + или —.

1. Does the game of chess come from Germany? 2. Has this game been invented in India? 3. Was the game invented by king Shirham? 4. Was it invented by the king's vizier? 5. Did the king like the game? 6. Was he ready to thank his vizier? 7. Did the vizier ask the king to give him money? 8. Did the king think that the vizier had asked him an impossible thing? 9. Did the king agree to give his vizier the wheat? 10. Did the king understand how much wheat he would have to give? 11. Are there 60 squares on the chessboard? 12. Does the bushel of wheat contain about 1,000,000 grains? 13. Is the world production of wheat equal to 5,000,000 bushels a year? 14. Did the king want to remain constantly in debt?

LESSON 17

ASSIGNMENT I

I. Listen and repeat after the speaker. а) Note that various letters or combinations of letters produce the same sound.

[i:] — feed, see, seems, meet, need, beta, theme, he, mete, Pete, these, scene, even, secret, complete, meat, mean, heat, speak, field, piece.

[a:] — arm, far, article, card, father, rather, yard, artist, margin, mask, fast, last, pass, ask, answer, half.

[ɔ:] — form, glory, more, oral, short, tall, wall, small, walk, salt, cause, because, author, autumn, door, floor, saw, law, draw, war, warm, quarter, your, four, course, thought, brought, taught.

[ə:] — first, firm, circle, thirty, third, curve, hurt, urgent, turn, germ, serve, herd, nerve, person, earn, early, work, word, worth.

б) Note the stress.

1. 'meaning, 'measure, 'object, 'building, 'Egypt, 'subject, 'volume, 'problem, 'knowledge, 'sequence, 'famous, 'recent, 'also, 'study, 'point, 'picture, 'common, 'paper, 'figure, 'segment, 'ruler.

2. 'probably, ge'ometry, 'pyramid, 'property, 'capital, 'separate, 'multiply, 'calculate, 'definite, 'transitive.

3. fun'da'mental, nece'ssarily, uni'versity, elec'tricity.

4. e'xact, pre'sent, re'fer, in'definitely, be'low, in'clude, be'tween, mys'terious, com'plete, ex'tend, a'gree, a'pply, im'prove, re'late.

II. Repeat the words given below after the speaker. Guess* the meaning of the italicised words and write down** their Russian equivalents.

Geometry — geometric — *geomtrician*; 'object — *objective*; probably — *probable* — *probability*; land — *landless*; to build — *builder*; location — *to locate*; to move — *movement*; to refer — *reference*; to imagine — *imagination*; complete — *completely, incomplete*.

III. Change the following according to the model.

a) T.: — I like *to get up* early. (he).

St.: — He also likes *getting up* early.

1. He begins *to work* at 9 o'clock. (we). 2. I expect *to see* him. (she). 4. We expect *to go* there today. (I). 5. She continued to translate the text. (they).

b) T.: — Do not *tell* him about it.

St.: — It's no use*** *telling* him about it.

1. Do not *go* there now. 2. Do not *begin* the experiment tomorrow. 3. Do not *speak* to him. 4. Do not *attend* that seminar. 5. Do not *discuss* it with her.

c) T.: — I am afraid *to go* there.

St.: — Are you really afraid *of going* there?

1. I am afraid *to tell* him this news*. 2. He is afraid *to take* his exam. 3. She is afraid *to speak* to him. 4. I am afraid *to begin* the work.

d) T.: — Was he able to come in time?

St.: — Yes, he *succeeded*** *in coming* in time.

1. Was she able to present her thesis? 2. Were they able to publish that article? 3. Were you able to find the data? 4. Will he be able to solve the problem? 5. Will she be able to change the program?

e) T.: — It is important *to know* these rules.

St.: — Yes, *knowing* these rules is important.

1. It is important *to discuss* the question today. 2. It was necessary *to produce* that information. 3. It will be interesting *to find* that result. 4. It is important *to locate* the point in space.

f) T.: — He *multiplied* the numerals and found the product.

St.: — He found the product *by multiplying* the numerals.

1. He *drew* a straight line and *cut* the segment. 2. She *performed* the operation of subtraction and found the difference. 3. I *used* a ruler to draw a straight line.

* to guess — догадываться

** to write down — записывать

*** It's no use — бесполезно

* news — новость

** to succeed (in) — преуспеть, суметь

IV. Listen to the new words of the lesson (text 1) and repeat them after the speaker.

V. Follow the speaker as he is reading the text.

VI. Listen to the questions given below. Write down your answers in your exercise-book with the help of a + or a — sign.

1. Is geometry an old subject? 2. Did geometry begin in England? 3. Were Egyptians mostly concerned with the practical use of geometry? 4. Did the knowledge of Egyptians spread to Greece? 5. Is Euclid's book called *Elements* famous? 6. Does geometry include only the study of the shape and size of objects? 7. Is the idea of a point fundamental in geometry? 8. Can one feel, see, move or hold a point? 9. Has a point any dimensions? 10. Are points represented by dots? 11. Does a line segment include its endpoints? 12. Can you draw a straight line by using a ruler?

ASSIGNMENT II

VII. Listen to the words of the lesson (text II) and repeat them after the speaker.

VIII. Listen and repeat the words to follow. Guess the meaning of the italicised words and write down their Russian equivalents.

Contain — *container*; idea — *ideal* — *idealist*; physics — *physical* — *physisist*; serve — *service*; to agree — *to disagree* — *agreement* — *disagreement*; common — *commonly*; length — *long*; width — *wide*; thickness — *thick*; air — *airless*; alphabet — *alphabetic*; to indicate — *indication*; definite — *indefinitely* — *indefinite* — *finite* (adj); symbol — *symbolize*; to continue — *continuation* — *continuous* — *to discontinue*; to differ — *difference* — *different* — *indifferent*.

IX. Change the following sentences according to the model.

a) T.: — I know *that he is* a good student.

St.: — I know *of his being* a good student.

1. We know *that the Sun moves* constantly. 2. I know *that he studies* geometry. 3. I know *that she speaks* English. 4. Everybody knows *that atoms are* very small.

b) T.: — I know *that he has come*.

St.: — I know *of his having come*.

1. I know *that he has served* in the Army. 2. We know *that you have constructed* this model. 3. He knows *that we have applied* his method. 4. I know *that they have agreed*.

c) T.: — He should not go *until he sees* her.

St.: — He should not go *without seeing* her.

1. One cannot solve the problem *unless one knows* the rule. 2. We must not do it *until we speak* to him. 2. You cannot translate

the text *unless you know* the words. 3. She cannot imagine that object *until she sees* it.

X. Follow the speaker as he is reading the text (2).

XI. Listen to the questions about the text and write down yes or no answers (use + and —).

1. Does the world around us contain physical objects? 2. Can these objects serve as models of the geometric figures? 3. Can the edge of a ruler serve as a model of a line? 4. Has a line any thickness? Has it length? 5. Is a point an idea of an exact location? 6. Do we usually use letters of the alphabet to name geometric objects? 7. Can you locate as many points as you like between any two points? 8. Is a segment a subset of a line? 9. Does a line segment consist only of two endpoints? 10. Has a line segment definite length? 11. Is there any difference between a segment and a ray? 12. Does a ray extend in two directions?

LESSON 18

ASSIGNMENT I

1. Listen and repeat after the speaker.

a) [Λ] — 'subject, 'publish, us, 'utter, cons'truct, a'bove, dis'cover, other, nothing, young, enough, double.

[ɔ] — hop, lot, want, what, water, was.

[i] — system, duty, ready, gym, inch.

[e] — help, tend, head, bread, steady, ready.

[u] — book, took, look, put, pull.

[u:] — true, blue, rule, soon, group, smooth.

[ju:] — due, unity, union, use, news, knew, few, Newton, Europe, stupid.

b) Note the stress.

1. 'angle, 'vertex, 'measure, 'square, 'follow, 'aspect, 'area, 'system, 'neither, 'valid, 'clear, 'image, 'logic, 'surface, 'certain.

2. 'opposite, 'postulate, 'parallel, 'usual, 'special, 'century, 'realize, 'congruent.

3. a'cute, con'cern, re'fer, con'tain, ex'ist, dis'cuss, as'sume, dis'tinct, di'rect, wi'thout, wi'thin, ex'terior, hy'potenuse, equi'lateral, con'sider, contra'dict, in'terior, in'tuitive.

II. Repeat the words given below after the speaker. Guess the meaning of the italicised words. Write down their Russian equivalents.

Certain — certainly — *certainly*; form — *formalize* — formal — *formality*; deduce — *deduction*; common — *uncommon* — *commonly*; to separate — *separation*; distinct — *indistinct* — *distinctly*; measu-

re — *measurable*; opposite — *to oppose*; *opposition*; congruent — *congruence* — *congruous*; define — *definite* — *indefinite*; special — *specialist* — *specialize*; base — *baseless*.

III. Change the following according to the model.

a) T.: — If you do not understand it you ...

St.: — Without understanding it you ...

1. If he does not know the rule he ... 2. If you have not found the length of the side you ... 3. If we do not check division by multiplication we ... 4. If she does not classify these triangles she will not ...

b) T.: — If we are not given the size of the ...

St.: — Without being given the size of the ...

1. If he is not told about it he ... 2. If these numerals are not added they ... 3. If I am not given the necessary information I shall not ... 4. If these numbers are not placed according to the accepted order they ...

c) T.: — When I was measuring the distance... (in)

St.: — In measuring the distance...

T.: — When we had found the product... (on)

St.: — On finding the product...

1. When we were applying this rule... 2. After they had changed the method... 3. When he was developing his idea... 4. When we had used the data obtained... 5. When you are defining the value... 6. After I had defined the width...

d) T.: — I know that he has given a complete picture of...

St.: — I know of his having given a complete picture of...

1. I know that they included her in the delegation... 2. I am told that you have referred to my recent paper. 3. She told us that they had moved into a new house. 4. We know that this scientist has improved the procedure.

e) T.: — Do you often go there?

St.: — No, I avoid * going there.

1. Have you seen him? 2. Has she spoken to you? 3. Has he made any mistakes? 4. Does she refer to his article?

IV. Listen to the new words of the lesson (text I) and repeat them.

V. Follow the speaker as he is reading the text.

VI. Listen to the questions below and write down your answer with the help of a + or a — sign.

1. Do you remember how we form a ray? 2. Do we extend a line segment in two directions when we form a ray? 3. Will two rays originating from the same endpoint form an angle? 4. Do angles separate the plane into 2 distinct sets of points? 5. Is the obtuse angle less than the right angle? 6. Is the right angle greater than the

* to avoid — избегать

ASSIGNMENT I

I. Listen and repeat after the speaker.

- a) [ei] — stable, waste, famous, danger, raise, con'tain, ob'tain, a'gain, mainly, stay, day, way, say, they, grey, stimulate, calculate, formulate, great.
 [ai] — mild, hind, find, design, align, sign, ideal, item, shine, define, apply, sky, shy, typist, imply.
 [au] — brown, town, down, out, about, found, stout, loud.
 [ou] — note, so, only, though, low, slow, own, cold, hold, most, load, boat, road, coat, coast.

b) Note the stress.

1. 'Compass, 'circle, 'center, 'figure, 'symbol, 'fortune, 'ratio.
 2. 'Radius, 'radii, di'ameter, pe'rimeter.
 3. En'close, con'tain, a'bove, in'terior, ex'terior, in'stead, a'round, be'cause, dis'cover, ex'press, de'note, a'llow.

II. Repeat the words given below after the speaker. Guess the meaning of the italicised words. Write down their Russian equivalents.

Sharp — sharply — *to sharpen*; center — *central*; cirle — *circu-lar* — *to encircle*; measure — *measurable*; fortunately — *fortune*; to discover — *undiscovered*; same — *sameness*; express — *expression* — *expressionless*.

III. Change the following according to the model.

a) T.: — When *we study* geometry we...

St.: — When *studying* geometry we...

1. When *we measure* the distance we... 2. When *they use* this system they... 3. When *you divide* a decimal fraction you... 4. When *we deal* with this kind of problems we...

b) T.: — When *the scientist was showing* the film he...

St.: — While *showing* the film *the scientist*...

1. When *the student was speaking* at the seminar he... 2. When *the operator was getting ready* for the work he... 3. When *the young men were discussing* their plans they... 4. When *they were considering* the results of our experiments they...

c) T.: — If *you know* the measure of the sides you can...

St.: — Knowing the measure of the sides you can...

1. If *you apply* this rule you will... 2. If *he uses* an automatic computer he must... 3. If *one extends* the segment one will... 4. When *they perform* such operations they...

d) T.: — I have got a book *which deals* with computers

St.: — I have got a book *dealing* with computers.

1. I know the man *who teaches* you English. 2. Give me the journal *which lies* on the table. 3. I must see the scientists *who work* in this lab. 4. The letters *which name* the angles are A. B. C.

acute angle? 7. Are triangles classified according to the measures of their angles? 8. Can any triangle be referred to as equilateral? 9. Does a right triangle contain three right angles? 10. Are opposite sides of a quadrilateral always parallel? 11. Are all the four angles of a square congruent? 12. Is every rectangle a square?

ASSIGNMENT II

VII. Listen to the words of the lesson (text 2) and repeat them after the speaker.

VIII. Listen to the words below. Guess the meaning of the italicised words and write down their Russian equivalents.

Special — *especially*; to consider — *consideration*; mathematics — *mathematician*; geometry — *geometrician*; to depend — *in-dependently* — *dependence* — *interdependence*; to vary — *variati-on* — *variable* — *various*; internally — *internal*; sense — *sense-less* — *sensible*; intuitively — *intuition*; realize — *realization*; ima-ge — *to imagine* — *imaginable*; flat — *flatly* — *flatness*.

IX. Change the following sentences according to the model.

a) T.: — *Must they translate* the text (1).

St.: — Yes, *9 insist on* * *their translating* the text.

1. *Must she go* there? 2. *Must the students write* these words? 3. *Must he present* the data tomorrow? 4. *Shall I come* in the evening?

b) T.: — He *did not want to go* there.

St.: — He *objected to* ** *going* there.

1. She *did not want to speak* on the subject. 2. I *do not want to discuss* these things. 3. He *does not want to work* in the lab to-day. 4. She *does not want to see* him.

X. Follow the speaker as he is reading the text (2).

XI. Listen to the questions about the text and write down yes or no answers (use + or -).

1. Did Lobachevski and Rieman work in the nineteenth century? 2. Did they continue to develop Euclidian geometry? 3. Did Lo-bachevski and Rieman develop their geometries independently of one another? 4. Can you draw more than one parallel line through a gi-ven point not on the given line according to Euclid? 5. Are conclu-sions drawn in non-Euclidean geometries always consistent with Euc-lidean geometries? 6. Do rectangles exist according to Rieman's geo-metry? 7. Does any deductive system begin with undefined terms? 8. Are intuitive images logically a part of the deductive system?

* to insist on — настаивать на

** to object to — возражать против

e) T.: — The material *which is used* in the article is...

St.: — The material *used* in the article is...

1. The calculations *which were made* are... 2. The value *which was divided* equalled... 3. The information *which was produced* by them was... 4. The result *which was obtained* had to be published.

IV. Listen to the new words of the lesson and repeat them.

V. Follow the speaker as he is reading the text (1).

VI. Listen to the questions below and give 'yes' or 'no' answers (use + or —).

1. Can one draw a circle by using a compass? 2. Are all the points in a circle equidistant from the center? 3. Does a diameter contain two radii? 4. Is the center of the circle one of the endpoints of the radius? 5. Is a chord curved? 6. Is an arc curved? 7. Can a chord serve as a diameter? 8. Can we find the measure of the circumference by adding the measure of the segments? 9. Does a circle contain any segments? 10. Does the formula $\frac{c}{d} = r$ mean the same as

$$\frac{c}{2r} = \pi?$$

ASSIGNMENT II

VII. Listen to the words of the lesson (text 2) and repeat them.

VIII. Listen to the words below. Guess the meaning of the italicised words and write down their Russian equivalents.

Traditional — *tradition*; octagon — *octagonal*; formula — *to formulate*; regular — *to regulate*; entire — *entirely*; exist — *existence*; necessary — *necessity* — *unnecessary*; desire — *desirable* — *undesired*.

IX. Change the following according to the model.

a) T.: — *After we had found* the measure of the area we...

St.: — *Having found* the measure of the area we...

1. *After they had slightly changed* the traditional approach they...
2. *After you had inscribed* the regular polygon you can... 3. *After the limit concept had been introduced*, the teacher... 4. *After they had arrived* at this conclusion they...

b) T.: — *When (if) the method is used* properly it must...

St.: — *When (if) properly the method must*...

1. *When an angle is bisected* it will... 2. *If students are given* a certain task they may... 3. *When a polygon is inscribed* it will... 4. *If the plan is changed slightly* it may...

c) T.: — The method *which is being applied* may...

St.: — The method *being applied* may...

1. The procedure *which is being followed* seems... 2. The area *which is being enclosed* is equal to... 3. The ratio *which is being defined* must... 4. The lines *which are being extended* represent...

d) T.: — The lecture *was followed* by an experiment

St.: — The lecture *followed* by an experiment *was*...

1. The angle *was subtended* by a chord. 2. The lecture *was followed* by a discussion. 3. The discussion *was followed* by a statement. 4. The statement *was followed* by some illustrations.

X. Listen to the text (2).

XI. Listen to the questions about the text and write 'yes' or 'no' answers (use + or —).

1. Can one define the circumference as a perimeter of the circle?
2. Is there only one definition of a circumference? 3. Is the limit concept necessary for a precise definition? 4. Can one inscribe only a limited number of polygons in a circle? 5. Can we continue the process of bisecting the central angle indefinitely? 6. Is the area of a circle greater than the area of an inscribed polygon?

LESSON 20

ASSIGNMENT I

I. Listen and repeat after the speaker.

a) Pay attention to the various ways of reading of the same letter.

a — hat, hate, hail, hay, hart, hare, hall, haste, law, cause.

e — ten, tell, tea, teeth, term, tear, they, earn.

i — fist, first, file, fire, fight, field.

o — nock, normal, node, hold, noisy, ought, some, work, look, loop, low.

u — tub, tube, turn, pure, pull, put, due.

y — gym, try, tyre, yes, type, you, duty.

b) Note the stress.

1. 'Method, 'follow, 'region, 'notice, 'credit, 'area, 'useful, 'product, 'either.

2. 'Several, 'origin, par'ticular, 'position, 'radical, 'integer.

3. Com'pare, cons'truct, in'volve, ob'tain, re'sult, sup'pose, be'cause, bet'ween, con'tinue, in'definite, ir'rational, a'pproximate.

II. Repeat the words given below after the speaker. Guess the meaning of the italicised words. Write down their Russian equivalents.

Region — *regional*; to construct — *to reconstruct*; total — *total-ly*; to credit — *to discredit*; to compare — *comparison*, relationship — *to relate*.

III. Change the following according to the model. Use the absolute Participle Construction.

a) T.: — Since (as) the definition *is given* we can...

St.: — The definition *being given*, we can...

1. As the number of elements *is known* we must... 2. Since the total area equals the sum of the squares we may... 3. Since the temperature *increases* we may expect... 4. As the theorem *is stated* correctly we need not...

b) T.: — After the region *had been separated* we began...

St.: — The region *having been separated*, we began...

1. After the data *had been obtained* the scientist could... 2. After the advantages of the system *had been discussed* the operator agreed... 3. After the new method *had been accepted* they changed... 4. After an appropriate solution *had been found* we decided to continue...

IV. Listen to the new words of the lesson and repeat them.

V. Follow the speaker as he is reading the text (1).

VI. Listen to the questions below and give yes or no answers (use + or —).

Can each side of every triangle be used as the side of a square? 2. Can you inscribe triangular regions in a square? 3. Was Pythagoras a philosopher? 4. Is there only one proof of the Pythagorean theorem? 5. Is the Pythagorean Property true for all triangles? 6. Is it possible to state the Pythagorean Property in mathematical language? 7. Does the proof of Pythagorean Property involve working with areas? 8. Is each of the four triangles congruent?

ASSIGNMENT II

VII. Repeat the words of the lesson (text 2).

VIII. Listen to the words below. Guess the meaning of the italicised words. Write down their Russian equivalents.

place—to place—to replace — *to displace*; to solve — *unsolved*; negative — *to negate*; integer — *integral* — *integrity* — *integration*; to continue — *continuation*, exact — *exactness*; express — *expression* — *expressionless*.

IX. Change the following according to the model.

a) T.: — If the temperature *increases* the volume of the gas will...

St.: — The temperature *increasing* the volume of the gas will ...

1. If the line segment *extends* in both directions we shall get ...
2. If the production of these materials *increases* it will be easier...
3. If this rule *applies* to the method under consideration we must...
4. If these systems *differ* but slightly it is no use replacing...

b) T.: — All the assumptions *being considered* they found is possible...

St.: — All the assumptions *considered*, they found it possible...

1. The existence of these elements *being discovered*, the scientist found it necessary... 2. All the conditions *being stated*, the theorem... 3. The program *having been realized*, the members of the group could... 4. A consistent study *having been completed*, we could present...

X. Listen to the text (2).

XI. Listen to the questions about the text and write 'yes' or 'no' answers.

1. Can we find the measure of the third side of a triangle by applying Pythagorean Property? 2. Is there a number which when used twice gives a product of 16? 3. Is 2 the square root of 5? 4. Is the product of two negative numbers also a negative number? 5. Is the radical sign used to denote the positive square root? 6. Is there an integer whose square root is 22? 7. Does the $\sqrt{20}$ represent a rational number?

LESSON 21

ASSIGNMENT I

I. Listen to the words and repeat them after the speaker. Note the stress.

1. 'Basic, 'differ, 'process, 'recent, 'series, 'single, 'purpose, 'person, 'limit, 'always, 'content, 'member;

2. 'Theory, 'general, 'algebra, 'similar, 'family, 'several, 'usually, 'capital, 'element;

3. A'gree, re'peat, a'djust, a'round, a'pproach, de'fine, be'long.

II. Repeat these words. Guess the meaning of the italicised words. Write down their Russian equivalents.

Theory — *theoretical*; develop — *development*; adjust — *adjustment*; algebra — *algebraic*; purpose — *purposeless* — *purposeful*; similar — *similarity* — *similarly*; general — *generally* — *generalize*; person — *personal*; idea — *idealist* — *idealistic*; discribe — *discription*; family — *familiar*; satisfy — *satisfaction*; understand — *misunderstand*; to use — *to misuse*; to calculate — *to miscalculate*.

III. In the following sentences replace the Gerund with the Infinitive according to the model.

a) T.: — *Knowing* English is helpful.

St.: — *To know* English is helpful.

1. *Finding* out the truth is necessary. 2. *Playing* tennis is rather difficult. 3. *Attending* this seminar is important.

b) T.: — I like *collecting* stamps.

St.: — I like *to collect* stamps.

1. I expect *hearing* your comment. 2. He began *collecting* books on mathematics. 3. She likes *playing* chess. 4. I expect *being given* the information. 5. He expects *being asked* to speak at the conference.

c) T.: — Here is an example *which must be followed*.

St.: — Here is an example *to be followed*.

1. He showed me the book *which must be translated*. 2. He gave me the tools *which had to be adjusted*. 3. The data *which will be obtained* is rather new. 4. The person *who must be given* this work is quite young. 5. The viewpoint *that will be presented* is rather unexpected. 6. There are certain facts *that are to be considered*.

d) T.: — The article *presented* seemed...

St.: — The article *is to be presented* ...

1. The truth *discovered* by them appeared... 2. The unit *defined* is... 3. The distance *covered* equalled... 4. The statement *made* showed...

IV. Listen to the new words of the text (1) and repeat them.

V. Follow the speaker as he is reading the text.

VI. Listen to the questions below and give "yes" or "no" answers.

1. Is the world around us changing? 2. Must people become adjusted to the conditions around them? 3. Do the basic truths of arithmetic change a great deal with time? 4. Is one of the recent approaches to mathematics based on sets? 5. Is the meaning of sets in algebra similar to the general use of the word? 6. Can we say that a family is a set? 7. Is a set usually represented by a small letter? 8. Does the term "set" include various objects?

ASSIGNMENT II

VII. Repeat the words of the lesson (text 2) after the speaker.

VIII. Change the following according to the model.

a) T.: — He *must state* his viewpoint.

St.: — He *must have stated* his viewpoint.

1. He *must give* another definition. 2. She *may take* the journal. 3. They *must consider* this proof. 4. He *may accept* their conditions.

b) T.: — *In order to understand* it you must...

St.: — *To understand* it you must...

1. *In order to speak* English well you have to... 2. *In order to complete* the work in time they are expected to... 3. *In order to find* the difference the student is to ... 4. *In order to make* sure that everything is correct you ought to...

IX. a) Repeat after the speaker degrees of comparison.

good (well) — better — the best

bad (badly) — worse — the worst

little — less — the least

much (many) — more — the most

b) Replace the Russian word with the English one.

1. This is the (наименьший) common factor. 2. He knows these rules (плохо). 3. She solves such equations (лучше) than I do. 4. She has (меньше) time for her English than you. 5. Try to give (наилучшее) definition. 6. This is the (наихудшее) possible solution of the problem.

X. Listen to the speaker as he is reading the text (2).

XI. Give 'yes' or 'no' (+or —) answers to these questions.

1. Are symbols $<$ or $>$ more specific than the symbol of non-equality \neq ? 2. Does the mathematical sentence $8 \neq 10$ express the general inequality? 3. Will you write a false statement if you choose the incorrect symbol? 4. Is the sentence "... is bigger than the planet Mars" an open sentence? 5. Can you make the previous sentence true? 6. Does the orbit of Mercury lie inside the earth's orbit? 7. Is it possible to write mathematical sentences as open sentences? 8. Does it ever happen that there is no solution to satisfy a given statement?

LESSON 22

ASSIGNMENT I

I. Listen and repeat.

1. 'Product, 'ordered, 'notice, 'purposeless, 'wonder, 'label, 'figure.

2. 'Possible, 'element, 'necessary, perpen'dicular, 'similar, 'positive, 'negative, 'parallel, 'numeral.

3. Con'sider, de'note, ob'serve, be'tween, im'portance, in'terpret, inter'sect, as'sign, re'fer, de'terminate, co'ordinate, pre'cede.

II. Listen and repeat. Guess the meaning of the italicised words and write down their Russian equivalents.

Product — to produce — production — *productive* — *productivity*; form — *formalize* — *formality*; important — *unimportant*; element — *elemental*; commutative — *commutativeness*; first — *firstly*; wonder — *wonderful*; to correspond — *correspondent*; geometric — *geometrician*; axis — *axial*; to cooperate — *cooperation*; to coordinate — *coordination*; to indicate — *indication*.

III. In the following sentence replace the object clause with the Complex Object.

a) T.: — I expect that the article *will be written*

St.: — I expect the article *to be written*.

1. I expect that *these rules will be observed*. 2. I know that *this work is of great importance*. 3. He expects that *the situation will be analysed carefully*. 4. We believe that *the machine has certain advantages*.

b) T.: — I found *that he was unprepared*.

St.: — I found *him to be unprepared*.

1. I thought *she was ready*. 2. He expected that *I knew the solution*. 3. We found that *they were interested* in the problem. 4. I expect that *she will understand me*.

c) T.: — I thought that *she had come*.

St.: — I thought *her to have come*.

1. We expected that *he had completed* the experiment. 2. I knew that *you had obtained* similar results. 3. I believed that *they had closely cooperated* with you. 4. We found that *she had studied* the material properly.

IV. Listen to the new words of the text (1) and repeat them.

V. Follow the speaker as he is reading the text.

VI. Listen to the questions below. Give 'yes' or no answers (use + or —).

1. Is forming the product set a commutative operation? 2. Is it possible to set up a geometric interpretation of a set of ordered pairs of numbers? 3. Do we intersect two number-lines at the zero-point? 4. Are the intersecting lines perpendicular to each other? 5. Do we denote the vertical line with a letter x ? 6. Do we denote the horizontal with a letter y ? 7. Do we assign positive numbers to the left halfline of x ? 8. Are the two number lines called axes?

ASSIGNMENT II

VII. Repeat the words of the lesson (text 2) after the speaker.

VIII. Ask questions using the word 'really'.

T.: — We expect the students to learn the material?

St.: — Do you really expect them to learn the material?

1. We expect the scientists to establish a pattern. 2. He expects the student to speak on the coordinate system. 3. The students wanted their teacher to speak on number relations. 4. We found these statements to be mathematically correct. 5. I believe this result to be of some importance.

IX. Listen to the speaker as he is reading the text (2).

X. Change the following according to the model.

T.: — Are these elements of the same kind?

St.: — I wonder if these elements are of the same kind.

1. Are these the elements of the original set? 2. Is this an empty set? 3. Have you learned anything about sets in the previous article? 4. Does this new set consist of ordered pairs? 5. Have you defined the two ordered sets to be equal in this case? 6. Why do we have different names for two equal sets? 7. Do these sets represent different physical entities? 8. What do we obtain as a result of this operation? 9. Is every point of the Cartesian plane uniquely defined by one ordered pair of numbers? 10. Can number relations express geometric figures? 11. Can geometric figures be reduced to number relations? 12. Do arithmetic and geometry represent one single mathematical system?

LESSON 23

ASSIGNMENT I

I. Listen and repeat.

1. 'Single, 'common, 'series, 'power; 2. Pre'cede, poly'nomial, bi'nomial, ex'ponent, re'fer, de'fine, re'strict, be'tween, con'venient, ar'range, de'scend, a'scend; 3. 'Classify, 'specify, 'clarify, 'simplify; 4. Spe'cific, opti'mistic, eco'omic, a'tomic.

II. Listen and repeat. Guess the meaning of the italicised words and write down their Russian equivalents.

To factor — *factorable*; restrict — *restriction* — *restricted* — *unrestricted* — *restrictive*; outside — *inside*; end — *endless*; convenient — *conveniently* — *inconvenient* — *convenience*; power — *powerful* — *powerless*; to base — *base* — *baseless*; respect — *respective*; divide — *divisible* — *indivisible*; same — *sameness*; use — *useful* — *usefulness* — *useless* — *uselessness*.

III. Change the sentences below.

a) T.: — The article is expected *to be published*.

St.: — The article is expected *to have been published*.

1. He seems *to arrange* everything. 2. They are likely *to study* this law. 3. The method is unlikely *to be applied*. 4. They are sure *to restrict* themselves to a short discussion.

b) T.: — The statement *is shown* to be correct.

St.: — The statement *has been shown* to be correct.

1. The law *is found* to hold for all similar cases. 2. The conference *is assumed* to be of importance. 3. The machine *is observed* to operate well. 4. Single terms *are shown* to be arranged in ascending order.

IV. Replace the following sentences with the infinitive construction.

a) T.: — It is likely that everything will be arranged.

St.: — Everything is likely to be arranged.

1. It seems that the process is too complicated. 2. It is shown that the value is constant. 3. It appeared that the use of this material was restricted. 4. It is not shown that the two lines intersect at point A. 5. It is found that certain facts contradict the theory. 6. It does not seem that the procedure is convenient.

b) T.: — The first chapter *seems to be interesting*. (other chapters).

St.: — Other chapters *do not seem to be interesting*.

1. Multiplying from left to right *appears to be convenient*. (multiplying from right to left). 2. The law *seems to hold* for this particular case. (for similar cases). 3. There *seems to be* a solution for the first equation. (for the second one). 4. These two sides *seem to be* congruent. (the opposite angle).

V. Listen to the new words of the text (1) and repeat them.

VI. Follow the speaker as he is reading the text.

VII. Listen to the questions below. Give 'yes' or 'no' answers. (Use + or —).

1. Is an expression containing more than one term called a polynomial? 2. Is a polynomial containing three terms referred to as a trinomial? 3. Are polynomials containing two terms referred to as monomials? 4. Do you remember rules for signs? 5. Do you remember laws for exponents? 6. Are parentheses used in multiplying polynomials? 7. Is it more convenient to multiply polynomials from right to left? 8. Are the terms in the polynomial (x^3, x^2, x) arranged in ascending order?

ASSIGNMENT II

VIII. Repeat the words of the lesson (text 2) after the speaker.

IX. Ask questions using the word 'really'.

T.: — He is supposed to come.

St.: — Is he *really* supposed to come?

1. We are expected to finish the work. 2. Atoms are considered to be the smallest material particles. 3. Students are expected to learn that law. 4. Their results proved to be interesting. 5. He seemed to know the subject well. 6. They are likely to be in the lab.

X. Listen to the speaker and contradict his statement according to the model.

T.: — He is expected to speak to her.

St.: — But he *has already spoken* to her.

1. He is likely to give them a lecture. 2. They are unlikely to make that experiment. 3. You are expected to write your homework. 4. He is likely to meet the foreign scientists. 5. You are expected to

learn the new words. 6. They are expected to hold a conference. 7. He is unlikely to come. 8. You are expected to read that journal.

b) T.: — I think he is ready. (seem).

St.: — No, he *does not seem to be ready*.

1. I think he *understands* the situation. (seem). 2. I hope she *knows* the rules, (unlikely). 3. I am sure they *realize* our difficulties. (seem). 4. I believe he *has found* a solution. (appear). 5. I am sure he *has arrived* (unlikely).

X. Listen to the speaker as he is reading the text (2).

XI. Listen to these questions in connection with the text and give 'yes' or 'no' answers. (Use + or —).

1. Do there exist quadratic trinomials? 2. Should the factors of a quadratic trinomial be monomials? 3. Is the first term in the product found by multiplying the first terms of the two binomials? 4. Are the terms of a quadratic trinomial arranged either in ascending or descending order? 5. Are the terms of a quadratic trinomial arranged both in ascending and in descending order?

LESSON 24

ASSIGNMENT I

I. Listen and repeat.

1. 'Ratio, 'constant, 'common, 'total, 'standard; 2. Re'ward, re'member, re'peat, ex'ponent, pre'cede, con'sider, a'ssume, re'quest, ap'proximately, a'mount, under'stand; 3. Ge'ometry, 'logarithm, 'billion, 'formula, 'positive, 'oscillate, al'ternative.

II. Listen and repeat. Guess the meaning of the italicized words and write down their Russian equivalents.

To oscillate — *oscillation* — *oscillator* — *oscillogram* — *oscillograph*; value — to evaluate — *evaluation* — *valuable*; succession — *successive* — *successor*; abbreviate — *abbreviation* — *abbreviated*; to repeat — *repeater* — *repetition* — *repeatedly*; approximately — *to approximate* — *approximation* — *proximity*; progression — *to progress* — *progress* — *progressive*; according (to) — *accordingly* — *accordance*

III. Insert the required form of the verb following the model.

T.: — It would be helpful if you (to find) the article.

St.: — It would be helpful if you found the article.

1. It would be natural if they (to give) you their data. 2. It would be useful if they (to see) how you worked. 3. It would be natu-

ral if they (to stimulate) the research. 4. It would be very helpful if she (to make) these calculations.

IV. Answer these questions.

a) T.: — What would you do to draw a straight line?
(to use a ruler).

St.: — I would use a ruler to draw a straight line.

1. What would you do to solve this problem? (find the value of the unknown). 2. What would you suggest for improving the situation? (some modification). 3. What would you do to be sure of the result? (check the result). 4. What would you suggest for evaluating this formula? (making use of the logarithms).

b) T.: — Would you come if I asked you to? (to have time).
St.: — Yes, if I had time.

1. Would you speak to him? (to know him). 2. Would you assist her? (to know how). 3. Would you learn French now? (to have more time). 4. Would you give them the date now? (to see them).

c) T.: — What would you do if he were here? (speak to him).

St.: — I would speak to him.

1. What would you do if you had more time? (learn French). 2. What would he do if he were in the lab? (help us). 3. What would she do if she were ready? (start immediately). 4. What would you do if you went home now? (do my homework).

V. Express the same thing using "unless".

T.: — I would not go there if I did not have to.

St.: — I would not go there unless I had to.

1. I would not speak to him if I did not know him well. 2. I would not agree to write this article if I did not know the subject. 3. I would not begin the work if I were not sure. 4. We would not be able to go on with the experiment if you did not help us.

VI. Listen to the new words of the text (1) and repeat them.

VII. Follow the speaker as he is reading the text.

VIII. Listen to the questions below and give 'yes' or 'no' answers. (Use + or —)

1. Do you remember the story of the king and his vizier? 2. Does the sequence 1, 3, 9 represent the vizier's desire? 3. Is the ratio of each term in a sequence like 1, 2, 4, 8 a constant? 4. Is G. P. an abbreviation for an arithmetic progression? 5. Can you make use of logarithms? 6. Are logarithms helpful in evaluating formulas? 7. Is the chessboard G. P. a decreasing progression? 8. Is it possible for a common ratio to be negative? 9. Is it possible for a sequence to oscillate?

ASSIGNMENT II

IX. Repeat the words of the text (2) after the speaker.

X. Change the following sentences into the conditional mood.

a) T.: — If you multiply these numerals you will get...

St.: — If you multiplied these numerals you would get...

1. If you draw a straight line you will subtend the angle. 2. If you divide 25 by 4 the remainder will be equal to 1. 3. If one reduces this fraction the resulting number will be... 4. If these curves intersect the point of intersection will be located... 5. If he knows this law he will prove the theorem. 6. I shall speak to him provided I see him tomorrow. 7. They will attend the lecture unless they have other things to do. 8. Nothing will happen if you are more careful.

b) T.: — If you tell him the truth he will understand.

St.: — If you had told him the truth he would have understood.

1. If they follow the rule they will find the solution. 2. If we go into detail the picture will become clear. 3. If you observe the order you will arrange the objects properly. 4. You will understand my point if you try.

X. Change according to the model.

T.: — I do not know when he came but...

St.: — No matter when he came...

1. I do not know why he did so but... 2. I do not know how he reached this result but... 3. I do not know where she found the book but... 4. I do not know who told you about it but... 5. I do not know what they did but... 6. I do not know how often they went there but...

XI. Listen to the speaker as he is reading the text (2).

XII. Answer these questions in connection with the text (use + or —).

1. Do finite sequences have a definite number of terms? 2. May a sequence have an unending number of terms? 3. Can you imagine $10^{21} + 1$? 4. Can an arithmetic progression be finite? 5. May a G. P. be infinite? 6. Is there a symbol by means of which you denote infinity?

LESSON 25

ASSIGNMENT I

I. Listen and repeat. Mind the stress.

1. 'Circle, 'cover, 'finger, 'ratio, 'total, 'favour, 'trial, 'certain, 'present, 'equal, 'even, 'normal, 'rather, 'other, 'coin, 'reason; 2. Be-

cause, in'deed, pro'ceed, suc'ceed, re'sult, pre'sent, a'gain, as'sume, suc'cess, oc'cur, a'gainst, sup'pose; 3. Par'ticular, 'similar, 'illustrate, 'realize;

4. Proba'bility, poly'nomial, simi'larly, mathe'matics, irre'ducible, intro'duce, intu'itional, funda'mental, pseudo'spherical, pseudo'scalar, pseudo'tensor, presen'tation, prede'terminate, poly'logarithm, simu'lation, subdi'vision, sub'normal, sub'program, super'position

II. Listen and repeat. Guess the meaning of the italicised words. Write down their Russian equivalents.

To realize — realization — *realizable* — realizability; normal — normally — normalize — *normalization*; probability — probable — *improbable* — probably; favour — favourable — *unfavourable* — *unfavourably*; to white — *whiteness*; certainty — certain — *uncertain*; likeness — like — *unlike*; to like — *to dislike*; black — *blackness*.

III. Express the same idea leaving out "should".

T.: — It is important that you *should be given* the data.

St.: — It is important that you *be given* the data.

1. It is necessary that the conference *should be attended*. 2. It is desirable that the program *should be fulfilled*. 3. It is important that research *should be properly planned*. 4. It is desirable that processing of information *should be done* by computers. 5. It is unlikely that there *should be a failure*.

IV. Replace the infinitive construction with the subjunctive.

T.: — It is necessary *for you to go*.

St.: — It is necessary *that you should go*.

1. It is important *for them to see* his work. 2. It is impossible *for him to continue* research. 3. It is necessary *for the plan to be accepted*. 4. It is important *for everybody to know* these rules.

V. Replace the infinitive construction with the subjunctive.

T.: — I *want you to present* your paper. (suggest).

St.: — I *suggest that you should present* your paper.

1. He *wants me to speak* at the conference. (insist). 2. They *want us to stop* experimenting. (suggest). 3. He *wants her to give* her reasons. (insists). 4. I *want you to include* the material in your article. (recommend).

VI. Express the same thing in a different way.

T.: — He gave me the book *so that I could* read it.

St.: — He gave me the book *in order that I may* read it.

1. She showed me the data *so that I could* use them. 2. He gave her a pen *so that she could* write with it. 3. I gave him my reasons *so that he could* understand the situation. 4. We helped him *so that he might* have another chance.

VII. Listen to the new words of the lesson (text 1) and repeat them.

VII. Follow the speaker as he is reading the text.

IX. Listen to the questions and give 'yes' or 'no' answers (+ or -).

1. Suppose you have nine circles. Can the trial succeed in nine ways? 2. Does anything favour the choice of either black or white circle? 3. Is the sum of probabilities of success and failure equal to 1? 4. Can the probability that an event will occur be more than 1? 5. Suppose $p=1$. Is success a certainty in this case? 6. Suppose S and f are equal. Are chances even?

ASSIGNMENT II

X. Repeat the words of the text (2) after the speaker.

XI. Change the infinitive construction into the subjunctive.

a) T.: — I want you *to write* that paper.

St.: — I wish you *wrote* that paper.

1. I want you *to go* to the library. 2. I want you *to see that* journal. 3. I want you *to find* a proper answer. 4. I want you *to give* him another chance. 5. I want you *to speak* to your research adviser. 6. I want you *to hold* the meeting. 7. I want you *to send* her your abstract. 8. I want you *to understand* me better.

T.: — I expected them *to build* the machine.

St.: — I wish they *had built* the machine.

1. I expected him *to come* sooner. 2. I expected her *to draw* a right conclusion. 3. I expected them *to begin* the experiment. 4. I expected you *to deal* with the problem. 5. I expected them *to take* their exam. 6. I expected him *to tell* the truth. 7. I expected her *to make* the necessary changes. 8. I expected him *to do* everything possible.

XII. Listen to the speaker as he is reading the text (2).

XIII. Contradict the following statements.

T.: — He got a penalty.

St.: — He did not get a penalty.

1. These events are mutually exclusive. 2. He is dependent on his family. 3. He drew a wrong conclusion. 4. He distinguished between those two approaches. 5. She excluded the second chapter. 6. They got a reward. 7. The coin fell down. 8. One event affects the other.

LESSON 26

ASSIGNMENT I

I. Read the words of ex. 7 of the lesson outloud and compare your pronunciation with the speaker's. In case you've made a mistake, correct it.

II. a) Follow the speaker as he is reading the words. Repeat the words after him.

Absurd, accuracy, administrative, aeroplane, amend, arise, brain, chemical, circumstance, culmination, demand, detect, difficulty, digital, error, explicit, factory, ingredient, instruction, intelligent, major, mansidedness, memory, merit, mixture, otherwise, device, performance, popularly, preparatory, scrupulous, subconsciously, occasion, obey, cause, reliable, generation, equipment, significant, decade.

b) Mark the international words (above) and write down their Russian equivalents in your exercise book.

c) Look up the dictionary for the meaning of the dangerous words: 'intelligent', 'decade', 'factory', 'major', 'generation'.

ASSIGNMENT II

III. a) Read the following words and compare your reading with the tape.

Card, code, fully, due, encounter, finally, former, individual, mention, necessitate, enable, transcribe, transfer, typewriter, variation.

b) Write out the international words and give their Russian equivalents.

IV. Follow the speaker as he is reading the text "Distribution of Sexes" without actually seeing the text.

a) Before you begin, look up the dictionary for the meaning of the words 'sample', 'card file'. You are expected to guess the meaning of the rest of the words that are not familiar to you.

b) After you have heard the text write down its main points. Be prepared to discuss the topic in class.

LESSON 27

ASSIGNMENT I

I. Read the words of ex. 6 of the lesson outloud and compare your pronunciation with the speaker's. In case you've made a mistake correct it.

II. a) Follow the speaker as he is reading the words. Repeat the words after him.

Universal, gravitation, achievement, to examine, clarify, astronomer, Danish, vector, focus, body, support, proportional, elliptic, comparable, sectoral, to possess, acceleration, toward, inversely, to preserve, furthermore, to collect, experience, to induce, course, near, mutual, predecessor, weight, uniform, to compel, to alter, to impress, momentum.

b) Write down the international words from above in your exercise book and give their Russian equivalents.

c) Look up the dictionary for the meaning of: 'universal', 'examine', 'uniform', 'preserve', 'Danish', 'experience'.

ASSIGNMENT II

III. a) Read the following words and compare your reading with the tape.

Invariable, proportionality, artificially, whereas, to weigh, pan, balance, spring, suitably, respectively, unfortunately, density, inadequate, attempt, immediate, deduction, economical, proposition, thought, to emphasize, foundation, junction, deductively, corollary.

b) Write out the international words and give their Russian equivalents.

IV. Follow the speaker as he is reading the text «Language Translation» without actually seeing the text.

a) Before you begin look up the dictionary for the meaning of the words 'affairs', 'punch'.

LESSON 28

ASSIGNMENT I

I. Read the words of ex. 6 of the lesson outloud and compare your pronunciation with the speaker's. In case you've made a mistake correct it.

II. a) Follow the speaker as he is reading the words. Repeat the words after him.

Potential, gravitational, attraction, extremely, deviation, to deviate, frequent, explainable, elementary, curl, moon, comet, to cope with, heavenly, perihelia, to combine, to permit, apart from, rotation, irrotational, precision, intense, planetary, function, simplicity, significance, solid, to devise, source, aid, correlate, prediction, manipulate, to assert, advance, extraordinary, electromagnetic, to create, nuclear, originally.

b) Write down the international words in your exercise book and give their Russian equivalents.

c) Look up the dictionary for the meaning of: 'attraction', 'solid', 'originally'.

ASSIGNMENT II

III. a) Read the words below and compare your reading with the tape.

Attractive, ambiguity, arbitrary, identifiably, continuous, pendulum, to remove, gradient, strictly, to suppress, to vanish, integral, integration, undetermined, within, additive.

b) Write out the international words and give their Russian equivalents.

IV. Follow the speaker as he is reading the text "Newton and His Famous Laws" without actually seeing the text.

a) Before you begin look up the dictionary for the meaning of the words 'tremendous', 'rigorous', 'tide'. You are expected to guess the meaning of the rest of the words that are not familiar to you.

b) After you have heard the text write down its main points. Be prepared to discuss the topic in class.

LESSON 29

ASSIGNMENT I

I. Read the words of ex. 7 (a, b) of the lesson outloud and compare your pronunciation with the speaker's. In case you've made a mistake correct it.

II. a) Follow the speaker as he is reading the words. Repeat the words after him.

Implicit, perception, thought, mental, once, together, congregate, team, match, superset, player, entity, conceptually, president, association, to scatter, convention, to gain, concreteness, to insert, thereby, to interpose, to display, mysterious, to decode, to yield, characterize.

b) Write out the international words and give their Russian equivalents.

c) Look up the dictionary for the meaning of: match, convention.

ASSIGNMENT II

III. a) Read the words above and compare your reading with the speaker's.

Mapping, ease, partially, ingenious, ingredient, commonplace, instinct, recognize, habit, habitually, visualize, visual, accompany, seldom, appropriately, to rely, to emerge, to demonstrate.

b) Write out the international words and give their Russian equivalents.

IV. Follow the speaker as he is reading the text "The Problem of Three Bodies" without actually seeing the text.

a) Before you begin look up the dictionary for the meaning of the words 'justly', 'accessory', 'inherent'. You are expected to guess the meaning of the rest of the words that are not familiar to you.

b) After you have heard the text write down its main points. Be prepared to discuss the topic in class.

LESSON 30

ASSIGNMENT I

I. Read the words of ex. 6 of the lesson outloud and compare your pronunciation with the speaker's. In case you've made a mistake correct it.

II. a) Follow the speaker as he is reading the words. Repeat the words after him.

Domain, derivative, to sketch, lazy, monotonous, to prefer, boredom, slope, tangent, figure, moment, to accomplish, smooth, to scream, utilize, content, labor, to save, labor saving, bottom, top.

b) Mark the international words (above) and write down their Russian equivalents in your exercise book.

c) Look up the dictionary for the meaning of the dangerous words: 'to sketch', 'figure'.

ASSIGNMENT II

III. a) Read the following words and compare your reading with the tape.

Variety, critical, maximum, maxima, minimum, minima, maximize, minimize, exceed, boundary, height, wood, summarize.

b) Write out the international words and give their Russian equivalents.

IV. Follow the speaker as he is reading the text "Sequences" without actually seeing the text.

a) Before you begin, look up the dictionary for the meaning of the words 'instantaneous', 'accidental', 'recall'. You are expected to guess the meaning of the rest of the words that are not familiar to you.

b) After you have heard the text write down its main points. Be prepared to discuss the topic in class.

УРОК 1

По смысловому содержанию, синтаксической функции в предложении и морфологическим признакам слова принято делить на разряды, называемые частями речи.

В свою очередь, части речи делятся на самостоятельные (знаменательные), т. е. несущие смысловую нагрузку (имя существительное, имя прилагательное, глагол, наречие, местоимение), и на служебные, которые в отличие от знаменательных частей речи, передавая связи и отношения между словами (предлоги) и предложениями (союзы) или указывая на принадлежность слов к определенной части речи (артиклы), играют лишь вспомогательную роль.

Существительное

Существительное в английском языке имеет два числа — единственное и множественное.

Множественное число существительных образуется путем прибавления окончания *-s* или *-es* к основе слова.

Окончание *-s* (*-es*) произносится глухо — [s] после глухих согласных и звонко — [z] после звонких согласных и гласных.

[s]	[z]	[iz]
fact — facts	hand — hands	place — places
length — lengths	idea — ideas	size — sizes
		class — classes
		lady — ladies

Некоторые существительные образуют форму множественного числа особым образом, Запомните их:

	ед. число	мн. число
1. человек	man [mæn]	men
женщина	woman ['wʊmən]	women ['wɪmən]
ребенок	child [tʃaɪld]	children ['tʃɪldrən]
фут (мера длины)	foot [fu:t]	feet [fi:t]

2. Слова латинского и греческого происхождения, например:

ось	axis ['æksɪs]	axes ['æksɪz]
матрица	matrix ['meɪtrɪks]	matrices ['meɪtrɪsiːz]
критерий	criterion [kraɪ'tɪəriən]	criteria [kraɪ'tɪəriə]
явление	phenomenon [fɪ'nɒmɪnən]	phenomena [fɪ'nɒmɪnə]
спектр	spectrum ['spektrəm]	spectra ['spektrə]

Существительное в английском языке имеет общий и притяжательный падеж.

В общем падеже существительное имеет нулевое окончание, т. е. падеж специально не оформлен.

Притяжательный падеж существительных в единственном числе характеризуется наличием окончания *-s*, которому предшествует апостроф ('), или апострофа без *-s*, если существительное во множественном числе.

the student's pen — ручка студента

the sides' length — длина сторон

Примечание: Правила произношения слов, имеющих окончание *-s*, совпадают с произношением окончаний множественного числа существительных.

Оборот с предлогом *of* также передает отношения принадлежности. Сравните:

the man's help — the help of the man

the sides' length — the length of the sides.

Существительное в английском языке имеет при себе артикль (определенный или неопределенный). В ряде случаев артикля может и не быть. Наличие или отсутствие артикля связано со значением и употреблением существительного в каждом данном случае.

Одно и то же существительное может сочетаться как с определенным артиклем (*the*), так и с неопределенным (*a, an*).

Неопределенный артикль произошел от числительного *one* — «один». Именно поэтому он употребляется только с существительным в единственном числе: *a pen, a man* и свидетельствует о принадлежности предмета к какому-либо классу однородных предметов, т. е., выполняет классифицирующую, причисляющую функцию.

A table — стол, какой-то из многих ему подобных столов.

An article — статья, какая-то, относящаяся к классу статей вообще. Статья, а не книга или газета.

Определенный артикль происходит от указательного местоимения *that* и употребляется перед существительным как в единственном, так и во множественном числе. Он выделяет некий предмет или явление из класса подобных ему предметов или явлений. Сравните:

take a pen — возьми ручку (а не карандаш)

take the pen — возьми (эту) ручку (ту, которая уже упоминалась).

Артикль отсутствует:

1. Перед существительными во множественном числе в том случае, если в единственном числе им предшествовал неопределенный артикль:

a simple fact — простой факт

simple facts — простые факты.

2. Перед именами собственными, перед существительными, обозначающими названия дней недели, месяцев, времен года.

Прилагательное

Прилагательное выполняет функцию определения по отношению к существительному и ставится перед ним. Артикль, если он имеется, всегда предшествует определению, выраженному прилагательным:

a nice place; the thin, red pencil.

УРОК 2

Указательные местоимения

ед. ч.
this — этот
that — тот

мн. ч.
these — эти
those — те

Указательное местоимение перед существительным исключает употребление артикля.

Личные местоимения

Личные местоимения имеют два падежа: именительный и объектный. В именительном падеже личное местоимение выполняет функцию подлежащего, а в объектном — дополнения.

Число	Именительный падеж	Объектный падеж
единственное	I — я you — вы [ju:] she — она he — он it — он, она, оно (для неодушевл. предметов)	me — мне, меня you — вам, вас her — ей, ее [h ə:] him — ему, его it — переводится в зависимости от рода предмета
множественное	we — мы you — вы they — они (для одушевленных и неодушевл. предметов)	us — нам, нас you — вам, вас them — им, их

Притяжательные местоимения

Притяжательные местоимения употребляются в качестве определения к существительному и исключают употребление артикля:
my pen — моя ручка

Личные местоимения	Притяжательные местоимения
I she he it we you they	my — мой her — ее his — его its — ее, его our — наш [aʊ] your — ваш [jɔ:] their — их

Повелительное наклонение

В английском языке имеется три наклонения: изъявительное, сослагательное и повелительное.

Повелительное наклонение выражает просьбу, приказ, побуждение к действию. Повелительное наклонение для второго лица единственного и множественного числа образуется при помощи инфинитива смыслового глагола без частицы *to*. Например:

to go — идти *go!* — иди(те)!
to take — брать *take the pen!* — возьми(те) ручку!

Отрицательная форма повелительного наклонения образуется при помощи вспомогательного глагола (*to*) *do* и отрицания *not*.

Вместо *do not* иногда употребляют сокращенную форму *don't* [daʊnt].

Do not (don't) take the pen! Не бери ручку!
Do not (don't) make the line! Не проводи линию!

Повелительное наклонение для I и III лица единственного и множественного числа образуется с помощью глагола *let* — позволить, разрешить, допустить, например:

Let me go. Позволь(те) (разрешите) мне уйти.
Let her take the bag. Пусть она (позволь(те) ей) возьмет сумку.
Let the student hold that table. Пусть студент подержит тот стол.
Let us help them. Давай(те) поможем им.

Обратите внимание, что в сочетании с *let* употребляется местоимение в объектном падеже или существительное в общем падеже и смысловой глагола без частицы *to*.

Отрицательная форма образуется при помощи вспомогательного глагола *do* и отрицания *not* (don't).

Do not let him do it.	Пусть он не делает этого.
Do not let the boy go.	Пусть мальчик не идет.

УРОК 3

Для выражения отношения к действию, а не самого действия, используется модальный глагол *must* «должнствовать», *can* «мочь», *may* «иметь возможность, мочь». Само же действие передается инфинитивом смыслового глагола без частицы *to*, следующим непосредственно за модальным глаголом — *must go, may take* — независимо от лица, числа и времени.

Умение или способность (физическая или умственная) выполнять действие передается модальным глаголом *can* (could — в прошедшем времени).

I can help him.	Я могу (у меня есть возможность) помочь ему.
He could open the bag.	Он смог открыть портфель.

Необходимость, долженствование, обязательность или вероятность свершения действия передается глаголом *must* (он не имеет формы прошедшего времени).

He must study the problem.	Ему надо (он должен) изучить эту задачу.
He must be at home.	Он должно быть дома.

Возможность, позволительность, разрешение совершить действие передается глаголом *may* (might — в прошедшем времени).

You may take our data.	Вы можете (можно) взять наши данные.
He may come.	Возможно (может быть) он придет.

Вопросительная форма

Could you find a place?	Смогли ли (сумели ли) вы найти место?
Must she go?	Ей надо идти?
May I take your pen?	Можно мне взять твою ручку?

Специальные вопросы образуются с помощью вопросительных слов *what* «что», *when* «когда», *who* «кто».

Обратите внимание на порядок слов в вопросительных предложениях:

	Can he study the text now?
	Who can study the text now?
What	can he study now?
When	can he study the text?

Отрицательная форма

He cannot hold the box.
You must not go (need not).

Он не может удержать ящик.
Ты не должен идти. (Тебе не нужно...)

Краткие ответы на вопросы

Can she open it?	Yes, she can.
	No, she cannot.
Must he do it?	Yes, he must.
	No, he must not.
	No, he need not. (Нет, не надо.)
May I take it?	Yes, you may.
	No, you must not. (Нет, нельзя.)

Сокращенная форма *mustn't* ['mʌsnt], *needn't* ['ni:dnt], *can't* [kɑ:nt].

УРОК 4

Глагол *to be*

Present, Past, Future Indefinite

Глагол *to be* «быть», «есть», «являться», «представлять (собой)», «заключаться в том, чтобы» спрягается следующим образом:

Лицо	Present Tense	Past Tense	Future Tense
ед. ч. } мн. ч. }	I I am We are	I was We were	I } We } shall be
ед. ч. } мн. ч. }	II You are	You were	You will be
ед. ч. } мн. ч. }	III She (he, it) is They are	She (he, it) was They were	He (she, it) } They } will be

Для образования будущего времени вводятся вспомогательные глаголы *shall* для I лица, *will* для II и III лица, после которых употребляется Infinitive глагола (*to*) *be* без частицы *to*.

Глагол *to be* выполняет различные функции в предложении, в частности, он является смысловым глаголом:

The book is on the table. Книга (лежит, находится) на столе.

We were in the room. Мы были в комнате.

Как видите, в английском языке в настоящем времени глагол не опускается, в то время как в аналогичном русском предложении глагол «быть», как правило, не употребляется.

В качестве глагола связи *to be* входит в состав именного составного сказуемого и предшествует его именной части. Именная часть сказуемого может быть выражена существительным, прилагательным, глаголом и пр.

This is a text. Это текст.
The text was long. Текст был длинный.
The problem is to translate the text. Задача (состоит) в том, чтобы перевести текст.

Вопросительная форма и краткие ответы

Is this a text? Yes, it is. (It's a text).

No, it is not. (It isn't.)

Was the text long? Yes, it was.

No, it was not.

Yes, they will.

Will they be in the room?

No, they will not.

Обратите внимание:

He was in the room.
Was he in the room?
Who was in the room?

Where was he?
She will be here soon.

Will she be here soon?
Who will be here soon?

When will she be here?
Where will she be soon?

Отрицательная форма образуется при помощи отрицания *not*, которое в настоящем и прошедшем времени следует за глаголом *to be* (в личной форме), а в будущем — предшествует глаголу.

I am not a student.
They were not at the University.
He will not be at home.

УРОК 5

Оборот *there is (there are)*

Оборот *there is (are)* представляет собой единую группу, где слово *there* выполняет служебную роль, полностью утрачивая при этом свое основное значение «там, туда».

Оборот переводится на русский язык словами *есть*, «существует», «бывает», «имеется» или совсем не переводится. Оборот *there is* предшествует подлежащему. Далее следует обстоятельство. Перевод предложений, содержащих данный оборот, надо, как правило, начинать с обстоятельства места или времени (если они есть в предложении).

There is a book on the table.

На столе (*есть*) книга (а не тетрадь).

There was a seminar last week.

На прошлой неделе *был* семинар (а не лекция).

There will be a lecture at the University tomorrow.

Завтра в университете *будет* лекция (а не семинар).

А теперь сравните:

I. The book is on the table.

Книга находится на столе, (а не на стуле).

The students are there.

Студенты находятся там.

II. There is a book on the table.

На столе — книга (а не тетрадь).

There are students there.

Там — студенты (а не аспиранты).

Если вы вслушаетесь внимательно в интонацию русского предложения, то вы неизбежно обратите внимание на то, что в первой группе примеров говорится об определенной книге и определенных студентах и при этом подчеркивается их местонахождение. Книга на столе (а не на стуле). Студенты там (а не в комнате).

Между тем во втором случае вы убедитесь, что главное в предложении сообщении — что (кто), а не где. На столе — книга (а не тетрадь). Там — студенты (а не аспиранты). При этом в этом случае речь идет о какой-то книге, о каких-то студентах, еще неизвестных читателю. Поэтому с оборотом *there is* обычно употребляется неопределенный артикль с существительным в единственном числе. Во множественном числе существительное при наличии оборота *there are* употребляется без артикля.

Для образования отрицательной формы употребляется отрицательное местоимение *no* или *not any* никакой, нисколько, которые помещаются между оборотом *there is* (*there are*) и существительным. Артикль при этом, как правило, не употребляется.

There is no (not any) lecture today. Сегодня нет лекций.

There were no (not any) seminars yesterday. Вчера не было семинаров.

There will be no (will not be any) changes in the plan. В плане не будет изменений.

В вопросительной форме глагол *to be* ставится перед словом *there*.

Обратите внимание на краткие ответы:

Is there a lecture today?	Yes, there is.
	No, there is not.
Were there seminars yesterday?	Yes, there were.
	No, there were not.
Will there be a lecture tomorrow?	Yes, there will.
	No, there will not.

Обратите внимание на порядок слов:

There was a seminar yesterday.

Was there a seminar yesterday?

What was there yesterday?

Примечание: Кроме глагола *to be* после *there* могут употребляться такие глаголы, как *to live* «жить», *to exist* «существовать», *to appear* «появляться», модальные глаголы.

There live (appeared) students in this room. В комнате живут (появились) студенты.

There may be students there. Там могут быть студенты.

Наречия *much, many, few, a few, little, a little*

Наречия *much, little* употребляются с неисчисляемыми существительными, *many, few* — с исчисляемыми существительными.

<i>much</i>	}	<i>time</i>	<i>много</i>	}	<i>времени</i>
<i>little</i>			<i>мало</i>		
<i>many</i>	}	<i>books</i>	<i>много</i>	}	<i>книг</i>
<i>few</i>			<i>мало</i>		

little time — мало времени (настолько, что я не могу вам его уделить);

a little time — немного времени (и мы можем поговорить);

few books — мало книг (настолько, что нечего вам дать);

a few books — немного книг (можно кое-что выбрать).

УРОК 6

Глагол *to have* переводится на русский язык словами «есть», «иметь» или иногда вообще не переводится. В третьем лице ед. числа настоящего времени глагол имеет форму *has*, в остальных лицах *have*.

I (you, we, they) *have* English books.

1. У меня *есть* английские книги.

He (she) *has* many friends.

2. У него много друзей.

We *have* reasons to think that so.

3. Мы *имеем* основания думать так.

В прошедшем времени глагол *to have* имеет форму *had* для всех лиц единственного и множественного числа

We (you, he, they) *had* a lecture yesterday.

Вчера у нас была лекция.

Будущее время образуется прибавлением вспомогательных глаголов *shall* и *will* к смысловому глаголу

I *shall have* some time tomorrow.

1. Завтра у меня будет немного времени.

He *will have* a research adviser.

2. У него будет научный руководитель.

Отрицательная форма

I *have no* (not any) time.

1. У меня нет времени.

He *has no* (not any) facts.

2. Он не имеет фактов.

You *had no* (not any) seminar last week.

3. У вас не было семинара на прошлой неделе.

They *will have no* (will not have any) time.

4. У них не будет времени.

Вопросительная форма и краткие ответы

Have you a (any) lecture today?	_____→Yes, we have.
	_____→No, we have not.
Has she any English books?	_____→Yes, she has.
	_____→No, she has not.
Shall I have this information?	_____→Yes, you will.
	_____→No, you will not.

УРОК 7

Основные способы словообразования

а) Словообразование путем прибавления суффиксов и префиксов (приставок) к основе слова, например:

осуществлять	—	reg-	—	al-	—	iz(e)	—	ation	формализация
информировать	—	in-	form	—	al-	—	ity	—	формальность
реформировать	—	re-	—	—	—	—	ly	—	официально, формально
деформировать	—	de-	—	—	—	—	ation	—	формация, образование
							less	—	бесформенный
							ulate	—	формулировать
									форма
									формировать

Примечание: Список суффиксов и префиксов дан в приложении к учебнику.

б) Словообразование путем конверсии. Новое слово образуется без изменения его формы и является другой частью речи, например:

lecture — to lecture	лекция — читать лекцию
form — to form	форма, внешний вид — формировать, образовываться

в) Словообразование в результате переноса ударения. Ударение в существительных и прилагательных падает на первый слог, а в глаголе той же формы — на второй:

'present	подарок	to pre'sent	предъявлять, дарить
	присутствующий, данный		
'import	импорт	to im'port	импортировать

г) Словообразование с помощью словосложения:

classboard	— (классная) доска
wall-paper	— стенная газета

Слова, образованные таким образом, пишутся слитно или через дефис.

Времена группы Indefinite (Active)

(Present, Past, Future)

В английском языке существует четыре группы времен: Indefinite, Continuous, Perfect and Perfect Continuous. Каждая из этих групп имеет настоящее, прошедшее и будущее время.

Вы уже знакомы с временами Present, Past and Future Indefinite глаголов *to be* и *to have*.

Времена группы Indefinite употребляются:

а) для констатации факта совершения действия в настоящем, прошедшем или будущем, без указания на характер протекания действия (длительность, совершенность) и безотносительно к какому-либо другому действию или моменту.

Кроме того, времена этой группы употребляются:

б) для выражения обычного, изо дня в день совершаемого действия (в настоящем, прошедшем или будущем времени) и в) логически последовательных действий.

Прочие группы времен, о которых мы будем говорить в дальнейшем — Continuous, Perfect, Perfect Continuous, обозначают действие в развитии, указывают на то, как происходит (происходило, будет происходить) действие во времени, как действия соотносятся друг с другом во временном отношении.

The Present Indefinite Tense

I (you, we, they) read English. Я (ты, мы, они) читаю по-английски.

He (she, it) reads English. Он (она) читает по-английски.

Сравните: The boy speaks English.
The boys speak English.

Как видите, только в третьем лице ед. числа глагол приобретает характерное для этого лица окончание *s (es)*.

Примечание: Окончание глагола *s (es)* произносится по известным вам правилам произношения окончания множественного числа существительного: likes [s], stays [z], begs [z], wishes [iz], study — studies [iz] (если букве *y* предшествует согласная).

Отрицательная форма образуется с помощью вспомогательного глагола (*to*) *do (does* в третьем лице единственного числа), отрицания *not* и смыслового глагола в инфинитиве без частицы *to*.

I (you, we, they) do not study this problem.

He (she, it) does not work.

Сводная таблица

		Infinitive	Present	Past	Future
Indefinite	Active	to ask	I (you, we, they) ask He (she, it) asks	I He asked	I (we) shall He (she, you, they) will
	Passive		I am He (she, it) is asked You (we, they) are	I (he, she, it) was asked You (we, they) were asked	I (we) shall He (she, you, they) will
Continuous	Active	to be asking	I am You are asking He is	I was You were asking	I shall You will be asking
	Passive		I am You are being asked He is	I was You were being asked	—
Perfect	Active	to have asked	I (you, we, they) have asked He (she, it) has	I He had asked	I shall He will have asked
	Passive		I have He has been asked	I He had been asked	I shall He will have been
Perfect Continuous		to have been asking	I have He has been asking	I He had been asking	I shall He will have been

Как видите, окончание -s, характерное для третьего лица единственного числа (he works), в отрицательной и вопросительной форме переносится на вспомогательный глагол (does).

Вопросительная форма использует тот же вспомогательный глагол do (does).

Do you (we, I, they) study this problem? — Yes, I do.
— No, I do not (don't).

Does she (he, it) work? — Yes, she does.
— No, she does not (doesn't) [dʌzənt]

употребления времен

	Примечания
ask	1. Обычные, регулярно повторяющиеся действия (usually, every day, twice a month) 2. Факты, события, действия, имевшие (имеющие) место (yesterday, 2 days ago, tomorrow, in 3 days, in May, in 1967, last week, next month). 3. Изменение событий в последовательности.
be asked	
	1. Процесс, происходящий в определенный момент в настоящем, прошедшем или будущем (now, at 3 o'clock, when I saw). 2. Параллельно происходящие процессы (while, when — пока, тогда, когда) 3. Процесс, охватывающий период времени от и до (from... till (to))
asked	1. Действие, завершенное к определенному моменту, результат которого очевиден. при Present Perfect: а) Время часто не указывается (подразумевается момент речи); б) Употребляются наречия just, already, never, yet и др., а также today, this week (month, year) при Past и Future Perfect момент выражается предлогом by — «к». 2. Past и Future Perfect выражают также действия, завершенные до начала какого-то другого действия, (в прошлом или будущем)
asking	Действие начавшееся в какой-то момент или до какого-то момента и продолжающееся до настоящего момента, включая или исключая его (с непременно указанием длительности совершения действия) since the morning — с утра; for two hours — в течение двух часов; since you came — с тех пор как ты пришел

Если предложение начинается с вопросительного слова (кроме вопроса к подлежащему и группе слов, определяющих его), то оно ставится перед вспомогательным глаголом (do, does).

My teacher goes to the University in the morning.

Who goes to the University...?

Whose teacher goes to the University...?

Does my teacher go to the University?

When does my teacher go to the University?

Where does my teacher go in the morning?

Английский глагол существует в четырех основных формах:

I — настоящего времени; II — прошедшего времени; III — при-

частия прошедшего времени (Причастия II); IV — причастия настоящего времени (Причастия I).

В зависимости от способа образования форм прошедшего времени и Причастия II все глаголы делятся на правильные и неправильные.

Правильные глаголы образуют форму прошедшего времени и Причастия II путем добавления окончания *-ed(d)* к основе глагола

I ask	II asked	III asked
спрашиваю	спросил	спрошенный

Примечание: Окончание прошедшего времени произносится как [d] после гласных и звонких согласных (*begged, stayed*), как [t] после глухих согласных (*asked*) и как [ɪd], если основа слова оканчивается буквами *t* или *d* (*wanted, attended*).

Неправильные глаголы образуют форму прошедшего времени и Причастия II иначе, например:

cut — <i>cut</i> — <i>cut</i>	резать
take — <i>took</i> — <i>taken</i>	брать
spend — <i>spent</i> — <i>spent</i>	тратить

Отрицательная и вопросительная форма с глаголом в Past Indefinite образуется с помощью вспомогательного глагола *did* (прошедшее от *do*) для всех лиц единственного и множественного числа.

He (we, they, I) did not work last week.

————→ Yes, I did.

Did you give her your paper?

————→ No, I did not (didn't) [didnt]

His research adviser spoke at the conference yesterday.

Did his research adviser speak at the conference?

Who spoke at the conference yesterday?

Whose research adviser spoke at the conference yesterday?

Where did his adviser speak yesterday?

When did his adviser speak at the conference?

The Future Indefinite Tense

(будущее неопределенное время)

Как вы уже видели, это сложное время, для образования которого используется вспомогательный глагол *shall* и *will*.

I (we) shall show you the room tomorrow (I'll).

He (she, it, they, you) will do it next week (he'll).

Отрицательная форма

We shall not attend the seminar.

She will not begin the lesson

Вопросительная форма

He will help her next week.

————→ Yes, he will.

Will he help her next week?

————→ No, he will not.

Who will help her next week?

Whom will he help next week?

When will he help her?

Из того, что вам уже известно, очевидно, что для английского языка характерен строго фиксированный порядок слов:

0	I	II	III	IV
Обстоятельства места, времени	Подле- жащее	Скаже- мое	Допол- нение	Обстоятельства места, времени и пр.

Слова, определяющие существительное, как правило, ставятся перед определяемым словом.

Слова, определяющие глагол, ставятся после определяемого слова, например:

I have *much* work.

У меня много работы.

He must work *much*.

Он должен много работать.

УРОК 8

Future Indefinite

в придаточных условиях и времени

В придаточных условиях и времени, вводимых союзами *if* «если», *unless* «если не», *provided* «при условии, если», *when* «когда», *after* «после того как», *before* «до того как», *till*, *until* «до тех пор пока», *as soon as* «как только», время Future Indefinite заменяется временем Present Indefinite. При этом на русский язык придаточное предложение переводится будущим временем.

лицо (или предмет), на которое направлено действие, например: работа сделана, он приглашен. Это есть не что иное, как страдательный залог (Passive).

Passive в английском языке образуется с помощью вспомогательного глагола *to be* (в соответствующем времени, лице и числе) и Причастия II (III формы смыслового глагола), которое остается неизменным.

to be + Participle II

The article <i>is written</i> .	Статья <i>написана</i> .
The article <i>was written</i> .	Статья <i>была написана</i> .
The article <i>will be written</i> .	Статья <i>будет написана</i> .

В данном ниже предложении в форме Indefinite Active имеются два дополнения — косвенное и прямое. Обратите внимание на предложения а) и б):

He gave <i>me</i> a book.	} Мне дали книгу.
б) I <i>was given</i> a book.	
а) A book <i>was given</i> to me.	

В Passive любое из дополнений может занять место подлежащего, стать им.

Если есть необходимость упомянуть действующее лицо, то оно вводится предлогом *by*.

I *was given* a book *by him*. Он дал мне книгу.

Как видите, для русского языка предпочтителен действительный залог.

Способы перевода страдательного залога на русский язык разнообразны:

1. The book <i>was written</i> last year.	Книга <i>была написана</i> в прошлом году.
2. The problem <i>is studied</i> .	Проблема <i>изучается</i> .
3. The post-graduate <i>will be given</i> this article.	Аспиранту <i>дадут</i> эту статью.
4. These problems <i>are dealt with</i> .	Этими проблемами <i>занимаются</i> .
5. The problem <i>is often spoken about</i> .	Об этой проблеме часто <i>говорят</i> .

Модальные глаголы могут сочетаться с инфинитивом в страдательном залоге.

The paper *must be written*. (Статью *нужно написать*.)
(could be written, may be written, might be written) Статья *должна быть написана*.

Отрицательная форма

I <i>was not asked</i> .	Меня <i>не спросили</i> .
They <i>were not told</i> .	Им <i>не сказали</i> .
He <i>will not be given</i> the book.	Ему <i>не дадут</i> книгу.

Вопросительная форма

Are these problems <i>solved</i> ?	Эти проблемы <i>решены?</i>
Shall I <i>be helped</i> ?	Мне <i>помогут?</i>
Was the information <i>obtained</i> yesterday?	Информация <i>была получена</i> вчера?

УРОК 10

Местоимения *some, any, no, every*

Some, any употребляются в качестве определения к существительному, обозначая некое (неопределенное) количество предметов (исчисляемых и неисчисляемых). Иногда эти местоимения заменяют собой артикль и в этом случае они вообще на русский язык не переводятся.

Some употребляется в утвердительных предложениях, *any* — в вопросительных и условных. Кроме того, *any* употребляется и в утвердительных предложениях в значении: «любой», «какой угодно».

You must find *some* time for this work.
Give me *some* book (a book).
Some of our students, will take their exams today.

Here are *some* interesting articles on the problem.
There is *some* water in my glass.
If you have *some* time we shall discuss it.
Are there *any* publications on the subject?

Is there *any* work for him?

You may find this word in *any* dictionary.

Вы должны найти время для этой работы
Дай мне *какую-нибудь* книгу.
Некоторые из наших студентов будут сдавать сегодня экзамены.

Вот *несколько* интересных статей по этой проблеме.
В моем стакане *немного* воды.

Если у вас есть время, мы обсудим это.
Существуют ли (какие-нибудь) печатные работы по этому вопросу?

Есть ли для него (какая-нибудь) работа?
Вы можете найти это слово в *любом* словаре.

Any, no употребляются в отрицательных предложениях.

She does *not* attend *any* lectures.

There are *not any* books on mathematics there.

I saw *no* water in his glass.

They had *no* time for *any* discussion.

No information was obtained.

No problem can be solved in this way.

Она не посещает (никаких) лекций.

Там нет (никаких) книг по математике.

или

Я не увидел (никакой) воды в его стакане.

У них не было времени для обсуждения.

и

Никакой информации не было получено.

Ни одна проблема не может быть решена таким способом.

Сочетания местоимений *some, any, no* и наречия *every* (каждый) со словами: *body, thing, one, where* образуют производные: *something, anywhere, everybody* и пр.

Таблица основных и производных местоимений

	one	body	thing	where
some	someone	somebody	something	somewhere
any	anyone	anybody	anything	anywhere
no	no one	nobody	nothing	nowhere
every	everyone	everybody	everything	everywhere

Если *some, any, no, every* не могут существовать без существительного, о котором к которому каждое из них является, то производные от них употребляются в качестве подлежащего, дополнения, обстоятельства, т. е. самостоятельно.

Something must be done.

Nothing can be changed.

Do you know *anything* about him?

There is *someone* (somebody) in the room.

Everyone (everybody) here speaks English.

Что-то надо делать.

Ничего нельзя изменить.

Вы о нем *что-нибудь* знаете?

В комнате *кто-то* есть.

Здесь *каждый* говорит по-английски (все, всякий).

Participle I

Причастие настоящего времени, как вы знаете, образуют прибавлением окончания *-ing* к основе глагола.

Причастие I может являться определением, и в этом случае оно соответствует русскому причестию: *говорящий, вращающийся, работающий*...

The *rotating* axis must...

The students *working* in the lab yesterday finished the experiment.

Вращающаяся ось должна...

Студенты, *работавшие* вчера в лаборатории, закончили этот эксперимент.

Будучи обстоятельством, причастие переводится на русский язык деепричастием или обстоятельственным предложением:

Thinking about it he...

Being ready the students...

(While) —↓

going home the girl...

(When) —↑

Думая об этом, он...

Будучи готовыми, студенты...

—↓ Идя домой, девушка

—↑ Когда девушка шла домой, она

Кроме того, Participle I участвует в образовании временной группы Continuous.

Времена группы Continuous (Active)

(Present, Past, Future)

Незаконченные действия, находящиеся в процессе их совершения, в настоящем, прошедшем или будущем выражаются с помощью времени Continuous и переводятся глаголами несовершенного вида.

В образовании данной формы участвует глагол *to be* в личной форме + Причастие I: *working, reading, telling*.

to be + Participle I

am —↓

is —→ working

are —↑

was —↑

were —↑ working

will —↑

shall —↓

be —→ working

will —↑

Например: I am reading. He was doing it. You will be translating the text.

Вопросительная форма: Are you working?

Отрицательная форма: He is not working.

Обратите внимание на обстоятельства, которые требуют употребления этой группы времен.

Where are you going?

I am going home.

Куда ты идешь?

Я иду домой. (Из формы глагола, очевидно, что речь идет о данном моменте.)

What was he doing → when you came
→ at 6 o'clock
→ from 5 till 6 yesterday?
→ all day long

Что он делал, когда ты пришел? (в 6 часов, от 5 до 6, весь день вчера)

I shall be reading → at 6 o'clock
→ from 7 till 9 tomorrow
→ when you come
→ all day long

Я буду читать в 6 часов (от 7 до 9, когда ты придешь, весь день завтра).

УРОК 11

Continuous Passive

Страдательный залог *Present* и *Past Continuous*, как и в случае *Indefinite Passive*, образуется с помощью глагола *to be* в личной форме и причастия прошедшего времени смыслового глагола. Кроме того, необходимой составной частью этой временной формы является глагол *to be* в форме причастия настоящего времени:

to be + being + Participle II

Сравните:

Students are given various tests.

They are being given a test now.

Студентам дают (обычно) различные тесты.

Им дают тест сейчас.

The problem was discussed at the conference.

The problem was being discussed when you came.

Проблему обсудили на конференции.

Когда вы пришли, проблема обсуждалась (проблему обсуждали).

Сравните с *Continuous Active*:

Now he is translating the article.

Now the article is being translated (by him).

Вопросительная и отрицательная форма

Is the machine being built?

The machine is not being built.

УРОК 12

Эквиваленты модальных глаголов

Модальные глаголы в английском языке имеют целый ряд эквивалентов, способных передавать различные оттенки модальности. Кроме того, эти эквиваленты в ряде случаев восполняют недостающие временные формы модальных глаголов. Эквивалентом глагола *can* является *to be able to*. Глагол *may* имеет эквивалент в страдательном залоге — *to be allowed* (см. таблицу). Эквивалентами глагола *must* являются: *to have to*, *to be to*, *ought*, *should*.

Модальные глаголы и их эквиваленты

	Present	Past	Future
могу	I can go.	I could go.	—
в состоянии	I am able to go.	I was able to go.	I'll be able to go.
должен	I must go.	—	—
вынужден, приходится	I have to go.	I had to go.	I'll have to go.
предстоит, должен (есть договоренность)	I am to go.	I was to go.	—
следует	You ought to go.	—	—
следует	You should go.	—	—
можно	You may go.	You might go.	—
возможно, разрешается	You are allowed to go.	You were allowed to go.	You'll be allowed to go...

УРОК 13

Степени сравнения прилагательных и наречий

В английском языке (так же как и в русском) существует три степени сравнения прилагательных и наречий: положительная, сравнительная и превосходная. Сравнительная и превосходная сте-

пени в русском языке образуются двояко: интересней — более интересный и интереснейший — самый интересный. Как мы видим из примеров, в каждом случае мы имеем и простую и сложную форму образования причастий в пределах одной степени.

В английском языке тоже есть простая и сложная форма. Но деление на группы происходит по принципу односложные и двусложные — многосложные слова.

Односложные и двусложные прилагательные образуют сравнительную степень с помощью суффикса *-er*, а превосходную — с помощью суффикса *-est*.

short — shorter — the shortest

big — bigger — the biggest

easy — easier — the easiest

В вышеприведенных примерах обратите внимание на удвоение согласной (*bigger, biggest*) и переход буквы *y* в *i* (*easier, easiest*), если ей предшествует согласная.

Многосложные прилагательные образуют степени сравнения при помощи слов *more* (сравнительная степень) и *the most* (превосходная), например:

difficult — more difficult — the most difficult

Обратите внимание, что перед существительными, имеющими при себе прилагательное в превосходной степени, обязателен определенный артикль.

The easiest text. The most important problem.

Образование степени сравнения некоторых прилагательных и наречий происходит не по общему правилу. Запомните их:

good well	хороший хорошо	better	лучший лучше	best	наилучший, самый лучший лучше всего
bad badly	плохой плохо	worse	худший хуже	worst	наихудший, самый худший плохой, хуже всего
much many	много	more	больше	most	наибольшее (количество), больше всего
little	мало	less	меньше	least	наименьшее (количество), меньше всего
far	далекий	further farther	дальше	furthest farthest	самый дальний

Обратите внимание на перевод прилагательных в сочетании с *of all* и предлогом *at*

best most worst least	} of all	{ лучше больше хуже меньше	} всех (всего)

at least — по крайней мере

at most — самое большее, максимум

Некоторые значения слова "most"

Most students at our department study English. Большинство студентов...

Most of this work was done yesterday. Большая часть работы...

В образовании сравнительной степени участвует союз *than*:
shorter than короче, чем.

При этом часто в сравнительных конструкциях во избежание повторения существительного пользуются словами-заместителями. Ими являются местоимения: *that — those; one — ones* и притяжательные местоимения *mine, yours, his, hers, its, ours, theirs*.

His article is longer than mine. Его статья длиннее моей (статьи).

These books are more interesting than those ones. Эти книги более интересны, чем те (книги).

В сравнительных конструкциях типа: «такой же ... как», «не такой (не так) ... как», «чем ... тем», используются:

as ... as — в утвердительных (иногда в отрицательных предложениях);

not so ... as — в отрицательных предложениях.

This problem is as important as the one discussed yesterday. Эта проблема столь же важна, как и та, которую обсуждали вчера.

It is not as easy as I thought. Это не так легко, как я полагал.

This pen is not so good as those ones. Эта ручка не такая хорошая, как те.

the ... the
The sooner you do it the better. Чем скорее ты это сделаешь, тем лучше.

The smaller (is) the value of 'a', the farther are the points from the axis of symmetry. Чем меньше величина 'а', тем дальше от оси симметрии расположены точки.

УРОК 14

Времена группы Perfect (Active)

Времена группы *Perfect* означают действие, завершенное к определенному моменту в настоящем, прошлом и будущем.

Необходимыми элементами образования *Perfect Active* является глагол *have* в личной форме + причастие прошедшего времени смыслового глагола:

to have + Participle II

Present	— I have — He has	done it.
Past	— They had	
Future	— We shall have	

Present Perfect

Present Perfect обозначает действие, происходившее в прошлом, но, так или иначе, связанное с моментом речи, т. е. с настоящим моментом. Эта связь осуществляется двояко: (1) через результат действия: нас интересует не то, когда оно закончилось в прошлом, а то обстоятельство, что оно закончилось и результат его ощущается в настоящее время, например:

They have built a new computer. Они построили новую счетную машину (и теперь на ней можно работать).

(2) через время свершения действия (действие уже закончено, но некий отрезок времени — *сегодня*, на этой неделе, в этом месяце, в этом году — еще не истек).

I have translated a few articles today (this week, this month). Я перевел сегодня несколько статей (на этой неделе, в этом месяце).

Часто в роли обстоятельства времени выступают наречия неопределенного времени: «иногда», «всегда», «часто», «редко», «только что», «уже», «никогда», «еще не».

He has	just often always already seldom sometimes never (not) yet	done it.	Он	только что часто всегда уже редко иногда никогда не еще не	делал (сделал) это
--------	---	----------	----	---	--------------------

Present Perfect всегда переводится на русский язык прошедшим временем.

Запомните, что наречия *yesterday*, *last week (month, year)*, *ago* и пр. никогда не употребляются с глаголом в *Present Perfect*. В этих случаях всегда употребляется *Past Indefinite*. Сравните:

I have seen him today (this week, this month). I saw him yesterday (last week, last month).

Отрицательная форма

We have not seen him (yet). He has never done it.

Вопросительная форма

Have you seen him? — Yes, I have.
— No, I have not.
Has he (ever) done it? — Yes, he has.
— No, he has not.

Если действие совершено к какому-то моменту в прошлом или ранее какого-то другого действия в прошлом, т. е. предшествовало этому действию, то глагол в этом случае будет иметь форму *Past Perfect*.

I had done it by 5 o'clock. Я сделал это к 5 часам.
before he came. до его прихода.

Future Perfect

Когда речь идет о том, что некое действие закончится к определенному моменту в будущем или до того, как будет произведено следующее за ним действие, то пользуются временем *Future Perfect*. Это редко употребляемая форма.

He will have done it by 5 o'clock. Он (уже) проделает это к 5 часам (до твоего прихода).
before you come.

УРОК 15

Времена группы *Perfect (Passive)*

Вы, конечно, помните, что в образовании форм *Passive* всегда участвует глагол *to be* + причастие прошедшего времени. Сравните:

The book was written last year.

The book is being written now.

The book has been written this year.

to have + been + Participle II

Итак:

Отрицательная и вопросительная формы образуются по знакомой вам схеме:

The book has not (yet) been written by them.

Have the articles been translated (yet)?

Времена группы Perfect Continuous

Предположим, мы говорили о действии, которое началось с некого момента в прошлом (*since* «с тех пор, как») и длится, длилось или будет длиться вплоть до какого-то момента в настоящем, прошедшем или будущем. Или, предположим, нас интересует, сколько времени длилось действие до какого-то момента в настоящем, прошлом или будущем включительно (*for* — в течение).

В обоих упомянутых случаях мы воспользуемся группой времен *Perfect Continuous*.

Perfect Continuous образуется сочетанием формы *Perfect* и вспомогательного глагола *to be* (в соответствующем лице, числе, времени) с причастием настоящего времени смыслового глагола:

to have + been + Participle I

I *have been*
He *has been*
They *had been* working.
She *will have been*

Present Perfect Continuous

The computer has been working for two hours (since the morning, since he came). Компьютер работает в течение двух часов (с утра, с тех пор, как он пришел).

Past Perfect Continuous

We *had been discussing* the problem for two hours when you came. Мы (уже) обсуждали эту проблему в течение двух часов до того, как вы пришли.

Future Perfect Continuous — редко употребляемое время.

УРОК 16

Согласование времен

В сложных предложениях выбор временной формы сказуемого в придаточном предложении (дополнительном, а иногда и определительном и обстоятельственном) обусловлен тем, в каком времени употреблено сказуемое (глагол) главного предложения. Сравните:

(1) I know →	he works there he is working there	работает
	he worked there he was working there	работал
	he will work he will be working	будет работать

(2) I knew →	he worked there he was working there	работает
	he had worked there had been working there	работал
	would work would be working	будет работать

Во второй группе предложений (первые два примера) сказуемое придаточного предложения выражает действие, одновременное с действием, выраженным глаголом-сказуемым главного предложения, и переводится на русский язык настоящим временем.

Действие, выраженное придаточным предложением в третьем и четвертом примерах второй группы предложений, предшествует действию, выраженному сказуемым главного предложения. На русский язык они переводятся прошедшим временем.

Обратите внимание на пятое и шестое предложения второй группы слов. В данном случае действие придаточного предложения относится к будущему. Здесь вместо вспомогательных глаголов *shall* (I лицо) и *will* (II, III лицо) употребляются вспомогательные глаголы *should* и *would* соответственно. В вышеописанных примерах мы опираемся на правило согласования времен.

То же правило действует и при обращении предложения в косвенную речь. Сравните:

My research adviser said to me, "I wrote this paper yesterday".
My research adviser told me (that) he had written that paper the day before.
He said "I shall come".
He said (that) he would come.

Как видно из первого примера, при обращении прямой речи в косвенную пришлось а) глагол *to say* заменить глаголом *to tell*, *Past Indefinite* в придаточном предложении заменить на *Past Perfect*, б) произвести соответствующие изменения в местоимениях и наречиях.

а) Present Indefinite изменяется на Past Indefinite	б) <i>this</i> изменяется на <i>that</i>
Present Continuous »	<i>these</i> » <i>those</i>
на Past Continuous	<i>now</i> » <i>then</i>
Past Indefinite »	<i>today</i> » <i>that day</i>
на Past Perfect	<i>tomorrow</i> » <i>the next day</i>
Future Indefinite »	<i>yesterday</i> » <i>the day before</i>
на Future in the past	<i>here</i> » <i>there</i>

Правила согласования времен

Правила согласования времен следует соблюдать и в том случае, если надо обратить вопросительное предложение в косвенную

речь. Порядок слов в косвенном вопросе всегда прямой. Общие вопросы вводятся в этом случае союзами *if* или *whether*.

He said to me, "Have you done the work?"
He asked me if (whether) I had done the work.
Он спросил меня, сделал ли я работу.

Перевод косвенного вопроса следует начинать со сказуемого «знаю ли», «пойдет ли», «сделал ли».

В предложениях, содержащих вопросительное слово, оно сохраняется в начале косвенного вопроса.

He said to me, "Where will you go?"
He asked me where I should go.
Он спросил меня, куда я пойду.

При обращении в косвенную речь предложений, содержащих просьбу или приказание, глагол в косвенной речи употребляется в форме инфинитива:

He said to me, —→ "Sit down, please".
He said to me, —→ "Do not go".
He asked me (He told me) —→ to sit down
Он попросил меня сесть.
Он попросил меня не ходить.
—→ not to go

Бессоюзные придаточные предложения

Определительные и дополнительные придаточные предложения в английском языке могут присоединяться к главному без помощи союзов и союзных слов, если союзное слово не является подлежащим придаточного. Если придаточное определительное заканчивается предлогом, то при переводе на русский язык предлог ставится перед союзным словом, которое в русском языке нельзя опускать.

Определительные предложения

The number (*which, that*) you have found must be doubled.
Число, которое вы нашли, нужно удвоить.
The man (*whom*) you saw yesterday was our professor.
Человек, которого ты вчера видел, наш профессор.
Here is the book (*about which*) I have told you about.
Вот книга, о которой я тебе говорила.

Дополнительные предложения

He thought (that) they would hold the conference.
Он думал, (что) они проведут конференцию.

Неличные формы глагола

The Gerund, the Participle, the Infinitive

	Forms of verbs	Active	Passive
Gerund	Indefinite Perfect	asking having asked	being asked having been asked
Participle	Present (I) Past (II) Perfect	asking — having asked	being asked asked having been asked
Infinitive	Indefinite Continuous Perfect	to ask to be asking to have asked	to be asked to have been asked

Отрицание *not* помещают перед герундием, причастием и инфинитивом: *to ask — not to ask; asking — not asking, given — not given* и пр.

Герундий, причастие и инфинитив называются неличными формами глагола потому, что они выражают действие, не указывая на лицо и число. Неличные формы глагола никогда не выступают самостоятельно в роли сказуемого предложения.

Неличные формы глагола выражают относительное время (относительно момента совершения действия, выраженного глаголом-сказуемым).

Indefinite Gerund, Participle, Infinitive выражают действия одновременные с действием глагола-сказуемого, или будущее относительно действия глагола-сказуемого.

He is interested in going there.
(Indefinite Gerund)
Going home he met a friend.
(Participle I)
I want to go there.
(Indefinite Infinitive)
Он заинтересован в том, чтобы поехать туда (в поездке).
Идя домой, он встретил приятеля.
Я хочу пойти туда.

Perfect Gerund, Perfect Participle, Perfect Infinitive выражают действия, предшествующие действию, выраженному глаголом-сказуемым.

Having done the work they went home. (Perfect Participle)
Сделав работу, они пошли домой.

He insists on *having done* it.
(Perfect Gerund)
I am glad *to have seen* him.
(Perfect Infinitive)

Он настаивает на том, что он
сделал это.
Я рад, что повидал его.

Неличные формы глагола определяются наречием и могут иметь после себя прямое дополнение: *to work well, asking questions*.

В предложении герундий и инфинитив выполняют функцию подлежащего, второй части сложного сказуемого, дополнения, определения и обстоятельства.

Причастие может выполнять функцию определения, обстоятельства и части сказуемого.

Герундий (The Gerund)

Герундий, как вы уже знаете, совпадает по форме с Participle I и Perfect Participle

	Active	Passive	
Indefinite	doing	being done	Выражает действие, одновременное с действием глагола-сказуемого
Perfect	having done	having been done	Выражает действие, предшествующее действию глагола-сказуемого

По каким же признакам следует различать герундий и причастие?

1) Если перед глагольной формой с окончанием *-ing* стоит предлог, существительное в притяжательном падеже или притяжательное местоимение, то вы имеете дело с герундием, а не с причастием.

On coming home he... По приходе (придя) домой, он...
His working there proved... Его работа там (то, что он работает там) доказала...
The boy's having gone there... То, что мальчик пошел туда...

2) В отличие от причастия герундий может выполнять функцию подлежащего и дополнения, а не только функцию определения и обстоятельства и второй части сказуемого.

1. Подлежащее	<i>Knowing</i> English is helpful	Знание (знать) английского полезно
2. Часть сказуемого	Seeing is <i>believing</i>	Увидеть — значит поверить
3. Дополнение	He likes <i>asking</i> questions	Он любит задавать вопросы
4. Предложное дополнение	He insisted on her <i>being told</i> about it	Он настаивал на том, чтобы ей сказали об этом
5. Определение	I studied the method of <i>solving</i> the problem	Он изучил этот способ решения проблемы
6. Обстоятельство	<i>In translating</i> the text he made a lot of mistakes	При переводе (переводя) текста он сделал массу ошибок

Наличие предлога перед герундием означает, что герундий выполняет функцию обстоятельства.

in solving... при решении (решая)...
on (upon, after) coming... по приходе (придя, после прихода)...
by finding... путем, посредством нахождения...
without knowing the result... не зная (без знания) результата...

Как видно из данных примеров, способы перевода герундия на русский язык разнообразны. В соответствии со смыслом герундий можно переводит существительным (1,5), инфинитивом (2,3), придаточным предложением (4), деепричастием (6).

Герундиальные обороты

В сочетании с существительным в притяжательном (или общем) падеже или притяжательном местоимением герундий образует так называемые герундиальные обороты, которые переводятся на русский язык придаточным предложением, вводным союзом «то, что»; «в том, что»; «о том, что»; «тем, что»; «чтобы»:

I know of his *having come*. Я знаю о том, что он пришел.
I am sure of their *having been asked to come*. Я уверен в том, что их просили прийти.
The student's *being given* a good mark was unexpected. То, что этому студенту поставили хорошую оценку, было неожиданно.
She insists on your *doing* it. Она настаивает на том, чтобы вы сделали это.

Запомните значение глаголов с предлогами, после которых характерно употребление герундия:

знать о	<i>to know of</i>	
говорить о	<i>to speak of</i>	
думать о	<i>to think of</i>	(her) going
бояться	<i>to be afraid of</i>	
быть способным	<i>to be capable of</i>	
зависеть от	<i>to depend on</i>	
настаивать на	<i>to insist on</i>	finishing...
полагаться на	<i>to rely on</i>	
возражать против	<i>to object to</i>	
заклучаться в	<i>to consist in</i>	
привести к	<i>to result in</i>	
добиться успеха в	<i>to succeed in</i>	solving...
быть заинтересованным в	<i>to be interested in</i>	
мешать	<i>to prevent from</i>	

Герундий также употребляется после: *instead of* «вместо», *besides* «кроме», *owing to* «благодаря» и пр.

УРОКИ 19 И 20

Причастие (The Participle)

Причастие, будучи неличной формой глагола, имеет признаки как прилагательного, так и глагола. Вместе с относящимися к нему словами причастие образует причастный оборот.

Active		Passive	
Participle I	doing	being done	Выражает действие, одновременное с действием глагола-сказуемого
Participle II	—	done	Выражает действие, одновременное с действием глагола-сказуемого или предшествующее ему
Perfect Participle	having done	having been done	Выражает действие, предшествующее действию глагола-сказуемого

Participle I Active *doing* в предложении выполняет функцию: 1) определения, 2) обстоятельства, 3) части сказуемого (времени группы Continuous и Perfect Continuous).

1. The *working* men will be...
The man *standing* at the desk...
2. *Considering* these properties we noticed...
While *—* *solving* a problem you
When *—* must write down the equation.
3. Students *are using* various method of computation.

1. *Работающие* люди будут...
Человек, *стоящий* у стола...
2. *Рассматривая* (когда мы рассматривали) эти свойства, мы обратили внимание...
Решая (при решении) задачи, вам следует записать уравнение. (Когда вы решаете уравнение, вы должны...)
3. Студенты *пользуются* различными методами вычислений.

Participle I Passive — *being constructed* в предложении выполняет функцию: 1) определения, 2) обстоятельства, 3) части сказуемого.

1. The computers *being built* will be extensively used.
2. *Being sent* to the conference he may report on the results of its work.
3. The system which is *being tested* seems very complicated.

1. *Строящиеся* вычислительные машины будут широко применяться (...которые сейчас строятся...)
2. *Будучи посланным* на конференцию, он сможет сделать сообщение о результатах ее работы (Если его пошлют...)
3. Система, *которую сейчас испытывают*, кажется очень сложной.

Participle II — *done*, *studied* выполняет функцию: 1) определения, 2) обстоятельства, 3) части сказуемого в страдательном залоге и во временах группы Perfect,

1. The *proposed* program caused much discussion.
The information *obtained* was of great interest.

The law just *referred* to was discovered by Newton.

They demonstrated the *reconstructed* machines.

2. *Translated* from the language of mathematics into everyday language the relation became easier to understand.

1. *Предложенная* программа вызвала много споров.
Полученная информация представляла большой интерес.
Закон, *на который* только что *сослались*, был открыт Ньютоном.
Они демонстрировали *реконструированные* машины.
2. *Будучи переведенным* с языка математики на обычный язык, это соотношение стало легче для понимания (Ког-

As seen from the article this kind of experiments are being carried out in quite a few laboratories.

When (if) given enough time he will write his paper.

Unless properly adjusted the computer will not give out reliable information.

3. I was told about the advantages of the method accepted.

Perfect Participle — *having given, having been given* выполняет функцию обстоятельства.

Having answered the teacher's questions the student left.

Having been given the program we began to analyse it.

да это соотношение перевели с...)

Как видно из статьи, такого рода эксперименты проводятся во многих лабораториях.

Если ему дадут достаточно времени, он напишет свою статью.

Если вычислительную машину не отрегулировать должным образом, она не будет давать надежных результатов.

3. Мне говорили о преимуществах принятого метода.

Ответив на вопросы преподавателя, студент ушел.

(После того, как он ответил...)

После того, как нам дали программу, мы начали изучать ее.

Независимый (абсолютный) причастный оборот

Обстоятельственные причастные обороты бывают зависимыми и независимыми. В первом случае обстоятельственный причастный оборот относится к подлежащему всего предложения, выражает его действие, т. е. зависит от подлежащего.

В независимом причастном обороте действие, выражаемое причастием, входящим в состав данного оборота, не относится к подлежащему всего предложения. Оно выражает действие существительного (или местоимения), стоящего непосредственно перед причастием, и не зависит от подлежащего всего предложения.

Признаки, по которым можно определить независимый причастный оборот:

а) независимый причастный оборот всегда отделен запятой;
б) перед причастием здесь стоит либо существительное без предлога, либо местоимение в именительном падеже.

1. Если независимый причастный оборот стоит в начале предложения, то он переводится на русский язык придаточным обстоятельственным предложением времени или причины, вводными союзами «когда», «после того как», «так как», «поскольку», «если» и пр.

The advantages of the new machine being obvious, we decided to make use of it.

Everybody having come, they proceeded with the experiment.

All the preparations completed, we could start.

Поскольку преимущества новой машины были очевидны, мы решили воспользоваться ею.

После того как все пришли, они продолжили эксперимент.

Так как все приготовления были завершены, мы могли отправиться.

2. Если независимый причастный оборот стоит в конце предложения, то он, как правило, переводится либо самостоятельным бессоюзным предложением, либо используются союзы «а», «и», «но», «причем».

They finished the experiment, the result being quite satisfactory.

Они завершили эксперимент, причем (и) результат оказался вполне удовлетворительным.

УРОКИ 21, 22, 23

Инфинитив (The Infinitive)

Инфинитив — неопределенная форма глагола. Признаком инфинитива является частица *to* — *to speak*.

	Active	Passive	
Indefinite	to do	to be done	Выражают действия, одновременные с действием глагола-сказуемого
Continuous	to be doing		
Perfect	to have done	to have been done	Выражают действия, предшествующие действию глагола-сказуемого. Переводятся прошедшим временем

Примечание: Форма Perfect Continuous Infinitive — *to have been doing* редко встречается в научной литературе.

Инфинитив вместе с относящимися к нему словами образует инфинитивный оборот.

В предложении инфинитив может быть: 1) подлежащим, 2) частью сказуемого, 3) дополнением, 4) определением, 5) обстоятельством.

1. To know English is helpful.

Знать английский (знание) полезно.

В этом случае инфинитив всегда стоит перед сказуемым.

2. a) The article is to be written in time.

Статья должна быть написана вовремя.

To do this means to change the whole system.

Сделать это — значит изменить всю систему.

b) Our task is to adjust the program to the computer.

Наша задача — приспособить программу к этой вычислительной машине (...цель состоит в том, чтобы; заключается в том, чтобы).

В данном случае (b) инфинитив является именной частью сказуемого, следующего за подлежащим, обычно выраженным словами: *task, method, plan, problem, aim, purpose, function*.

3. I expect to be given complete information.

Я рассчитываю, что мне дадут (получить) полную информацию.

4. The problem to be discussed is interesting.

Проблема, которая будет обсуждена (нужно, предстоит обсудить), интересна.

He was the first to agree.

Он первым согласился.

The idea to use these results seemed wrong to me.

Мысль о том, чтобы воспользоваться этими результатами, казалась мне неправильной (мысль об использовании...).

Инфинитив в функции определения всегда расположен после определяемого им существительного.

5. to understand the situation one must know the details.

Чтобы понять положение, надо знать подробности.

To check (in order to) the result of addition you have to subtract this number from the sum obtained.

Чтобы проверить результат сложения, вы должны вычесть это число из полученной суммы.

I have come here to (in order to, so as to) speak to you.

Я пришел сюда (чтобы) поговорить с тобой.

Сравните:

a) To operate this computer is easy.

Работать (работа) на этой вычислительной машине легко (подлежащее — работать).

b) To operate this computer you must do the following.

Для того, чтобы работать на этой машине, вы должны сделать следующее (подлежащее — вы).

Модальные глаголы в сочетании с перфектным инфинитивом (Perfect Infinitive)

Модальные глаголы *must* и *may* в сочетании с перфектным инфинитивом выражают предположение, относящееся к прошедшему времени.

This book *must have been written* many years ago.

Эта книга, *должно быть*, была написана много лет назад (...вероятно, была...).

The program *may have been fulfilled*.

Программа, *возможно*, осуществлена.

Для выражения действия, которое могло бы произойти, но не произошло, употребляется перфектный инфинитив в сочетании с глаголами *could, might, ought, should*.

You *could have told* them about it.

Вы *могли бы* сказать им об этом (но вы этого не сделали).

They *ought to have given* the necessary explanation.

Им *следовало бы* дать необходимые объяснения (а они этого не сделали).

Инфинитив в составе сложного дополнения (Complex Object)

Сложное дополнение состоит из существительного в общем падеже или местоимения в объектном (*him, us, me...*) и инфинитива смыслового глагола.

Сложное дополнение употребляется после глаголов, выражающих:

1) предположение, мнение — *to expect, to believe, to think, to understand, to consider, to assume, to know, to suppose*.

We know *them to have made* the computations.

Мы знаем, что они произвели вычисления.

I expect the *students to be working* in the lab.

Я рассчитываю, что (сейчас) студенты работают в лаборатории.

2) просьбу, желание — *to wish, to like, to require, to want*.

Professor wanted *me to read* my paper at the conference.

Профессор хотел, чтобы я сделал доклад на конференции.

3) чувственное восприятие — *to see, to feel, to hear, to watch*. После этих глаголов частица *to* перед инфинитивом опускается.

I saw *him enter* the University building.

Я видел, что он входил в здание университета.

После глаголов *to see, to feel, to hear, to watch* в сложном выполнении вместо инфинитива может употребляться *Participle I*.
 I saw him entering the University building. Я видел, как он входил в здание университета.

Предложный инфинитивный оборот *for*+существительное (местоимение в объектном падеже)+инфинитив может выполнять функцию дополнения, части сказуемого, обстоятельства и пр. и переводится придаточным предложением с союзами «что», «чтобы». При этом инфинитив оказывается сказуемым предложения, а существительное или местоимение, стоящее перед инфинитивом — подлежащим.

It is important for you to understand all the details. Важно, чтобы вы поняли все детали (вам важно...).
 For the experiment to be finished in time, we must begin to work immediately. Для того, чтобы эксперимент был закончен вовремя, мы должны начать работать немедленно.

Here is a book for you to read. Вот книга, которую тебе надо прочитать.

Инфинитив в составе сложного подлежащего (Complex Subject)

Сложное подлежащее состоит из существительного в общем падеже (или местоимения в именительном падеже) и инфинитива, занимающего место после сказуемого предложения.

Сложное подлежащее употребляется: 1) после сказуемого в страдательном залоге, выраженного следующими глаголами: *to say, to know, to consider, to believe, to report, to expect, to suppose, to assume, to know*.

The temperature is expected to rise. Ожидают, что температура поднимется.
 He is known to be working in this field of mechanics. Известно, что он работает в этой области механики (он, как известно, работает).

2) после сказуемого в действительном залоге, выраженного следующими глаголами: *to seem, to appear* «казаться», *to prove, to happen, to turn out* «оказываться».

The student appears to know the subject well enough. Кажется, этот студент знает предмет достаточно хорошо (по-видимому, этот студент...).

Перевод предложений, содержащих сложное подлежащее, лучше начинать со сказуемого инфинитивной конструкции: «говорят, что»; «полагают, что».

3) Иногда сказуемое образовано сочетанием глагола *to be* (в личной форме) с прилагательными *likely* «вероятный», *unlikely* «сомнительный», «маловероятный», *sure* «уверенный», *certain* «определенный».

The situation is unlikely to remain unchanged in future. Маловероятно, что в будущем положение останется неизменным.

The seminar is certain (sure) to have been held. Разумеется, (конечно) семинар состоялся.

Сравните:

The discussion is believed to be helpful. It is believed that the discussion is helpful. Полагают, что дискуссия полезна (Дискуссия, как полагают...).

The statement appeared to be false. It appeared that the statement was false. Оказалось, утверждение было ложным (Утверждение, как оказалось...).

They are likely to apply the new method. It is likely that they will apply the new method. Возможно, что они воспользуются новым методом.

УРОКИ 24 И 25

Сослагательное наклонение (The Subjunctive Mood)

Условные предложения (Conditional Sentences)

Мы уже имели дело с придаточными условными предложениями в изъявительном наклонении. Такие предложения описывают вполне реальные, выполнимые условия, относящиеся к настоящему, прошлому и будущему. Совершение действия оговаривается определенными, реально осуществимыми условиями. Это I тип условных предложений.

If he is in the lab now he must be working. Если он сейчас в лаборатории, он, должно быть, работает.

If I see him tomorrow, I shall ask him about it.

Если я увижу его завтра, я спрошу его об этом.

В условных предложениях используются и формы сослагательного наклонения. Сослагательное наклонение — это форма глагола, обозначающая действие как нечто предполагаемое, сомнительное, желательное, проблематичное.

Сослагательное наклонение в условном предложении употребляется для обозначения действия маловероятного или вообще существующего только в предположении нереального (в настоящем, прошедшем и будущем). Сюда относятся предложения II и III типов. Предложения II типа употребляются для выражения маловероятного или нереального предположения, относящегося к настоящему или будущему времени. При этом главное предложение строится с помощью *should (would, could, might)* + инфинитив глагола без *to*, а в придаточном употребляется форма глагола, совпадающая с Past Indefinite.

I *should tell* him everything if he *came* here now.

If she *entered* the University next year she *could learn* English.

Если *бы* он *сейчас* пришел сюда, я *бы* все ему рассказал.

Если *бы* она поступила в университет в *будущем* году, она могла *бы* изучать английский.

Глагол *to be* в условных предложениях данного типа имеет форму *were* для всех лиц единственного и множественного числа.

1. If he *were* at the lecture tomorrow I *should give* him the book.

2. If we *were* there now we *should see* her.

3. He would help you unless he *were* so busy now.

Если *бы* он был на лекции завтра, я дал *бы* ему книгу.

Если *бы* мы были сейчас там, мы повидали *бы* ее.

Он *бы* вам помог, если *бы* он не был так занят сейчас.

В условных предложения III типа, относящихся к прошедшему времени, в главном предложении употребляется *should (would)* + Perfect Infinitive, а в придаточном — форма глагола, совпадающая с формой Past Perfect.

1. If I *had seen* him yesterday he *would have told* me about it.

2. They *could have shown* us their results provided they *had done* the work last week.

Если *бы* я видел его вчера, он сказал *бы* мне об этом (но мы не виделись).

Если *бы* они сделали работу на прошлой неделе, они показали *бы* нам свои результаты (но они ее не сделали).

Нереальное условие может быть выражено сочетаниями типа: *but for, if it were not for*, означающими «если бы не»...

But for him

I should go

Если бы не он, я бы

If it were not for him

ушел.

If it had not been for him I should have gone

В нереальных условных предложениях допускается инверсия (нарушение обычного порядка слов в целях придания высказыванию большей эмоциональности), если в состав сказуемого входят глаголы — *should, could, had, were*. В таких предложениях союз *if* опускается, а глаголы *should, could, had, were* ставятся перед подлежащим.

Should he check the operation he would find the mistake (if he checked).

Were they ready we might begin the research (if they were ready).

Had I been given the article I could have translated it by now (provided I had been given the article).

Were it not for him I should not go (if it were not).

Если бы он проверил это действие, он бы нашел ошибку (проверь он...).

Если бы они были готовы, мы могли бы начать исследование (будь они готовы...).

Если бы мне дали статью, я мог бы уже перевести ее.

Если бы не он, я бы не пошел (не будь его...).

Кроме условных предложений II и III типа, сослагательное наклонение употребляется:

1) В простых предложениях, выражающих пожелание или предположение:

I *should (he would) like* you to observe these rules.

It *would be interesting* to attend their seminar.

The new computer *might be used* for the purpose.

Я *бы* (он бы) хотел, чтобы вы соблюдали эти правила.

Было бы интересно присутствовать на их семинаре.

Для этой цели *можно было бы* использовать новую вычислительную машину.

2) В сложноподчиненных предложениях, где независимо от лица сослагательное наклонение передается с помощью глагола *should* и инфинитива смыслового глагола без частицы *to* (иногда *should* опускается):

а) в придаточных-подлежащих после безличных оборотов типа: *it is important, it is necessary, it is desirable, it is required*;

It is important that the information (should) be properly used.

Важно, чтобы данные были использованы должным образом.

б) в дополнительных придаточных предложениях со значением требования после глаголов: *to insist* «настаивать», *to order* «приказывать», *to demand* «требовать», *to suggest*, *to propose* «предлагать».

They *demand* (suggest, insist) that an appropriate solution (should) be found.

Они *требуют* (предлагают, настаивают), чтобы было найдено соответствующее решение.

в) в обстоятельственных придаточных предложениях цели после союзов *so that*; *in order*, *that* «чтобы», «для того, чтобы» и *lest* «чтобы не».

В данном случае кроме *should* употребляются глаголы *could*, *might*, сохраняющие свое лексическое значение.

Эти глаголы в отличие от *should* переводятся на русский язык.

I left home early *lest* I (should) be late for the lecture.
I showed them the article *so that they might* read it (in order that).

Я ушел из дому рано, чтобы не опоздать на лекцию.
Я показал им статью, чтобы они могли прочесть ее.

Вы, вероятно, обратили внимание, что отсутствие глагола 'should' не меняет смысла предложения.

г) В сложноподчиненных предложениях — дополнительных, после глагола *to wish* «желать»:

I *wish* you came.

Мне бы хотелось, чтобы вы пришли.

I *wish* the experiment had been completed.

Я бы хотел, чтобы опыт был закончен (но этого не произошло).

д) В обстоятельственных придаточных предложениях, после союзов *as if* «как если бы», *as though* «как будто бы».

He behaved *as though* he had never seen a telescope before.

Он вел себя так, как будто бы никогда раньше не видел телескоп.

It looks *as if* the apparatus were out of order.

Кажется, будто прибор не в порядке (похоже на то, что...).

Таблица словообразовательных суффиксов

		Суффиксы	Примеры
Суффиксы существительного	указывающие на абстрактные понятия, процесс или результат действия	ion tion sion ance ence ure ship ty ment ness th	companion construction mission distance dependence culture pressure measure relationship unity measurement usefulness length
	указывающие на действующее лицо	er or ant ent ist ian	lecturer operator assistant student physicist mathematician
Суффиксы прилагательного, указывающие	на наличие свойства или качества	able ible al ic ful ous ive tuple y	variable divisible mathematical harmonic helpful previous active n-tuple sunny
	на отсутствие качества	less	shapeless
Суффиксы глагола		ate ize (ise) en ify	illustrate generalize shorten simplify
Суффиксы наречий		ly ward (s)	easily forward (s)

Таблица словообразовательных префиксов

Общее значение префикса	Префиксы	Примеры
выражение отрицания	de	decode
	dis	disprove
	in	indirect
	il	illogical
	ir	irrational
	un	undefined
повторность	mis	misunderstand
действия	re	reappear
Дву-	bi	binomial
ко-	co	cooperation
противо-		
контр-	counter	counteraction
само-	auto	autocode
равно-	equi	equilateral
гипер-	hyper	hyperbolic
интер-	inter	interaction
полу-		
сверх-	semi	semicircle
супер-	super	supercomplex
одно-	uni	unidirectional

Таблица нестандартных глаголов

Infinitive	Past Indefinite	Past Participle	Перевод
arise	arose	arisen	возникать
be	was, were	been	быть
bear	bore	borne	носить, выносить
become	became	become	становиться
begin	began	begun	начинать (ся)
bend	bent	bent	гнуть (ся)
bind	bound	bound	связывать
break	broke	broken	ломать
build	built	built	строить
choose	chose	chosen	выбирать
come	came	come	приходить
cost	cost	cost	стоять
cut	cut	cut	пересекать, резать
deal	dealt	dealt	иметь дело (с)
do	did	done	делать
draw	drew	drawn	чертить, тащить
fall	fell	fallen	падать
feel	felt	felt	чувствовать
find	found	found	находить

Продолжение

Infinitive	Past Indefinite	Past Participle	Перевод
fly	flew	flown	летать
foresee	foresaw	foreseen	предвидеть
forget	forgot	forgotten	забывать
get	got	got	получать, становиться
give	gave	given	давать
grow	grew	grown	расти, выращивать
have	had	had	иметь
hear	heard	heard	слышать
hold	held	held	иметь силу, держать
keep	kept	kept	держать, хранить
know	knew	known	знать
lay	laid	laid	класть
lead	led	led	вести
learn	learnt	learnt	узнавать, учиться
	(learned)	(learned)	
leave	left	left	оставлять
let	let	let	позволять
lose	lost	lost	терять
make	made	made	делать, заставлять
mean	meant	meant	значить, подразумевать
meet	met	met	встречать
put	put	put	класть
read	read	read	читать
run	ran	run	проводить в движение, бежать
say	said	said	говорить, сказать
see	saw	seen	видеть
send	sent	sent	посылать
set	set	set	помещать, ставить
show	showed	shown	показывать
sit	sat	sat	сидеть
speak	spoke	spoken	говорить, разговаривать
spend	spent	spent	тратить
spread	spread	spread	распространять (ся)
stand	stood	stood	стоять
strike	struck	struck	ударять, бастовать
		(stricken)	
swing	swung	swung	качать (ся)
tear	tore	torn	разрывать
tell	told	told	рассказывать, сказать
think	thought	thought	думать
throw	threw	thrown	бросать
under-stand	understood	understood	понимать
wear	wore	worn	носить
win	won	won	выигрывать
write	wrote	written	писать

СПИСОК ПРИНЯТЫХ СОКРАЩЕНИЙ

a adjective имя прилагательное
adv adverb наречие
conj conjunction союз
n noun имя существительное
num numeral числительное

part particle частица
pl plural множественное число
sing singular единственное число
pron pronoun местоимение
v verb глагол

А

abbreviate [ə'brɪviɪt] *v* сокращать;
n ~ion сокращение
able [eɪbl] *a* способный; *n* ability спо-
собность
about [ə'baʊt] *adv* почти, приближи-
тельно; *prep* о, об, относительно
above [ə'baʊ] *adv* наверху, сверху;
prep над, выше
abstract ['æbstrækt] *n* 1. абстракция;
2. конспект, реферат; *a* абстрактный
absurd [əb'sɜ:d] *a* абсурдный, нелепый
academy [ə'kædəmi] *n* академия; *a*
~ic академический
acceleration [æk'sele'reɪʃən] *n* ускоре-
ние
accept [ək'sept] *v* принимать, допу-
скасть; *a* ~able допустимый
accompany [ə'kʌmpəni] *v* сопровож-
дать
accomplish [ə'kʌmplɪʃ] *v* осуществлять
according (to) [ə'kɔ:diŋ] *prep* соглас-
но; *adv* ~ly соответственно
account [ə'kaʊnt] *v* считать; *a.* for
объяснять
accuracy ['ækjʊrəsi] *n* тщательность;
~ate тщательный
achievement [ə'tʃi:vmənt] *n* достиже-
ние
across [ə'krɒs] *prep* сквозь, через

action ['ækʃn] *n* действие; *a* ~ive
активный
actually ['æktʃʊəli] *adv* фактически,
по существу
acute [ə'kju:t] *a* острый
add [æd] *v* складывать, прибавлять
addend [ə'dend] *n* слагаемое
addition [ə'dɪʃən] *n* сложение
additive ['ædɪtɪv] *a* аддитивный
adequate ['ædɪkwɪt] *a* адекватный
adjacent [ə'dʒeɪsənt] *a* примыкающий,
смежный
adjust [ə'dʒʌst] *v* 1. приспособить;
2. регулировать
administrative [əd'mɪnɪstrətɪv] *a* адми-
нистративный
admit [əd'mɪt] *v* принимать, допускать
advance [əd'vɑ:ns] *n* продвижение,
успех; *v* передвигать(ся); *in a.* за-
ранее
advantage [əd'vɑ:ntɪdʒ] *n* преимуще-
ство
advice [əd'vaɪs] *n* совет
adviser [əd'vaɪzə] *n* советник
(aero)plane [æə'pleɪn] *n* самолет
affect [ə'fekt] *v* воздействовать
(be) afraid [ə'freɪd] *v* бояться
after [ɑ:ftə] *prep* после, за; *conj* после
того как

again [ə'geɪn] *adv* снова, опять
against [ə'geɪnst] *prep* против, с, к
ago [ə'ɡəʊ] *adv* тому назад; not long
а. недавно
agree [ə'ɡri:] *v* соглашаться; *n* ~ment
соглашение
aid [eɪd] *n* помощь
aim [eɪm] *n* цель; *v a.* at иметь целью
air [ɛə] *n* воздух
algebra ['ældʒɪbrə] *n* алгебра
algorithm ['ɔlgərɪzəm] = algorithm [dʒəm]
n алгоритм

align [ə'laɪn] *v* ставить в ряд
alike [ə'laɪk] *a* подобные, похожие
all [ɔ:l] *pron* весь, вся, всё, все
allow [ə'laʊ] *v* позволять, разрешать
almost ['ɔ:lməʊst] *adv* почти
alone [ə'ləʊn] *adv* лишь, только, один
along [ə'lɔŋ] *prep* вдоль, по
alphabet ['ælfəbet] *n* алфавит
already [ɔ:l'reɪdɪ] *adv* уже
also [ɔ:lsəʊ] *adv* тоже, также
alter [ɔ:l'tə] *v* изменять, переделывать
alternative [ɔl'tə:nətɪv] *n* альтернати-
ва, выбор
although [ɔ:l'ðəʊ] *conj* хотя
altitude ['æltɪtju:d] *n* высота
always [ɔ:lwəz] *adv* всегда
ambiguity [æm'bɪ'ɡju:ɪti] *n* неясность,
двусмысленность *a* ~ous двусмыс-
ленный

amend [ə'mend] *v* изменять; *n* ~ment
изменение
among [ə'mʌŋ] *prep* среди, между
amount [ə'maʊnt] *n* количество, сум-
ма; *v* доходить до составлять сум-
му; *a.* to сводиться к, равняться
analyse ['ænəlaɪz] *v* анализировать,
исследовать
analysis [ə'næləsɪs] *n* (pl analyses)
анализ
ancient ['eɪnfənt] *a* древний
and [ænd] *conj* и, а, но
angle ['æŋɡl] *n* угол
angular ['æŋɡjʊlə] *a* угловой
another [ə'nʌðə] *pron* другой, еще
один

answer [ɑ:nsə] *n* ответ; *v* отвечать
any ['eni] *a, pron* какой-нибудь,
сколько-нибудь (в отриц., *вопр.*
предл.); всякий, любой (в *утвер-*
дит. предл.)

anybody ['eni'bɒdi] *n, pron* кто-нибудь
(в отриц. и *вопрос. предл.*); лю-
бой, всякий (в *утвердит.*)
anyone ['eniwʌn] *см.* anybody
anything ['eniθɪŋ] *n, pron* что-нибудь
(в *вопр. и отриц. предл.*); что угод-
но, все (в *утвердит.*)

anywhere ['eniwɛə] *adv* 1. где-нибудь,
куда-нибудь; 2. повсюду
apart [ə'pɑ:t] *adv* отдельно *a.* from
кроме, помимо
appear [ə'piə] *v* появляться, показы-
ваться; 2. казаться, оказываться
apply [ə'plai] *v* применять, приклады-
вать; *n* application применение
appointment [ə'pɔɪntmənt] *n* назначе-
ние
appreciate [ə'pri:ʃieɪt] *v* ценить (по
достоинству)
approach [ə'prəʊtʃ] *v* приближаться,
подходить; *n* подход
appropriate [ə'prɒpriɪt] *a* соответст-
вующий, подходящий, надлежащий;
adv ~ly должным образом
approximate [ə'prɒksɪmeɪt] *v* приби-
лизать(ся), аппроксимировать;
[ə'prɒksɪməɪt] *a* приближенный; *adv*
~ly приблизительно
approximation [ə'prɒksɪ'meɪʃən] *n* при-
ближение

April ['eɪprɪl] *n* апрель
arbitrary [ə'bɪtrəri] *a* произвольный
arc [ɑ:k] *n* дуга, арка
area ['eəriə] *n* площадь
arise (arose, arisen) [ə'raɪz] [ə'raʊz]
[ə'raɪzən] *n* возникать, появляться;
a. from явиться результатом
arithmetic [ə'riθmətɪk] *n* арифметика;
[æriθ'metɪk] *a* арифметический
around [ə'raʊnd] *adv* 1. кругом, по-
близости; 2. примерно
arrange [ə'reɪndʒ] *v* размещать, рас-
ставлять, упорядочить
array [ə'reɪ] *n* расположение, таблица
arrive (at) [ə'raɪv] *v* 1. прибывать;
2. приходить к (решению)
arrow ['ærou] *n* стрела; ~head стрел-
ка, наконечник
article ['ɑ:tɪkl] *n* статья
artificially [ɑ:tɪ'fɪʃəli] *adv* искусствен-
ным образом

as [æz] *adv, conj* как, в качестве, так
как, по мере того как; *a.* if = *a.*
though как будто бы; *a.* for что ка-
сается; *a.* soon а. как только;
a. well также; *a.* well а. а также и
ascent [ə'sent] *n* подъем; ascend
[ə'send] *v* подниматься
ask [ɑ:sk] *v* 1. спрашивать; 2. просить
aspect ['æspekt] *n* 1. вид, аспект;
2. точка зрения
assert [ə'seɪt] *v* утверждать; *n* ~ion
утверждение
assign [ə'saɪn] *v* приписывать, прида-
вать; *n* ~ment задание
assist [ə'sɪst] *v* содействовать, по-
могать; *n* ~ance помощь

associate [ə'souʃieɪt] *v* связывать, ассоциировать; *a* сопряженный
 associative [ə'souʃi'eɪtɪv] *a* ассоциативный
 assume [ə'sju:m] *v* предполагать, допускать
 assumption [ə'sʌmpʃən] *n* предположение, допущение
 asterisk ['æstərɪsk] *n* звездочка (*в обозначениях*)
 astronomer [ə'strɒnəm] *n* астроном
 at [æt] *prep* за, при, на, в; at least по крайней мере
 atmosphere ['ætmosfɪə] *n* атмосфера
 atomic [ə'tɒmɪk] *a* атомный
 attach [ə'tætʃ] *v* присоединять, приписывать

attempt [ə'tempt] *n* попытка; *v* пытаться
 attend [ə'tend] *v* посещать, присутствовать
 attention [ə'tenʃən] *n* внимание
 attraction [ə'trækʃən] *n* притяжение
 attractive [ə'træktɪv] *a* притягательный
 August ['ɔ:gəst] *n* август
 automatic [ɔ:tə'mætɪk] *a* автоматический
 autumn ['ɔ:təm] *n* осень
 average ['ævərɪdʒ] *a* средний; *n* средняя величина; *v* в среднем равняться
 avoid [ə'vɔɪd] *v* избегать
 axiom ['æksɪəm] *n* аксиома
 axis ['æksɪs] *n* (*pl* axes ['æksɪ:z]) ось

B

back [bæk] *adv* назад, обратно; *v* поддерживать; *a* обратный
 bad [bæd] *a* плохой; *adv* ~ly плохо
 bag [bæg] *n* портфель, сумка
 balance ['bæləns] *n* весы, равновесие; *v* уравнивать
 base [beɪs] *n* основание, база, базис
 basic ['beɪsɪk] *a* основной, базисный
 be (was, were, been) [bi:], [wɜ:z], [wɜ:]
 [bi:n] *n* существовать, находиться, быть
 bear (bore, borne) [beə], [bɔ:], [bɔ:n] *v* носить; *b. in mind* помнить, учитывать
 because [br'kɔ:z] *conj* так как, потому что; *b. of* из-за, вследствие
 become (became, become) [br'kæm], [br'keɪm] *v* становиться
 bed [bed] *n* кровать; *go to b.* ложиться спать
 before [br'fɔ:] *prep* перед, до; *conj* прежде чем; *adv* впереди, ранее; *long b.* задолго до
 begin (began, begun) [br'gɪn], [br'gæn], [br'gæn] *v* начинать; *to b. with* для начала
 behave [br'heɪv] *v* вести себя
 behaviour [br'heɪvjə] *n* поведение, режим
 being ['bi:ɪŋ] *n* существо; *living b.* живое существо
 believe [br'li:v] *v* верить, полагать
 belong [br'ləŋ] *v* принадлежать
 below [br'ləu] *adv* ниже, под
 bend [bend] *v* сгибать
 besides [br'saɪdɪz] *prep* кроме, в дополнение
 best [best] *a* наилучший

better ['betə] *a* лучше
 between [br'twi:n] *prep, adv* между
 big [bɪg] *a* большой
 billion ['bɪljən] *n* в Англии 10¹², в США 10⁹
 binary ['baɪnəri] *a* двоичный, бинарный
 binomial [baɪ'nəʊmɪjəl] *n* двучлен
 bisect [baɪ'sekt] *v* делить пополам
 black [blæk] *a* черный, темный
 blank [blæk] *n* пробел, пустое место (*между цифрами*)
 board [bɔ:d] *n* 1. доска; 2. пульт
 body ['bɒdi] *n* 1. тело; 2. масса; 3. совокупность
 book [buk] *n* книга
 boredom ['bɔ:dəm] *n* скука
 both [bəʊθ] *pron* оба; *b. ... and* как ... так и
 bottom ['bɒtəm] *n* дно, низ
 boundary ['baʊndəri] *n* граница;
 bound *n* граница; *v* ограничивать
 box [bɒks] *n* ящик, коробка
 boy [bɔɪ] *n* юноша, мальчик
 brace [breɪs] *n* фигурная скобка
 bracket ['bræktɪ] *n* скобка, квадратная скобка
 brain [breɪn] *n* мозг
 branch [bræntʃ] *n* ответвление, область, направление
 briefly ['brɪ:flɪ] *adv* кратко; *in brief* кратко
 bring (brought) [brɪŋ], [brɔ:t] *v* приносить, приводить; *b. about* вызывать, приводить к
 brother ['brʌðə] *n* брат
 build (built) [bɪld], [bɪlt] *v* строить; *a built in* смонтированный

bushel ['buʃl] *n* бушель
 busy ['bɪzi] *a* занятой, занятый
 but [bʌt] *adv* только, лишь; *prep* за исключением, кроме

calculate ['kælkjuleɪt] *v* вычислять; *n* ~ion подсчет, вычисление; *n* calculus исчисление, счисление
 call [kɔ:l] *v* звать, называть; *so* ~ed так называемый
 can (could) [kæn], [kud] *v* мочь
 cancel ['kænsəl] *v* отменять, сокращать
 candidate ['kændɪdət] *n* кандидат
 capable ['keɪpəbl] *a* способный, умелый
 capital ['kæpɪtəl] 1. *n* столица; 2. *a* с. letter заглавная буква
 capture ['kæptʃə] *n* захват, обуздание; *v* обуздывать
 card [kɑ:d] *n* 1. карта, 2. перфокарта
 care [keə] *n* забота, внимание, уход; *a* ~ful осторожный; *adv* ~fully осторожно, тщательно; *to take c.* заботиться, предусмотреть
 carry ['kæri] *v* нести, переносить; *c. on* проводить, продолжать; *c. out* осуществлять, выполнять
 Cartesian [kɑ:'tɪzjən] *a* декартов
 case [keɪs] *n* 1. случай, обстоятельство; 2. дело; *prep* in c. of в случае; *conj* in c. в случае; *this is not the case* это не так
 category ['kætɪgəri] *n* категория
 cause [kɔ:z] *n* причина, повод; *v* вызывать, заставлять
 center (амер.), centre (англ.) ['sentə] *n* центр, середина
 centimeter ['sentɪmɪ:tə] *n* сантиметр
 century ['sentʃəri] *n* век, столетие
 certain ['sɜ:tən] *a* некий, определенный; *adv* ~ly разумеется, конечно; *n* ~ty определенность; несомненность
 chain [tʃeɪn] *n* цепь
 chance [tʃɑ:ns] *n* шанс, случай, вероятность
 change [tʃeɪndʒ] *n* замена, перемена; *v* изменять(ся), менять(ся)
 chapter ['tʃæptə] *n* глава
 character ['kærɪktə] *n* 1. цифра, знак; 2. характер; *v* ~ize характеризовать; *a characteristic of* характерный
 check [tʃek] *n* контроль, проверка; *v* проверять; сверять
 chemical ['kemɪkəl] *a* химический

C

by [baɪ] *prep* 1. при, около; 2. через, посредством; 3. к (*какому-то сроку*)
 chess [tʃes] *n* шахматы; ~board шахматная доска
 child (*pl* children) [tʃaɪld], [tʃɪldrən] *n* ребенок
 choice [tʃɔɪs] *n* выбор
 choose (chose, chosen) [tʃu:z], [tʃouz], [tʃouzən] *v* выбирать
 chord [kɔ:d] *n* хорда
 circle ['sɜ:kl] *n* круг, окружность
 circumference [sə'klɪmfərəns] *n* окружность круга
 circumstance ['sɜ:kəmstəns] *n* обстоятельство
 clarify ['klærɪfaɪ] *v* уточнять, внести ясность
 class [kla:s] *n* 1. урок, занятие; 2. класс; *v* ~ify классифицировать
 classmate ['klæsmeɪt] *n* соученик
 clear [kliə] *a* понятный, ясный; *adv* ~ly очевидно
 close [kləʊs] *a* близкий, точный; *v* замыкать, закрывать; *adv* ~ly близко; *a* ~d замкнутый
 closure ['kləʊʒə] *n* замкнутость
 code [kəʊd] *n* код, сигнал; *v* кодировать
 coefficient [kəʊ'fɪʃənt] *n* коэффициент
 coin [kɔɪn] *n* монета
 coincide [kəʊn'saɪd] *v* совпадать
 collect [kə'lekt] *v* собирать; *n* ~ion совокупность, система
 college ['kɒlɪdʒ] *n* колледж
 combination [kəm'bɪneɪʃən] *n* сочетание, соединение
 combine [kəm'baɪn] *v* объединять(ся), соединять(ся)
 come (came, come) [kʌm], [keɪm] *v* приходить; *c. to* сводиться к; *c. to know* познакомиться
 comet ['kɒmɪt] *n* комета
 comma ['kɒmə] *n* запятая
 comment [kə'ment] *v* комментировать
 common ['kɒmən] *a* 1. общий, обычный; 2. простой; *in c.* общий
 commonplace ['kɒmənpleɪs] *a* банальный
 communist ['kɒmjunist] *a* коммунистический
 commutative [kə'mju:tətɪv] *a* коммутативный
 comparable ['kɒmpərəbl] *a* сравнимый
 compare [kəm'peə] *v* сравнивать

compass ['kɑmpəs] *n* циркуль
 compatible [kəm'pætəbl] *a* совместимый
 compel [kəm'pel] *v* принуждать, заставлять
 complement ['kɒmplɪmənt] *n* дополнение
 complete [kəm'pli:t] *v* завершать, заканчивать; *a* полный
 complex ['kɒmpleks] *a* сложный, комплексный, составной; *s. fraction* четырехэтажная дробь
 complicated ['kɒmplɪkeɪtɪd] *a* сложный
 composite ['kɒmpəzɪt] *a* составной, сложный
 compute [kəm'pjʊ:t] *v* вычислять, подсчитывать; *n* ~ г вычислительная машина
 concentrate ['kɒnsəntreɪt] *v* сосредоточиться
 concept ['kɒnsept] *n* понятие, идея; *adv* ~ tually мысленно, в воображении
 concern [kən'sə:n] *n* дело, отношение; *v* касаться, иметь отношение; *be concerned with* касаться, иметь отношение
 concise [kən'saɪs] *a* сжатый
 conclude [kən'klu:d] *v* делать вывод, заключать
 conclusion [kən'klu:ʒən] *n* вывод; *argue at a c.* прийти к выводу; *draw a c.* сделать вывод
 concreteness [kən'kri:tɪnis] *n* конкретность
 condition [kən'dɪʃən] *n* условие; *v* налагать условия; *a* ~ al условный
 conference ['kɒnfərəns] *n* конференция
 confine [kən'faɪn] *v* ограничить(ся), заключать (в)
 congregate ['kɒŋgrɪgeɪt] *v* собираться
 congruent ['kɒŋgruənt] *a* конгруэнтный
 connect [kə'nekt] *v* связывать, соединять; *n* ~ ion связь
 consequence ['kɒnsɪkwəns] *n* (по)следствие
 consider [kən'sɪdə] *v* рассматривать; *n* ~ ation рассмотрение, изображение; *a* ~ able значительный
 consist (of) [kən'sɪst] *v* состоять из; *s. in* заключаться в; *a* ~ ent состоятельный; последовательный
 constant ['kɒnstənt] *n* постоянная величина; *adv* ~ ly постоянно
 construct [kən'strʌkt] *v* строить
 consult [kən'sʌlt] *v* консультировать, советоваться

contain [kən'teɪn] *v* содержать
 (be) content [kən'tent] *v* быть довольным
 contents (pl) ['kɒntənts] *n* содержимое, содержание
 context ['kɒntekst] *n* контекст
 continue [kən'tɪnju:] *v* продолжать
 continuous [kən'tɪnjuəs] *a* непрерывный, постоянный
 continuum [kə'tɪnjuəm] *n* континуум
 contrary ['kɒntrəri] *a* противоположный; *on the c.* наоборот
 control [kən'trɒl] *n* управление; *v* контролировать, управлять
 convenience [kən'vi:njəns] *n* удобство; *a* ~ ent удобный
 convention [kən'venʃən] *n* собрание, сбор
 conventional [kən'venʃənəl] *a* обычный, общепринятый
 conversation [kɒnvə'seɪʃən] *n* беседа
 conversely [kən'vɜ:sli] *adv* напротив, наоборот
 convey [kən'veɪ] *v* передавать
 cooperate [kou'ɒpəreɪt] *v* сотрудничать
 coordinate [kou'ɔ:dɪnɪt] *n* координата; *v* [kou'ɔ:dɪneɪt] согласовывать
 cope (with) [koup] *v* справляться (с)
 correct [kə'rekt] *a* правильный, *v* исправлять; *adv* ~ ly верно
 correlate ['kɒrɪleɪt] *v* соотносить(ся)
 correspond [kɒrɪs'pɒnd] *v* соответствовать; *n* ~ ence соответствие
 corollary [kə'rɒləri] *n* следствие
 cosmic ['kɒzmɪk] *a* космический
 count [kaunt] *v* считать; *a* ~ able исчисляемый
 couple [kʌpl] *n* пара; *v* сочетать
 course [kɔ:s] *n* ход, течение
 cover ['kʌvə] *v* покрывать, охватывать
 create [kri:'eɪt] *v* создавать, творить
 creation [kri:'eɪʃən] *n* создание, творение
 credit ['kredit] 1. *n* заслуга; 2. *v* приписывать (заслугу)
 criterion (pl criteria) [kraɪ'tɪəriən] *n* критерий
 critical ['krɪtɪkəl] *a* критический
 cross [krɒs] *v* пересекать
 cube [kju:b] *n* куб; *a* ~ ic кубический
 culmination ['kʌlmɪneɪʃən] *n* кульминация
 curl [kɜ:l] *n* вихрь или ротор
 curve [kɜ:v] *n* кривая (линия); *a* ~ d кривой, искривленный
 cut (cut) [kʌt] *v* разрезать, пересекать
 cybernetics [saɪbə:'netɪks] *n* кибернетика

Danish ['deɪmɪʃ] *a* датский
 dash [dæʃ] *n* черточка, штрих
 data (sing. datum) ['deɪtə] данные
 deal (dealt) [di:l], [delt] *v* d. with иметь дело с, касаться, заниматься; *a great d.* много,
 death [deθ] *n* смерть
 decade ['dekeɪd] *n* десятилетие, десяти-ток
 December [di'sembə] *n* декабрь
 decide [di'saɪd] *v* решать
 decimal ['desɪməl] *a* десятичный
 decode [di:'kəʊd] *v* декодировать, расшифровывать
 decrease ['di:kri:s] *n* уменьшение; *v* [di:'kri:s] уменьшать(ся)
 deduce [di'dju:s] *v* делать вывод
 deduction [di'dʌkʃən] *n* 1. вывод, дедукция; 2. вычитание
 deductive [di'dʌktɪv] *a* дедуктивный
 deep [di:p] *a* глубокий
 defend [di'fend] *v* защищать
 define [di'faɪn] *v* определять
 definite ['defɪnɪt] *a* определенный
 definition [di'fɪnɪʃən] *n* определение
 degree [di'ɡri:] *n* 1. степень, порядок; 2. градус
 demand [di'ma:nd] *n* требование, потребность; *v* требовать
 democratic [demə'krætɪk] *a* демократичный
 demonstrate ['demənstreɪt] *v* демонстрировать
 denominator [di,nɒmɪ'neɪtə] *n* знаменатель дроби
 denote [di'nəʊt] *v* определять
 density ['densɪti] *n* плотность
 department [di'pɑ:tment] *n* отделение, факультет
 depend (on) [di'pend] *v* зависеть; *a* ~ ent зависимый
 debt [det] *n* долг
 depth [depθ] *n* глубина
 derivation [derɪ'veɪʃən] *n* 1. дифференцирование, взятие производного; 2. деривация
 derivative [di'rɪvətɪv] *a* производная
 describe [dis'kraɪb] *v* описывать; *n* description описание
 descend [di'send] *v* убывать, спускаться; *n* снижение
 desk [desk] *n* письменный стол
 designate ['deɪzɪneɪt] *v* обозначать
 desire [di'zaɪə] *v* желать; *a* ~ d ожидаемый; desirable [di'zaɪərəbl] желательный
 detail [di'teɪl] *n* деталь; *in d.* подробно; *a* ~ ed подробный

D

detect [di'tekt] *v* обнаружить
 determine [di'tə:mɪn] *v* определить
 develop [di'veləp] *v* развивать; *n* ~ ment развитие, событие
 deviate [di'vi:et] *v* отклоняться; *n* ~ ion отклонение
 device [di'vaɪs] *n* прибор, устройство
 devise [di'vaɪz] *v* проектировать, конструировать
 diagonal [daɪ'æɡənəl] *n* диагональ; *a* диагональное сечение
 diagram [daɪ'æɡrəm] *n* диаграмма
 diameter [daɪ'æmɪtə] *n* диаметр
 dictionary ['dɪkʃənəri] *n* словарь
 differ ['dɪfə] *v* отличаться, различаться; *n* ~ ence разность, различие; *a* ~ ent различный
 differential [dɪfə'renʃəl] *a* дифференциальный
 difficult ['dɪfɪkəlt] *a* трудный; *n* ~ y трудность
 digit ['dɪdʒɪt] *n* цифра; *a* ~ al цифровой
 dimension [di'menʃən] *n* измерение; *pl* размеры
 direct [di'rekt] *v* направлять; *a* прямой; *adv* ~ ly прямо, непосредственно; *n* ~ ion направление
 disadvantage [disəd'vɑ:nɪdʒ] *n* недостаток
 discover [dis'kʌvə] *v* обнаружить, открыть
 discuss [dis'kʌs] *v* обсуждать; *n* ~ ion обсуждение
 disk [disk] *n* круг, диск
 display [dis'pleɪ] *n* демонстрация; *v* показывать
 dissertation [disə'teɪʃən] *n* диссертация
 distance ['dɪstəns] *n* расстояние
 distant ['dɪstənt] *a* отдаленный
 distinction [dɪs'tɪŋkʃən] *n* разграничение
 distinguish [dɪs'tɪŋɡwɪʃ] *v* различать(ся)
 distribution [dɪstrɪ'bju:ʃən] *n* распределение
 divide [di'vaɪd] *v* делить
 dividend ['dɪvɪdənd] *n* делимое
 divisible [di'vɪzəbl] *a* делимый
 division [di'vɪʃən] *n* деление
 divisor [di'vaɪzə] *n* делитель
 do (did, done) [du:], [dɪd], [dʌn] *v* делать
 domain [də'meɪn] *n* область
 dot [dɒt] *n* точка
 double ['dʌbl] *a* двойной

doubt [ˈdaʊt] *n* сомнение; *v* сомневаться
down [ˈdaʊn] *adv* до, вплоть, внизу
draw (drew, drawn) [drɔː], [druː], [drɔːn] *v* 1. тянуть, притягивать;

each [iːtʃ] *pron* каждый; each other друг друга
early [ˈɜːli] *adv* рано; *a* ранний
earth [ɜːθ] *n* земля
ease [iːz] *n* легкость
easy [ˈiːzi] *a* легкий
economical [ˌiːkəˈnɒmɪkəl] *a* экономичный
edge [edʒ] *n* край, грань
effect [ɪˈfekt] *n* следствие, результат
Egypt [ˈiːdʒɪpt] *n* Египет
eight [eɪt] *num* восемь
either [ˈaɪðə] *a* любой (из двух), оба; *e. ...* *or* *или ...* или
e. g. например
electric [ɪˈlektrɪk] *a* электрический
electromagnetic [ɪˈlektromæɡˈnetɪk] *a* электромагнитный
electronic [ɪləkˈtrɒnɪk] *a* электронный
element [ˈelɪmənt] *n* элемент; *a* ~ *ary* элементарный
eleven [ɪˈlevn] *num* одиннадцать
ellipse [ˈɪlɪps] *n* эллипс; *a* ~ *tic* эллиптический
ellipsoidal [ɪˈlɪp,sɔɪd] *n* эллипсоид
else [els] *adv* еще, кроме
emerge [ɪˈmɜːdʒ] *v* возникать
emphasize [ˈemfəsaɪz] *v* подчеркивать, делать ударение
empty [ˈemptɪ] *a* пустой
enable [ɪnˈeɪbl] *v* давать возможность
enclose [ɪnˈklaʊz] *v* вкладывать, заключать
encounter [ɪnˈkaʊntə] *v* встречать
end [end] *n* конец; *v* заканчивать
endpoint [ˈendpɔɪnt] *n* конечная точка
energy [ˈenədʒi] *n* энергия
England [ˈɪŋɡlənd] *n* Англия
English [ˈɪŋɡlɪʃ] *a* английский
enough [ɪˈnʌf] *a* достаточный; *adv* достаточно
ensure [ɪnˈʃʊə] *v* обеспечивать
enter [ˈentə] *v* входить, поступать
entire [ɪnˈtaɪə] *a* целый, весь
entity [ˈentɪti] *n* сущность, вещь
equal [ˈiːkwəl] *a* равный; *n* ~ *ity* равенство
equation [ɪˈkweɪʃən] *n* уравнение
equidistant [ˌiːkwəˈdɪstənt] *a* равноудаленный
equilateral [ˌiːkwəˈlætərə] *a* равнобедренный

2. чертить, рисовать
due [djuː] *a* надлежащий; *d. to* благодаря, вследствие
during [ˈdjuəri] *prep* в течение

Е

equipment [ɪˈkwɪpmənt] *n* оборудование
equivalent [ɪˈkwɪvələnt] *a* эквивалентный
error [ˈerə] *n* ошибка, погрешность
essential [ɪˈsenʃəl] *a* существенный, основной; *adv* ~ *ly* существенным образом
establish [ɪsˈtæblɪʃ] *v* устанавливать
estimate [ɪˈestɪmeɪt] *v* оценивать
etc (et cetera, and so on) и так далее
Euclid [ˈjuːklɪd] Евклид; *a* ~ *ean* евклидов
evaluate [ɪˈvæljuːeɪt] *v* 1. вычислять; 2. оценивать
even [ˈiːvən] 1. *a* четный; 2. *adv* даже
evening [ˈiːvnɪŋ] *n* вечер; in the *e.* вечером
event [ɪˈvent] *n* событие, исход
ever [ˈevə] *adv* всегда, когда-либо
every [ˈevri] *pron* каждый, всякий
everyday [ˈevriˌdeɪ] *a* повседневный
everyone [ˈevriwʌn] *pron* всякий, каждый
everything [ˈevrɪθɪŋ] *pron* все
everywhere [ˈevriweə] *adv* повсюду, везде
evident [ˈeɪdɪənt] *a* очевидный
exact [ɪɡˈzækt] *a* точный; *adv* ~ *ly* точно
exam [ɪɡˈzæm] *n* экзамен
examination [ɪɡˌzæmɪˈneɪʃən] *n* 1. экзамен; 2. обследование, рассмотрение
example [ɪɡˈzɑːmpl] *n* пример; for *e.* например
exceed [ɪkˈsiːd] *v* превышать
except [ɪkˈsept] *prep* кроме, за исключением; *n* ~ *ion* исключение
exclude [ɪksˈkluːd] *v* исключать
exclusive [ɪksˈkluːsɪv] *a* исключительный; *adv* ~ *ly* только
excuse [ɪksˈkjuːz] *v* извинять; *n* отговорка, извинение, предлог
exercise [ˈeksəsaɪz] *n* упражнение
exist [ɪɡˈzɪst] *v* существовать; *n* ~ *ence* существование
expansion [ɪksˈpænsən] *n* растяжение, протяженность
expect [ɪksˈpekt] *v* ожидать, рассчитывать; *n* ~ *ation* ожидание

experience [ɪksˈpɪəriəns] *n* опыт; *v* испытывать
experiment [ɪksˈperɪmənt] *n* опыт; *v* экспериментировать
explainable [ɪksˈpleɪnəbl] *a* объяснимый
explanation [ˌekspləˈneɪʃən] *n* объяснение
explicit [ɪksˈplɪsɪt] *a* явный, четкий
exponent [eksˈpəʊnənt] *n* экспонента, показатель степени

face [feɪs] *n* 1. грань; 2. лицо, лицевая сторона
facilitate [fəˈsɪlɪteɪt] *v* способствовать
fact [fækt] *n* результат, факт; in *f.* в действительности
factor [ˈfæktə] *n* множитель, множитель; *v* разлагать на множители
factory [ˈfæktəri] *n* фабрика, завод
fail [feɪl] *v* потерпеть неудачу
failure [ˈfeɪljʊə] *n* неудача
fall (fell, fallen) [fɔːl], [fel], [ˈfɒlən] *v* падать
false [fɔːls] *a* ложный
familiar [fəˈmɪljə] *a* знакомый
family [ˈfæmɪli] *n* 1. семейство, совокупность; 2. семья
famous [ˈfeɪməs] *a* знаменитый
far [fɑː] *a* далекий; so *f.* до сих пор
farther [ˈfɑːðə] *adv* далее, дальше
father [ˈfɑːðə] *n* отец
favour [ˈfeɪvə] *n* польза, благосклонность; *a* ~ *able* благоприятный; in *f. of* в пользу
feature [ˈfi:tʃə] *n* черта, свойство
February [ˈfebruəri] *n* февраль
feel (felt) [fiːl] *v* чувствовать
few [fjuː] *pron* немногие, мало
field [fiːld] *n* поле, область
figure [ˈfɪɡə] *n* 1. цифра; 2. рисунок
film [fɪlm] *n* 1. пленка; 2. фильм
final [ˈfaɪnəl] *a* конечный; *adv* ~ *ly* наконец
find (found) [faɪnd], [faʊnd] *v* находить; *f. out* выяснить
fine [faɪn] *a* тонкий, прекрасный
finger [ˈfɪŋɡə] *n* палец
finish [ˈfɪniʃ] *n* конец; *v* заканчивать
finite [ˈfaɪnaɪt] *a* конечный
first [fɜːst] *num* первый; at *f.* сначала
five [faɪv] *num* пять
fix [fɪks] *v* фиксировать; *a* ~ *ed* фиксированный
flat [flæt] *a* плоский
focus (pl foci) [ˈfoukəs], [ˈfousaɪ] *n* фокус

F

express [ɪksˈpres] *v* выражать; *n* ~ *ion* выражение
extend [ɪksˈtend] *v* простирается; *a* ~ *ed* расширенный
extension [ɪksˈtenʃən] *n* протяженность, расширение
extensive [ɪksˈtensɪv] *a* обширный
exterior [eksˈtɪəriə] *a* внешний
extraordinary [ˌekstrəˈɔːdnəri] *a* необычный
extreme [ɪksˈtriːm] *a* крайний, экстремальный; *adv* ~ *ly* чрезвычайно
follow [ˈfɒləʊ] *v* сопровождать, следовать за; *a* ~ *ing* следующий; as follows следующим образом
foot (pl feet) [fuːt], [fi:t] (сокр. ft) *n* 1. ступня; 2. фут=30, 48 см.
for [fɔː] *prep* 1. для, за; 2. в течение, из-за; *conj* так как
force [fɔːs] *n* сила; *v* заставлять
foreign [ˈfɒrɪn] *a* 1. иностранный; 2. чужой
foresee (foresaw, foreseen) [fɔːˈsiː], [fɔːˈsɔː], [fɔːˈsiːn] *v* предвидеть
forever [fɔːˈrevə] *adv* навсегда
form [fɔːm] *n* форма; *v* создавать, формировать
former [ˈfɔːmə] *a* первый (из упомянутых, перечисленных)
formula (pl formulae) [ˈfɔːmjulə] *n* формула
forth [fɔːθ] *adv* вперед; back and f. туда-сюда
fortunately [ˈfɔːtʃənətli] *adv* к счастью
foundation [faʊnˈdeɪʃən] *n* основа, фундамент
four [fɔː] *num* четыре
fraction [ˈfrækʃən] *n* дробь; *a* ~ *al* дробный
frame [freɪm] *n* система, система координат
French [frentʃ] *a* французский
frequent [ˈfriːkwənt] *a* частый
Friday [ˈfraɪdi] *n* пятница
friend [frend] *n* приятель
from [frɒm] *prep* от, из
front [frʌnt] *a* передний; in *f. of* перед
fulfil [ˈfʊlˌfɪl] *v* выполнять, осуществлять
full [fʊl] *a* полный; *adv* ~ *ly* полностью
function [ˈfʌŋkʃən] *n* функция
fundamental [ˌfʌndəˈmentl] *a* основной
further [ˈfɜːðə] *a* более отдаленный
furthermore [ˈfɜːðəˈmɔː] *adv* далее
future [ˈfjuːtʃə] *n* будущее

gain [geɪn] *v* выигрывать, приобретать; *n* усилие
 game [geɪm] *n* игра, партия
 gas [ɡæs] *n* газ
 general [dʒenərəl] *a* 1. общий; 2. главный; *v* ~ize обобщать; *adv* ~ly вообще
 generate [dʒenəreɪt] *v* генерировать, породить
 generation [dʒenə'reɪʃən] *n* 1. генерация, образование; 2. поколение
 genius [dʒi:njəs] *n* гений
 geometry [dʒi'ɒmɪtri] *n* геометрия
 German [dʒɜ:mən] *a* немецкий; *n* ~y Германия
 get (got) [get], [ɡɒt] *v* получать, достигать; *g. up* вставать
 girl [ɡɜ:l] *n* девушка, девочка
 give (gave, given) [ɡɪv], [geɪv], [ɡɪvn] *v* давать; *g. rise* to породить (be) glad [glæd] *v* радоваться
 go (went, gone) [ɡoʊ], [went], [ɡɒn] *v* идти, уходить; *to be going* (to)

habit [ˈhæbɪt] *n* привычка
 habitually [hə'bitʃuəli] *adv* обычно
 half [ha:f] *n* половина
 hand [hænd] *n* рука; *v* вручать, передавать
 handle [ˈhændl] *v* управлять, обращаться с; *to h. data* обрабатывать данные
 happen [ˈhæpən] *v* происходить, случаться
 hard [hɑ:d] *a* твердый, трудный; *adv* усиленно
 hardly [ˈhɑ:dlɪ] *adv* едва (ли)
 have (had) *v* иметь
 head [hed] *n* 1. голова; 2. глава, начальник (напр. лаборатории)
 heads (эд.) орел (на монете)
 hear (heard) [hɪə], [hɜ:d] *v* слышать
 heavenly [ˈhevənli] небесный
 heavy [ˈhevi] *a* тяжелый; *adv* ~ly тяжело, очень сильно
 height [haɪt] *n* высота
 help [help] *n* помощь; *v* помогать; *a* ~ful полезный
 hence [hens] *adv* следовательно

idea [aɪ'diə] *n* мысль, идея
 identically [aɪ'dentɪkəli] *adv* аналогично
 identity [aɪ'dentɪti] *n* тождество

намереваться, собираться
 good [ɡʊd] *a* хороший
 gradient [ˈɡreɪdɪjənt] *n* градиент
 graduate [ˈɡrædʒueɪt] *v* оканчивать вуз; *n* [ˈɡrædʒuɪt] выпускник вуза
 grain [ɡreɪn] *n* зерно
 graph [ɡrɑ:f] *n* график; *v* составлять график
 gravitation [ˌɡrævɪ'teɪʃən] *n* тяготение; *a* ~al гравитационный
 gravity [ˈɡrævɪti] *n* сила тяжести
 great [ɡreɪt] *a* великий, большой
 greatly [ˈɡreɪtli] *adv* очень
 Greece [ɡri:s] *n* Греция
 Greek [ɡri:k] *a* греческий
 group [ɡru:p] *n* группа; *v* группировать
 grow (grew, grown) [ɡrəʊ], [ɡru:], [ɡraʊn] *v* расти, становиться
 guess [ɡes] *v* угадывать, предполагать; *n* догадка, приблизительная оценка

here [hɪə] *adv* здесь, вот
 high [haɪ] *a* высокий
 highly [ˈhaɪli] *adv* чрезвычайно, очень
 hint [hɪnt] *n* подсказка; *v* подсказывать
 history [ˈhɪstəri] *n* история
 hold [həʊld] (held) *v* держать, удерживать; *to h. true* быть справедливым для
 home [həʊm] *n* дом; *adv* домой
 hope [həʊp] *n* надежда; *v* надеяться
 horizontal [ˌhɒrɪ'zɒntl] *a* горизонтальный
 hostel [ˈhəʊstl] *n* общежитие
 hour [aʊə] *n* час
 house [haʊs] *n* дом; *v* помещать
 how [haʊ] *adv* как, каким образом
 however [haʊ'evə] *adv* однако
 humanities (pl) [hju:'mænɪtɪz] *n* гуманитарные науки
 hundred [ˈhʌndrɪd] *num* сто
 hypotenuse [haɪ'pɒtɪnju:z] *n* гипотенуза
 hypothesis (pl hypotheses) [haɪ'pɒθɪsɪs] *n* гипотеза

i.e. (ed est, that is) то есть
 if [ɪf] *conj* если (бы); *if any, if at all* если вообще

illustrate [ˈɪləstreɪt] *v* иллюстрировать; *n* ~tion иллюстрация
 image [ˈɪmɪdʒ] *n* образ, отражение
 imagine [ɪ'mædʒɪn] *v* воображать, представлять себе
 immediate [ɪ'mɪdɪət] *a* непосредственный, прямой; *adv* ~ly непосредственно, сразу же
 implicit [ɪm'plɪsɪt] *a* неявный, подразумеваемый
 imply [ɪm'plaɪ] *v* 1. заключать в себе, означать; 2. подразумевать
 importance [ɪm'pɔ:təns] *n* значение, важность; *be of i.* иметь значение; *a* ~ant важный, значительный
 impose [ɪm'pəʊz] *v* налагать, накладывать
 impossible [ɪm'pɒsɪbl] *a* невозможный
 impress [ɪm'pres] *v* производить впечатление; *n* ~ion впечатление
 improper [ɪm'prɒpə] *a* неправильный; *i. fraction* неправильная дробь
 improve [ɪm'pru:v] *v* улучшать(ся); *adv* ~ed измененный, улучшенный
 in [ɪn] *prep* в; *adv* внутри, внутри
 inadequate [ɪn'ædɪkwɪt] *a* неподходящий
 include [ɪn'klu:d] *v* заключать в себе, включать
 inconsistent [ɪn'kɒn'sɪstənt] *a* непоследовательный, несовместимый
 incorrect [ɪn'kɒ'rekt] *a* ошибочный
 increase [ɪn'kri:s] *v* увеличивать; *n* [ɪn'kri:s] рост, увеличение
 indeed [ɪn'di:d] *adv* в самом деле
 indefinitely [ɪn'dɪfɪnɪtli] *adv* неопределенно; *a* indefinite неопределенный
 independent [ɪn'dɪ'pendənt] *a* независимый; *adv* ~ly независимо
 India [ˈɪndiə] Индия
 indicate [ɪn'dɪkeɪt] *v* указывать
 individual [ɪn'dɪvɪdʒuəl] *a* индивидуальный; *n* индивидуум
 induce [ɪn'dju:s] *v* побуждать, индуцировать
 induction [ɪn'dʌkʃən] *n* индукция
 industrial [ɪn'dʌstriəl] *a* промышленный
 inequality [ɪnɪ'kwɒlɪti] *n* неравенство
 infinite [ɪn'fɪnɪt] *a* бесконечный; *n* ~ity бесконечность; *infinitesimal* бесконечно малая
 information [ɪnfə'meɪʃən] *n* информация
 ingredient [ɪn'ɡri:dʒənt] *n* составная часть
 initial [ɪ'nɪʃəl] *a* начальный, исходный
 inner [ɪ'nə] *a* внутренний
 input [ɪn'put] *v* ввод, вход, выходной сигнал

inscribe [ɪn'skraɪb] *v* надписывать, вписывать
 insert [ɪn'sɜ:t] *v* вставлять
 inside [ɪn'saɪd] *adv* внутрь, внутри
 insist (on) [ɪn'sɪst] *v* настаивать
 instance [ɪn'stəns] *n* пример; *for i.* например
 instead (of) [ɪn'sted] *adv* вместо, взамен
 instinct [ɪn'stɪŋkt] *n* инстинкт
 institute [ɪn'stɪtju:t] *n* организация, институт; *v* устанавливать
 instruction [ɪn'strʌkʃən] *n* инструкция
 integer [ɪn'tɜ:dʒə] *n* целое число
 integral [ɪn'tɪgrəl] *n* интеграл, целое число
 integration [ɪn'tɪ'ɡreɪʃən] *n* интегрирование, интеграция
 intense [ɪn'tens] *a* интенсивный, сильный; *n* ~ity интенсивность
 interest [ɪn'trɪst] *n* интерес; *a* ~ed заинтересованный; *a* ~ing интересный
 interior [ɪn'tɪəriə] *n* внутренняя часть
 internally [ɪn'tə'nəli] *adv* внутренне
 interpose [ɪntə'pəʊz] *v* вставлять, вводить
 interpret [ɪn'tə'prɪt] *v* интерпретировать; *n* ~ation интерпретация
 intersect [ɪntə'sekt] *v* пересекать(ся)
 interval [ɪntə'vel] *n* интервал, отрезок, промежуток
 into [ɪntu] *prep* внутрь
 intriguing [ɪn'tri:ɡɪŋ] *a* занимательный, интригующий
 introduce [ɪn'trə'dju:s] *v* вводить, представлять
 intuitive [ɪn'tju:ɪtɪv] *a* интуитивный
 invariable [ɪn'veəriəbl] *a* постоянный
 invent [ɪn'vent] *v* изобретать
 inverse [ɪn've:s] *a* обратный; *adv* ~ly наоборот, обратно
 investigate [ɪn'vestɪ'geɪt] *v* исследовать
 involve [ɪn'vɒlv] *v* 1. влечь за собой, вызывать; 2. возводить в степень
 irrational [ɪ'ræʃən] *a* иррациональное число
 irrotational [ɪ'rəʊ'teɪʃən] *a* безвихревой
 isosceles [aɪ'sɒsɪli:z] *n* равнобедренный треугольник
 it [ɪt] *pron* оно, это
 item [aɪ'tɪm] *n* 1. пункт, вопрос; 2. статья
 itself [ɪt'self] *prep* сам, само, сама, себя

J

January ['dʒænjuəri] *n* январь
 job [dʒɒb] *n* работа
 join [dʒɔɪn] *v* соединять(ся), присоеди-
 нять(ся); *n* объединение
 journal ['dʒɔːnl] *n* журнал (толстый)
 July [dʒuː'laɪ] *n* июль

K

keep (kept) [ki:p], [kept] *v* хранить,
 держать(ся)
 kind [kaɪnd] *n* тип, вид, разряд
 king [kiŋ] *n* король

L

label ['leɪbl] *n* этикетка, надпись;
v надписывать
 labor (англ. labour) ['leɪbə] *n* труд;
 1. saving для экономии труда
 laboratory (сокр. lab.) [lə'bɒrətəri] *n*
 лаборатория
 lamp [æmp] *n* лампа
 land [lənd] *n* земля
 language ['læŋgwɪdʒ] *n* язык
 large [la:dʒ] *a* большой
 largely ['la:dʒli] *adv* главным обра-
 зом, в основном
 last [la:st] 1. *a* последний, прошлый;
 2. *v* длиться
 late [leɪt] *a* поздний; *v* to be 1. опаз-
 дывать
 latter ['lætə] *a* последний (из упомя-
 нутых)
 law [lɔ:] *n* закон
 lazy ['leɪzi] *a* ленивый
 lead (led) [li:d], [led] *v* вести, руково-
 дить
 learn (learnt) [lɜ:n] *v* узнавать, вы-
 учивать
 least [li:st] *a* наименьший; at 1. по
 крайней мере
 leave (left) [li:v], [left] *v* уходить,
 оставлять
 lecture ['lektʃə] *n* лекция; *v* читать
 лекции
 left [left] *a* левый; *adv* налево
 leg [leg] *n* 1. сторона, катет; 2. нож-
 ка циркуля
 legend ['ledʒənd] *n* легенда
 length [leŋθ] *n* длина
 less [les] *a* меньший; *v* ~en умень-
 шать
 lesson ['lesn] *n* урок, занятие

junction ['dʒʌŋkʃən] *n* соединение;
 point of j. точка соединения
 June [dʒu:n] *n* июнь
 Jupiter ['dʒʌpɪtə] *n* Юпитер
 just [dʒʌst] *a* справедливый, верный;
adv как раз, только что

know (knew, known) [nou], [nju:],
 [noun] *v* знать
 knowledge ['nɒlɪdʒ] *n* знание

let (let) [let] *v* позволять, допускать
 letter ['letə] *n* буква, символ
 library ['laɪbrəri] *n* библиотека
 lie (lay, lain) [lai], [lei], [lein] *v* ле-
 жать, находиться
 light [laɪt] 1. *a* легкий, слабый;
 2. *n* свет
 like [laɪk] *v* любить, нравиться
 like *a* похожий, подобный; *adv* по-
 добно
 likely ['laɪkli] *adv* вероятно
 likewise ['laɪk'waɪz] *adv* аналогично,
 также
 limit ['lɪmɪt] *n* предел; *v* ограничивать;
a ~ed ограниченный
 line [laɪn] *n* линия, прямая строчка
 linear ['liːniə] *a* линейный
 link [lɪŋk] *n* звено; *v* соединять
 list [lɪst] *n* список; *v* перечислять
 listen [lɪsn] *v* слушать
 little (less, the least) [lɪtl] *a* малый,
 небольшой; *adv* мало
 live [lɪv] *v* жить
 locate [lou'keɪt] *v* определять место-
 нахождение; *n* ~ion определение
 места, место
 locus (pl loci) ['loukəs], ['lousaɪ] *n*
 геометрическое место точки
 logarithm ['lɒgərɪθəm] *n* логарифм
 (сокр. log)
 logical ['lɒdʒɪkəl] *a* логический
 long [lɒŋ] 1. *a* длинный; 2. *adv* давно
 look [lʊk] *v* смотреть; *n* взгляд; to 1.
 for искать
 lose (lost) *v* терять, проигрывать;
n loss потеря
 lot [lɒt] *n* доля, масса; *a* 1. of много
 low [lou] *adv* низко; *v* ~er опускать
 lucky ['lʌki] *a* удачливый

M

machine [mə'ʃi:n] *n* машина
 magazine ['mæɡə'zi:n] *n* журнал
 magnitude ['mæɡnɪtju:d] *n* величина
 main [meɪn] *a* главный
 maintain [meɪn'teɪn] *v* сохранять, под-
 держивать
 major ['meɪdʒə] *a* главный, большой
 make (made) [meɪk], [meɪd] *v* 1. де-
 лать; 2. заставлять; *n*. up состав-
 лять
 man (pl men) [mæn], [men] *n* 1. чело-
 век; 2. мужчина
 manifold ['mænɪfəʊld] *n* многообразие,
 множество
 manipulate [mænɪ'piʒjuleɪt] *v* манипули-
 ровать, управлять
 manner ['mænə] *n* способ, манера
 many (more, the most) ['meni], [mɔ:],
 [maʊst] *a* многие; *adv* много
 map [mæp] *n* карта, отображение
 mapping ['mæpɪŋ] *n* отображение
 March [mɑ:tʃ] *n* март
 mark [mɑ:k] *n* отметка, знак
 mass [mæs] *n* масса
 match-box ['mætʃbɒks] *n* спичечная
 коробка
 material [mə'tɪəriəl] *n* материал; *a* ма-
 териальный
 mathematical [məθi'mætɪkəl] *a* мате-
 матический
 mathematician [məθɪmə'tɪʃən] *n* ма-
 тематик
 mathematics [məθi'mætɪks] *n* мате-
 матика
 matrix (pl matrices) ['meɪtrɪks], ['meɪ-
 trɪsɪz] *n* матрица
 matter ['mætə] *n* 1. материя, сущ-
 ность; 2. дело
 maximize ['mæksɪmaɪz] *v* увеличить до
 максимума
 maximum (pl. maxima) ['mæksɪmə],
 ['mæksɪmə] *n* максимум
 may (might) [meɪ], [maɪt] *v* могу,
 может, иметь возможность
 May [meɪ] *n* май
 mean (meant) [mi:n], [ment] *v* озна-
 чать, иметь в виду; *n* ~ing значе-
 ние; *a* meaningless бессмысленный;
 by means of посредством
 mean [mi:n] *n* среднее значение
 means (pl) [mi:nz] *n* средство
 measure ['meʒə] *n* мера; *v* измерять
 mechanics [mi'kæniks] *n* механика
 meet (met) [mi:t], [met] *v* встре-
 чать(ся), пересекать(ся)
 member ['membə] *n* член, элемент;
n ~ship членство
 memory ['meməri] *n* память
 mental ['mentl] *a* мысленный, умст-
 венный; *adv* ~ly мысленно

mention ['menʃən] *v* упоминать
 mere [miə] *a* сущий, явный; *adv* ~ly
 просто, только
 merit ['merɪt] *n* достоинство, заслуга
 method ['meθəd] *n* способ, метод
 middle [mɪdl] *n* середина
 million ['mɪljən] *num* миллион 10⁶
 mind [maɪnd] *n* ум, рассудок
 minimax ['mɪni'mæks] *n* минимакс
 minimize ['mɪnɪmaɪz] *v* доводить до
 минимума
 minimum (pl minima) ['mɪnɪmə],
 ['mɪnɪmə] *n* минимум
 minuend ['mɪnjuend] *a* уменьшаемое
 minus ['maɪnəs] *n* минус
 minute ['mɪnɪt] *n* минута (времени,
 угла)
 misnomer [mɪs'nɒmə] *n* неправильное
 название
 miss [mɪs] *v* пропускать; *a* ~ing не-
 достающий
 mistake [mɪs'teɪk] *n* ошибка
 misunderstanding ['mɪsʌndə'stændɪŋ] *n*
 недоразумение
 mixed [mɪkst] *a* смешанный; *n* ~ture
 смесь
 model [mɒdl] *n* модель; *v* моделиро-
 вать
 modern ['mɒdən] *a* современный
 modification [ˌmɒdɪfɪ'keɪʃən] *n* преоб-
 разование
 moment ['mɒmənt] *n* момент
 momentum (pl momenta) [mou'men-
 təm] *n* количество движения
 Monday ['mʌndɪ] *n* понедельник
 monomial [mɒ'nɒmɪəl] *n* одночлен
 monotonous [mə'nɒtənəs] *n* однооб-
 разный
 month [mʌnθ] *n* месяц
 moon [mu:n] *n* луна
 more [mɔ:] больше
 moreover [mɔ:'rouvə] *adv* более того
 morning ['mɔ:nɪŋ] *n* утро; in the m.
 утром
 most [maʊst] *a* наибольший; *adv*
 больше всего, большинство
 mother ['mʌðə] *n* мать
 motion ['mʌʃən] *n* движение
 move [mu:v] *v* двигать(ся)
 much (more, the most) [mʌtʃ], [mɔ:],
 [maʊst] *a* много; *adv* очень
 multiplicand [ˌmʌltɪplɪ'kænd] *n* множи-
 мое
 multiplication [ˌmʌltɪplɪ'keɪʃən] *n* ум-
 ножение; *n* ~ier множитель; *v* ~ly
 умножать
 must [mʌst] *v* должен
 mutual ['mju:tʃʊəl] *a* взаимный; *adv*
 ~ly взаимно
 mysterious [mɪs'tɪəriəs] *a* таинственный

N

name [neim] *n* имя, название; *v* называть
 namely ['neimli] *adv* именно
 natural ['nætʃrəl] *a* естественный
 near [niə] *adv* подле, близко
 nearly ['niəli] *adv* почти
 necessary ['nesisəri] *a* необходимый; *adv* ~ly обязательно; *n* ~ity необходимость
 necessitate [nə'sesiteit] *v* вызывать, делать необходимым
 need [ni:d] *n* нужда, потребность; *v* нуждаться
 negative ['negətiv] *a* отрицательный
 neighbourhood ['neibəhʊd] *n* соседство, близость
 negligible ['neglɪdʒəbl] *a* пренебрежимо малая величина
 нег ни ... ни
 never ['nevə] *adv* никогда
 neither ['neɪðə] *pron* никто; neither ... nevertheless ['nevəðə'les] *adv* тем не менее
 new [nju:] *a* новый
 newspaper ['nju:speɪpə] *n* газета
 next [nekst] *a* 1. соседний; 2. следующий, будущий
 nice [naɪs] *a* хороший, приятный
 nine [naɪn] *num* девять
 no [noʊ] *n* никакой

O

obey [ə'bei] *v* подчиняться
 object ['ɒbdʒɪkt] *n* объект, цель, предмет
 object ['ɒb'dʒɪkt] *v* возражать
 observe ['ɒbzə:v] *v* соблюдать, наблюдать; *n* ~ation наблюдение, наблюдательность
 obtain [əb'teɪn] *v* получать
 obtuse [əb'tju:s] *a* тупой (угол)
 obvious ['ɒbvɪəs] *a* очевидный; *adv* ~ly очевидно
 occasion [ə'keɪʒən] *n* случай
 occur [ə'kɜ:] *v* случаться, иметь место; *n* ~ence событие, случай
 o'clock [ə'klɒk] *n* время на часах
 octagon ['ɒktəgən] *n* восьмиугольник
 October [ɒk'təʊbə] *n* октябрь
 odd [ɒd] *a* нечетный
 odds [ɒdz] *n* разница, преимущество, шансы
 of [ɒv] *prep* указывает на принадлежность
 of course [əf'kɜ:s] конечно

none [nʌn] *pron* никто, ничто; *n.* of никто из
 normal ['nɔ:məl] 1. *a* нормальный; *adv* ~ly обычно; 2. *n* перпендикуляр
 notation [nou'teɪʃən] *n* система обозначений
 note [nəʊt] *n* записка, записка; *v* делать заметки
 nothing ['nʌθɪŋ] *pron* ничто
 notice ['nəʊtɪs] *n* заметка; *v* замечать
 notion ['nəʊʃən] *n* понятие, идея
 November [nə'vembə] *n* ноябрь
 now [naʊ] *adv* теперь, сейчас
 nowadays ['naʊədeɪz] *adv* в наше время
 nuclear ['nju:kliə] *a* ядерный; *n* nucleus (pl nuclei) ядро
 null [nʌl] *a* несуществующий, пустой
 number ['nʌmbə] *n* число, количество, номер; *v* перечислять; *a* *n.* of целый ряд
 numerable ['nju:mərəbl] *a* исчисляемый, счетный
 numeral ['nju:mərəl] *n* цифра, символ числа
 numeration [nju:me'reɪʃən] *n* счет, счисление
 numerator ['nju:məreɪtə] *n* числитель
 numerical [nju:'merɪkəl] *a* числовой, численный, цифровой

off [ɒf] *adv* указывает на удаление, отдаление
 often [ɒfn] *adv* часто
 old [əʊld] *a* старый
 omit [ou'mɪt] *v* 1. упускать; 2. опустить
 on [ɒn] *prep* на; and so on и т. д.
 once [wʌns] *adv* однажды, коль скоро, раз; *o.* more еще раз
 one [wʌn] *n* единица; *a* единственный; one-one взаимно-однозначный
 only ['əʊnli] *adv* только; the *o.* единственный
 onto ['ɒntu] *prep* на
 open ['əʊpən] *v* открывать; *a* открытый
 operation [ɔpə'reɪʃən] *n* действие, операция; *n* ~or оператор
 opinion [ə'pɪnɪən] *n* мнение
 opposite ['ɒpəzɪt] *a* противоположный
 or [ɔ:] *conj* или; or else или же
 orbit ['ɔ:bɪt] *n* орбита; *a* ~al орбитальный

order ['ɔ:də] *n* порядок; *a* ~ed упорядоченный; in *o.* to чтобы
 ordinal ['ɔ:dɪnəl] *a* порядковый
 origin ['ɔrɪdʒɪn] *n* источник, начало; *a* ~al первоначальный; *v* ~ate брать начало
 oscillate ['ɒsɪleɪt] *v* колебаться
 other ['ʌðə] *a* другой, иной; *pron* другой
 otherwise ['ʌðəwaɪz] *adv* в противном случае
 ought [ɔ:t] *v* должен, следует

page [peɪdʒ] *n* страница
 pair [peə] *n* пара
 pan [pæn] *n* чаша весов
 paper ['peɪpə] *n* 1. статья, газета; 2. бумага
 paradox ['pærədɒks] *n* парадокс; *a* ~ical парадоксальный
 parallel ['pærəlel] *a* параллельный
 parallelogram [pærə'leləgrəm] *n* параллелограмм
 parent ['pæərənt] *n* родитель
 parenthesis (pl parentheses) [pə'renθɪsɪs], [pə'renθɪsɪz] *n* круглая скобка
 part [pɑ:t] *n* часть
 partially ['pɑ:ʃəl] *adv* частично
 particle ['pɑ:tɪkl] *n* частица
 particular [pə'tɪkjʊlə] *a* конкретный; *adv* ~ly особенно
 party ['pɑ:ti] *n* партия, отряд
 pass [pɑ:s] *v* проходить; *p.* a test сдать зачет
 passive ['pæsɪv] *a* пассивный
 past [pɑ:st] *prep* после; *a* прошлый
 path [pɑ:θ] *n* путь, траектория
 pattern ['pætən] *n* схема, модель, образец
 pay [peɪ] *v* платить; to *p.* attention обращать внимание
 pen [pen] *n* ручка
 penalty ['penɪltɪ] *n* штраф
 pencil ['pensɪl] *n* карандаш
 pendulum ['pendjʊləm] *n* маятник
 people ['pi:pl] *n* люди
 per [pə:] *prep* в, на, за; напр., *per* hour в час
 perception [pə'sepʃən] *n* восприятие, ощущение
 perfect ['pɜ:fɪkt] *a* совершенный
 perform [pə'fɔ:m] *v* осуществлять, исполнять; *n* ~ance действие, работа
 perhaps [pə'hæps] *adv* возможно
 perihelion (pl perihelia) [peri'hi:lɪən] *n* перигелий
 perimeter [pə'rɪmɪtə] *n* периметр

P

our [aʊə] *pron* наш; ~selves сами
 out [aʊt] *a* внешний; ~er внешний
 outstanding [aʊt'stændɪŋ] *a* выдающийся
 outside [aʊt'saɪd] *a* внешний; *adv* снаружи
 over [əʊvə] *prep* над, выше; *adv* через; to be *o.* оканчиваться
 owing (to) ['əʊɪŋ] *prep* вследствие
 own [aʊn] *a* собственный; on one's own самостоятельно
 period [pɪəriəd] *n* период; *a* ~ic(al) периодический
 permit [pə'mɪt] *v* разрешать, позволять
 permutation [pə'mju:teɪʃən] *n* подстановка
 perpendicular [pə:pən'dɪkjʊlə] *a* перпендикулярный
 person [pɜ:sn] *n* личность
 phenomenon (pl phenomena) [fɪ'nɒmɪnən] *n* явление
 philosopher [fɪ'lɒsəfə] *n* философ; ~у философия
 physics ['fɪzɪks] *n* физика; *n* ~icist физик
 picture ['pɪktʃə] *n* картинка, изображение
 piece [pi:s] *n* кусок, отрезок
 place [pleɪs] *n* место; *v* помещать; *n* ~ment размещение
 plan [plæn] *n* план; *v* планировать
 plane [pleɪn] *n* 1. плоскость; 2. самолет
 planet ['plænɪt] *n* планета; *a* ~ary планетарный
 plant [plɑ:nt] *n* 1. завод; 2. растение
 play [pleɪ] *n* игра; *v* играть; *n* ~er игрок
 please [pli:z] *v* доставлять удовольствие, угождать
 plot [plɒt] *n* график, набросок; *v* чертить, наносить
 plus [plʌs] *n* плюс
 point [pɔɪnt] *n* точка; to *p.* to указывать; to *p.* out отмечать; *p.* of view точка зрения
 polygon ['pɒlɪgən] *n* многоугольник, полигон
 polynomial [pɒlɪ'nɒmɪjəl] *n* многочлен
 popular ['pɒpjʊlə] *a* популярный; *adv* ~ly обычно
 position [pə'zɪʃən] *n* положение
 positive ['pɒzɪtɪv] *a* положительный
 possess [pə'zes] *v* обладать

possible ['pɒsɪbl] *a* возможный; *n* possibility возможность
 post-graduate ['pəʊst'grædjʊɪt] *n* аспирант
 postulate ['pɒstjʊlɪt] *n* постулат;
 ['pɒstjʊleɪt] *v* постулировать
 potential [pə'tenʃəl] *n* потенциал, силовая функция
 power ['paʊə] *n* 1. сила; 2. показатель степени; raise to a *p.* возводить в степень; to the fourth power в четвертой степени
 practical ['præktɪkəl] *a* целесообразный
 practise ['præktɪs] *v* упражнять, при-
 менять
 precede [pri:'si:d] *v* предшествовать
 precise [pri:'saɪs] *a* точный
 precision [pri:'si:ʒən] *n* точность
 predecessor [pri:'disesə] *n* предшест-
 венник
 predicate ['predɪkɪt] *n* предикат
 prediction [pri:'dɪkʃən] *n* предсказание
 prefer [pri:'fɛə] *v* предпочитать
 prepare [pri:'peə] *v* готовить; *n* ~ation
 подготовка; *a* ~atory подготови-
 тельный
 present [pri:'zent] *v* предъявлять, да-
 вать; *a* данный, настоящий;
n ['preznt] подарок
 preserve [pri:'zɜ:v] *v* сохранять
 president ['prezɪdnt] *n* президент,
 председатель
 pressure ['preʃə] *n* давление
 prevent (from) [pri'vent] *v* предот-
 вращать
 previous [pri:'vjəs] *a* предыдущий
 prime [praɪm] *a* первичный, простой
 principal ['prɪnsəpəl] *a* главный
 principle ['prɪnsəpl] *n* принцип
 print [prɪnt] *v* печатать; *n* печать;
 reprint оттиск

quadratic [kwə'drætɪk] *a* квадратичный
 quadrilateral [kwɒdri'lætərəl] *n* че-
 тырехугольник
 quantity ['kwɒntəti] *n* количество

radical ['rædɪkəl] *n* корень
 radicand ['rædɪkənd] *n* подкоренное
 выражение
 radius (pl radii) ['reɪdɪəs], ['reɪdɪaɪ] *n*
 радиус; *a* radial радиальный
 raise [reɪz] *v* возводить в степень, по-
 вышать

probability [prəbə'bɪlɪti] *n* вероятность
 probably ['prɒbəblɪ] *adv* вероятно
 problem ['prɒbləm] *n* задача, проб-
 лема
 procedure [prə'sɪ:dʒə] *n* процедура
 proceed [prə'si:d] *v* продолжать
 process ['prəʊses] *n* процесс; *v* обра-
 батывать; *n* ~ing обработка
 produce [prə'dju:s] *v* производить
 product ['prɒdʌkt] *n* произведение;
n ~ion производство
 program (англ.), programme (амер.)
 ['prəʊgræm] *n* программа; ~mer
 программист
 progression [prə'greʃən] *n* прогрессия
 pronunciation [prə'nʌnsi'eɪʃən] *n* про-
 изношение
 proof [pru:f] *n* доказательство
 proper ['prɒpə] *a* 1. собственный;
 2. истинный, правильный; *adv* ~ly
 должным образом; proper fraction
 правильная дробь
 property ['prɒpəti] *n* свойство
 proportional [prə'pɔ:ʃənəl] *a* пропорци-
 ональный; *n* ~ity пропорциональ-
 ность
 proposition [prə'pɔ:zɪʃən] *n* 1. предпо-
 ложение, суждение; 2. теорема
 prove [pru:v] *v* доказывать
 provide [prə'vaɪd] *v* предоставлять,
 давать
 provided [prə'vaɪdɪd] *conj* при усло-
 вии, если
 pseudospherical [psju:'dou'sferɪkəl] *a*
 псевдосферический
 publication [pʌblɪ'keɪʃən] *n* публика-
 ция
 publish ['pʌblɪʃ] *v* издавать
 pull [pul] *n* тяготение; *v* тянуть
 purpose ['pɜ:pəs] *n* цель; *a* ~less
 бессмысленный
 put (put) [put] *v* класть, положить
 pyramid ['pɪrəˌmɪd] *n* пирамида

Q

question ['kwɛstʃən] *n* вопрос
 quite [kwat] *adv* вполне, совсем
 quotient ['kwɒʃənt] *n* частное

R

random ['rændəm] *a* беспорядочный
 range [reɪndʒ] *n* 1. диапазон; 2. об-
 ласть; *v* простираться
 rapidly ['ræpɪdli] *adv* быстро
 rate [reɪt] *n* 1. степень, скорость;
 2. коэффициент
 rather ['rɑ:ðə] *adv* вернее, до некото-
 рой степени; *r.* than *a* не; скорее,

ratio ['reɪʃiə] *n* соотношение
 rational ['ræʃənəl] *a* 1. рациональный;
 2. целесообразный
 ray [reɪ] *n* луч, полупрямая
 reach [ri:tʃ] *v* достигать
 reaction [ri:'ækʃən] *n* реакция
 read (read) [ri:d], [red] *v* читать
 readily ['redɪli] *adv* легко
 ready ['redi] *a* готовый; to be *r.* быть
 готовым
 real [riəl] *a* реальный; действитель-
 ный; *adv* ~ly в самом деле; *v*
 ~ize 1. осуществлять; 2. пони-
 мать; *n* ~ization осуществление
 reason ['ri:zn] *n* 1. причина; 2. разум;
n ~ing рассуждение; *adv* ~able
 разумный, приемлемый
 recently ['ri:səntli] *adv* недавно
 recognize ['rekəɡnaɪz] *v* 1. признавать;
 2. узнавать
 reconcile ['rekənsaɪl] *v* примирять(ся)
 record ['rekɔ:d] *n* запись, регистрация;
v [ri:'kɔ:d] записывать
 rectangle ['rek,tæ'gl] *n* прямоугольник
 rectify ['rektɪfaɪ] *v* выпрямлять,
 спрямлять
 red [red] *a* красный
 reduce [ri'dju:s] *v* 1. уменьшать;
 2. сокращать (до)
 refer (to) [ri'fɛə] *v* 1. ссылаться (на);
 2. иметь отношение; *n* ~ence ссы-
 лка, упоминание; to be referred to as
 называться
 reflect [ri'flekt] *v* отражать
 reflexive [ri'fleksɪv] *a* рефлексивный
 regard [ri'ɡɑ:d] *v* рассматривать; re-
 gardless of независимо от; with re-
 gard to по, относительно
 region ['ri:dʒən] *n* область, сфера
 regular ['regjʊlə] *a* 1. правильный;
 2. регулярный
 relate [ri'leɪt] *v* относить(ся)
 relation [ri'leiʃən] *n* отношение; *n*
 ~ship соотношение
 relative ['relatɪv] *a* 1. относительный;
 2. взаимный; *adv* ~ly относитель-
 но
 reliable [ri'laɪəbl] *a* надежный, досто-
 верный
 rely (on, upon) [ri'laɪ] *v* полагаться
 на
 remain [ri'meɪn] *v* оставаться; *n* ~der
 остаток

saddle ['sædl] *n* седло
 saddleshaped [sædl'feɪpt] *a* седлооб-
 разный
 same [seɪm] *a* тот же самый

remember [ri'membə] *v* помнить
 remove [ri'mu:v] *v* удалять; to *r.* pa-
 rentheses раскрывать скобки
 repeat [ri'pi:t] *v* повторять; repeating
 decimal периодическая десятичная
 дробь
 replace [ri'pleɪs] *v* заменять, заме-
 шать; *n* ~ment замещение
 represent [reprɪ'zent] *v* представлять
 request [ri'kwest] *n* просьба
 require [ri'kwaɪə] *v* требовать(ся),
 нуждаться; *a* ~d искомый
 research [ri'sə:tʃ] *n* исследование, изу-
 чение
 resolve [ri'zɒlv] *v* разлагать
 respect [ris'pekt] *n* отношение, каса-
 тельство; with *r.* to относительно;
adv ~ively соответственно
 rest [rest] *n* 1. покой, отдых; 2. the *r.*
 остаток; 3. at, *r.* в состоянии покоя;
v отдыхать
 restrict [ris'trikt] *v* ограничивать; *a*
 ~ed ограниченный
 result [ri'zʌlt] *n* результат; *v* проис-
 текать; to *r.* in приводить к; *a* ~ing
 результирующий; as a result of в
 результате
 return [ri'tɜ:n] *v* возвращать(ся),
 двигаться обратно
 reverse [ri've:s] *a* обратный
 review [ri'vju:] *n* обзор, рецензия
 revolution [revə'lju:ʃən] *n* 1. враще-
 ние; 2. революция
 reward [ri'wɔ:d] *n* награда; *v* награж-
 дать
 rhombus ['rɒmbəs] *n* ромб
 right [raɪt] *a* 1. правильный, правый;
 2. прямой
 ring [rɪŋ] *n* кольцо
 rise (rose, risen) [raɪz], [rouz], [ri:zn]
v подниматься; *n* подъем; to give
r. to вызывать
 room [ru:m] *n* 1. комната; 2. место,
 пространство
 root [ru:t] *n* корень
 rope [rəʊp] *n* веревка
 rotation [rou'teɪʃən] *n* вращение
 round [raʊnd] *a* круглый
 rule [ru:l] *n* правило
 ruler [ru:lə] *n* линейка
 run (ran, run) [rʌn], [rʌp] *v* 1. пробе-
 гать; 2. длиться; *n* бег, ход, тече-
 ние, интервал изменения

S

sample ['sɑ:mpl] *n* выборка, образец
 sand [sænd] *n* песок
 satisfy ['sætɪsfaɪ] *v* удовлетворять
 Saturday ['sætədi] *n* суббота

save [seiv] *v* спасать, оберегать
 say [said] [sei], [sed] *v* сказать
 scalar ['skeɪlə] *n* скалярная величина
 scatter ['skætə] *v* рассеивать
 school [sku:l] *n* школа
 science ['saɪəns] *n* наука
 scientific [ˌsaɪən'tɪfɪk] *a* научный
 scientist ['saɪəntɪst] *n* ученый
 scream [skri:m] *v* кричать; *s. for* (зд.) проситься
 scrupulous ['skru:pjələs] *a* тщательный
 second ['sekənd] 1. *n* секунда; 2. *a* второй
 section ['sekʃən] *n* 1. сечение, разрез; 2. раздел
 see (saw, seen) [si:], [so:], [si:n] *v* видеть
 seem [si:m] *v* казаться
 segment ['segment] *n* отрезок линии
 seldom ['seldəm] *adv* редко
 select [si'lekt] *v* выбирать
 self [self] *n* сам
 semicircle [ˌsemi'sə:kl] *n* полукруг
 seminar ['seminɑ:] *n* семинар
 send (sent) [send], [sent] *v* посылать
 sense [sens] *n* 1. смысл, значение; 2. направление; 3. ощущение
 sentence ['sentəns] *n* предложение, выражение
 separate ['sepəreit] *v* отделять;
a ['sepɪt] отдельный
 September [sep'tembə] *n* сентябрь
 sequence ['si:kwəns] *n* последовательность
 series (pl series) ['siəri:z] *n* ряд
 serve [sə:v] *v* служить
 set [set] 1. *n* множество, набор; 2. *v* ставить, учреждать
 seven ['sevn] *num* семь
 several ['sevrəl] *a* несколько
 shape [ʃeɪp] *n* форма
 sharp [ʃɑ:p] *a* острый
 she [ʃi:] *pron* она
 sheet [ʃi:t] *n* лист
 short [ʃɔ:t] *a* короткий
 should [ʃʊd] *v* должен, следует
 show (p. p. shown) [ʃou], [ʃoun] *v* показывать
 side [saɪd] *n* сторона
 sign [saɪn] *n* знак, символ
 significance [ˌsɪɡ'nɪfɪkəns] *n* значение
 significant [ˌsɪɡ'nɪfɪkənt] *a* значительный
 signify ['sɪgnɪfaɪ] *v* обозначать
 silently ['saɪləntli] *adv* молча, про себя
 similar ['sɪmɪlə] *a* подобный; *adv* ~ly подобно
 simple ['sɪmpl] *a* простой
 simplicity [sɪm'plɪsɪti] *n* простота

since [sɪns] *adv* с тех пор как
 since *conj* так как, поскольку
 single ['sɪŋɡl] *a* единственный, один
 sister ['sɪstə] *n* сестра
 sit (sat) [sit], [sæt] *v* сидеть
 situation [ˌsɪtʃu'eɪʃən] *n* положение
 six [sɪks] *num* шесть
 size [saɪz] *n* размер
 sketch [sketʃ] *n* набросок, эскиз
 skip [skip] *v* пропускать
 sky [skaɪ] *n* небо
 slight [slaɪt] *a* незначительный; слабый; *adv* ~ly слегка
 slip [slɪp] *n* обрывок
 slope [sləʊp] *n* наклон
 slow [sləʊ] *a* медленный
 small [smɔ:l] *a* маленький; *n* малая величина
 smooth [smu:θ] *a* гладкий
 so [soʊ] *adv* так, таким образом; *so* that так, чтобы
 solar ['səʊlə] *a* солнечный
 solid ['sɒlɪd] *n* твердое тело; *a* 1. твердый; 2. пространственный
 solution [sə'lju:ʃən] *n* решение
 solve [sɒlv] *v* решать, разрешать
 some [sʌm] *pron* 1. некоторый, какой-нибудь; 2. несколько; ~body кто-то; ~one кто-то; ~thing что-то, кое-что; ~where где-нибудь, куда-нибудь; ~how как-то
 sometimes ['sʌmtaɪmz] *adv* иногда
 soon [su:n] *adv* скоро
 sort [sɔ:t] *n* сорт, род
 source [sɔ:s] *n* источник
 Soviet ['səʊvjet] *a* советский
 space [speɪs] *n* 1. пространство; 2. космос
 speak (spoke, spoken) [spi:k], [spəʊk], [spəʊkn] *v* говорить, разговаривать
 special ['speʃəl] *a* особенный, особый
 specific [spɪ'sɪfɪk] *a* характерный
 specify ['spesɪfaɪ] *v* уточнять
 speech [spi:tʃ] *n* речь
 speed [spi:d] *n* скорость
 sphere [ʃiə] *n* сфера, шар
 spread (spread) [spred] *v* распространяться
 spring [sprɪŋ] *n* 1. пружина; 2. весна
 square [skweə] *n* 1. квадрат; 2. вторая степень; *a* квадратный; *a* ~d в квадрате
 stage [steɪdʒ] *n* стадия, этап
 stamp [stæmp] *n* марка
 stand (stood) [stænd], [stud] *v* 1. стоять; 2. помещать
 standard ['stændəd] *a* образцовый
 start [stɑ:t] *v* начинать, отправляться
 state [steɪt] *v* утверждать; *a* ~d изложенный; *n* состояние, положение;

n ~ment утверждение, формулировка
 stay [steɪ] *v* оставаться
 step [step] *n* шаг
 still [stɪl] *adv* однако, все еще
 stimulate ['stɪmjuleɪt] *v* стимулировать
 stop [stɒp] *n* остановка; *v* останавливать(ся)
 store [stɔ:] *v* накапливать, хранить
 story ['stɔ:ri] *n* рассказ
 straight [streɪt] *a* прямой, прямолинейный
 stress [stres] *n* напряжение, усилие; *v* подчеркивать
 stretch [stretʃ] *v* растягивать(ся), протирать(ся)
 strict [strikt] *a* строгий, точный; *adv* ~ly строго
 strong [strɒŋ] *a* сильный
 structure ['strʌktʃə] *n* структура
 student ['stju:dənt] *n* учащийся, студент
 study ['stʌdi] *v* учиться, изучать
 subconsciously [səb'kɒnʃiəsli] *adv* подсознательно
 subject ['sʌbdʒɪkt] *n* предмет, тема
 subject [səb'dʒekt] *v* подвергать
 subordinate [səb'ɔ:dɪneɪt] *v* подчинять; *a* [sə'ɔ:dɪnɪt] подчиненный
 subset ['sʌb,seɪt] *n* подмножество
 substitute ['sʌbstɪtju:t] *v* замещать, заменять
 subtend [səb'tend] *v* стягивать (угол)
 subtract [səb'trækt] *v* вычитать; *n* subtraction вычитание
 subtrahend ['sʌbtrəhend] *n* вычитаемое
 succeed (in) [sək'si:d] *v* достигать цели, преуспевать, суметь
 success [sək'ses] *n* успех; *a* ~ful успешный; *adv* ~fully успешно

table ['teɪbl] *n* 1. таблица; 2. стол
 tail [teɪl] *n* хвост, хвостовое оперение
 take (took, taken) [teɪk], [tuk], ['teɪkn] *v* брать, взять; *to t. place* происходить
 tangent ['tændʒənt] *n* 1. касательная; 2. тангенс
 tape [teɪp] *n* лента
 task [tɑ:sk] *n* задача, задание
 teach (taught) [ti:tʃ], [tɔ:t] *v* обучать, учить; *n* ~er преподаватель
 team [ti:m] *n* команда (спорт.)
 technology [tek'nɒlədʒi] *n* техника
 tell (told) [tel], [tould] *v* рассказывать, сказать

succession [sək'sesən] *n* последовательность; *a* ~ive следующий, последующий
 such [sʌtʃ] *a* такой; *s. as* как например
 sufficient [sə'fɪʃənt] *a* достаточный, удовлетворительный; *adv* ~ly достаточно
 suggest [sə'dʒest] *v* предполагать, предлагать
 suitable [sju:təbl] *a* подходящий, годный
 sum [sʌm] *n* сумма, итог; *v* складывать
 summand ['sʌmənd] *a* слагаемое
 summarize ['sʌməraɪz] *v* подводить итог, резюмировать
 summary ['sʌməri] *n* резюме, обзор
 summer ['sʌmə] *n* лето
 sun [sʌn] *n* солнце
 Sunday ['sʌndi] *n* воскресенье
 superset ['sju:pəset] *n* сверхмножество
 supply [sə'plai] *v* снабжать, предоставлять
 support [sə'pɔ:t] *n* поддержка; *v* поддерживать
 suppose [sə'pəʊz] *v* предполагать
 suppress [sə'pres] *v* подавлять, сокращать
 sure [ʃʊə] *a* верный, уверенный; *to be s. by* быть уверенным
 surface ['sɜ:fɪs] *n* поверхность
 switch [swɪtʃ] *n* выключатель; *to s. on* включать; *to s. off* выключать
 symbol ['sɪmbəl] *n* символ, обозначение; *v* ~ize символизировать, означать
 symmetric [sɪ'metrik] *a* симметричный
 system ['sɪstɪm] *n* система; *a* ~atic систематический

T

temperature ['temprɪtə] *n* температура
 ten [ten] *num* десять
 tend [tend] *v* стремиться, приближаться
 tendency ['tendənsi] *n* тенденция, склонность
 tennis ['tenɪs] *n* теннис
 term [tɜ:m] *n* 1. член, терм; 2. термин; 3. семестр; *in terms of* с точки зрения
 terminology [ˌtɜ:mɪ'nɒlədʒi] *n* терминология
 test [test] *n* тест, проверка; *v* подвергать проверке

text [tekst] *n* текст
 textbook *n* учебник
 than [ðæn] *conj* чем; rather *t.* а не, скорее ... чем
 thank [θæŋk] *v* благодарить; thanks *to* благодаря
 that (pl those) ðæt, [ðəʊz] *pron* тот, то, те; *t.* is to есть
 their [ðeə] *pron* их, свой
 themselves [ðəm'selvz] *pron* сами
 then [ðen] *adv* тогда, затем
 theorem ['θiərəm] *n* теорема
 theory ['θiəri] *n* теория; *a* ~etical теоретический
 there [ðeə] *adv* там, туда
 thereby ['ðeəbaɪ] *adv* тем самым
 therefore ['ðeəfɔː] *adv* поэтому
 these [ðiːz] *pron* эти
 thesis (pl theses) ['θiːsɪs], ['θiːsɪz] *n* тезис, диссертация
 they [eɪ] *pron* они
 thick [θɪk] *a* толстый; *n* ~ness толщина
 thin [θɪn] *a* тонкий
 thing [θɪŋ] *n* вещь, предмет; the *t.* is дело в том, что
 think (thought) [θɪŋk], [θɔːt] *v* думать
 this (pl these) [ðɪs], [ðiːz] *pron* этот, это
 those [ðəʊz] *pron* те
 though [ðəʊ] *conj* хотя; as *t.* как будто бы
 thought [θɔːt] *n* мысль, идея
 thousand ['θaʊzənd] *num* тысяча
 three [θriː] *num* три
 through [θruː] *prep* сквозь, через
 Thursday ['θɜːzdi] *n* четверг
 thus [ðʌs] *adv* так, таким образом
 till [tɪl] *prep* до; *conj* до тех пор пока
 time [taɪm] *n* 1. время; 2. раз
 today [tə'deɪ] *adv* сегодня
 together [tə'geðə] *adv* вместе
 tomorrow [tə'mɔːrəʊ] *adv* завтра
 to [tə] *prep* указ. направление или предел времени
 too [tuː] *adv* 1. также; 2. слишком

tool [tuːl] *n* инструмент, орудие
 top [tɒp] *n* верх, верхушка, крышка
 topic ['tɒpɪk] *n* тема
 topology [tə'pɒlədʒi] *n* топология
 toss [tɒs] *v* подбрасывать
 total ['təʊtəl] *n* сумма, целое; *a* общий, целый
 toward [tə'wɔːd] *prep* по направлению к
 town [taʊn] *n* город
 traditional [trə'dɪʃənəl] *a* традиционный
 transcendental [trænsen'dentl] *a* трансцендентный
 transcribe [træns'kraɪb] *v* расшифровать (зд.)
 transfer ['trænsfəː] *n* перенос; *v* [træns'fɜː] переносить, передавать
 transitive ['trænsɪtɪv] *a* транзитивный
 translate [træns'leɪt] *v* 1. переносить; 2. переводить, толковать
 travel ['trævl] *v* перемещаться, передвигаться
 treat [tri:t] *v* обращаться (с)
 trial ['traɪəl] *n* попытка, опыт, проба
 triangle ['traɪəŋɡl] *n* треугольник
 trinomial [traɪ'nəʊmɪjəl] *n* трехчлен
 true [truː] *a* истинный, верный; to hold *t.* быть справедливым
 truth [truːθ] *n* истина, правда
 try [traɪ] *v* 1. пытаться, 2. испытывать
 -tuple [-tʌpl] *suf* кратное; *n*-tuple *n*-ка; *n*-строка
 Tuesday ['tjuːzdi] *n* вторник
 turn [tɜːn] *v* поворачивать(ся); to *t.* to обращаться к; to *t.* out оказываться; in *t.* в свою очередь
 twice [twais] *adv* дважды; *t.* as much вдвое больше
 twelve [twelv] *num* двенадцать
 twenty ['twenti] *num* двадцать
 two [tuː] *num* два
 type [taɪp] 1. *n* тип, вид; 2. *v* печатать на машинке
 typewritten ['taɪp,rɪtn] *a* напечатанный

U

undefined [ʌndɪ'faɪnd] *a* неопределенный
 under [ʌndə] *prep* 1. под; 2. при; 3. в процессе
 underline [ʌndə'leɪn] *v* подчеркивать
 understand (understood) [ʌndə'stænd], [ʌndə'stʌd] *v* понимать; *n* ~ing понимание
 unfortunately [ʌn'fɔːtʃənətli] *adv* к сожалению

unidirectional ['juːnɪdɪ'rekʃənəl] *adv* односторонний
 uniform ['juːnɪfɔːm] *a* однородный, равномерный
 union ['juːnjən] *n* объединение, союз
 unique [juː'niːk] *a* единственный, односторонний; *n* ~ness единственность
 unit ['juːnɪt] *n* 1. единица; 2. единица измерения; 3. блок, узел

universal [juːnɪ'vɜːsəl] *a* всеобщий, всемирный
 university [juːnɪ'vɜːsɪti] *n* университет
 unknown [ʌn'nəʊn] *a* неизвестный
 unless [ʌn'les] *conj* если не, разве что
 unlike [ʌn'laɪk] *adv* в отличие от; *a* ~ly маловероятный
 unlimited [ʌn'limitɪd] *a* неограниченный

valid ['vælid] *a* справедливый, имеющий силу; *n* ~ity справедливость
 value ['væljuː] *n* величина, значение
 vanish ['vænɪʃ] *v* исчезать
 variable ['vɛəriəbl] *a* переменная
 variation [vɛəri'eɪʃən] *n* изменение
 variety [və'reɪtɪ] *n* разнообразие
 various ['vɛəriəs] *a* различный
 vary ['vɛəri] *v* различаться, отличаться
 vector ['vektə] *n* вектор
 velocity [vɪ'lɒsɪti] *n* скорость (векторная)

want [wɒnt] *v* хотеть
 watch [wɒtʃ] *v* наблюдать
 wave [weɪv] *n* волна
 way [weɪ] *n* путь, способ, средство
 we [wiː] *pron* мы
 weak [wiːk] *a* слабый
 Wednesday ['wenzdi] *n* среда
 week [wiːk] *n* неделя
 weigh [weɪ] *v* весить, взвешивать
 weight [weɪt] *n* вес
 well [wel] *adv* хорошо
 what [wɒt] *pron* что, какой
 wheat [wiːt] *n* пшеница
 when [wen] *conj* когда; *adv* тогда как;
conj ~ever всякий раз когда
 where [weə] *adv* *conj* где, куда
 whereas [weə'æz] *conj* тогда как
 whereby [weə'baɪ] *adv* тем самым
 whether ['weðə] *conj* ли
 which [wɪtʃ] *pron* какой, который, что
 while [waɪl] *conj* в то время как
 white [waɪt] *a* белый
 who [huː] *pron* который
 whole [həʊl] *adv* целый, весь

x-rays ['eks'reɪz] *n* рентгеновские лучи

until [ʌn'tɪl] *prep* до
 up [ʌp] *adv* вверх, по; *a* ~per верхний
 use [juːs] *n* употребление, применение;
v [juːz] применять, использовать;
a ~ful полезный
 usual ['juːʒuəl] *a* обычный; *adv* ~ly обычно
 utilize ['juːtɪlaɪz] *v* использовать

V

vertex (pl verteces) ['vɜːteks], ['vɜːtɪsɪz] *n* вершина
 vertical ['vɜːtɪkəl] *a* вертикальный
 very ['veri] *adv* очень; *a* the *v.* самый, самая
 via ['vaɪə] *prep* через, посредством
 vice versa ['vaɪsɪ'vɜːsə] *adv* наоборот
 viewpoint ['vjuːpɔɪnt] *n* точка зрения
 visualize ['vɪzjuəlaɪz] *v* зрительно представить
 vocabulary [və'kæbjʊləri] *n* словарь
 volume ['vɒljum] *n* объем

W

whose [huːz] *pron* чей
 why [waɪ] *adv* почему
 wide [waɪd] *a* широкий
 width [wɪdθ] *n* ширина
 wing [wɪŋ] *n* крыло
 winter ['wɪntə] *n* зима
 wish [wɪʃ] *v* хотеть
 with [wɪð] *prep* с, со
 within [wɪð'in] *adv* в пределах
 without [wɪð'aʊt] *prep* без
 woman (pl women) ['wʊmən], ['wɪmɪn] *n* женщина
 wonder ['wʌndə] *v* интересоваться
 wood [wʊd] *n* дерево
 word [wɜːd] *n* слово
 work [wɜːk] *n* работа; *v* работать
 world [wɜːld] *n* мир
 worse [wɜːs] *a* хуже
 worst [wɜːst] *a* наихудший
 worth [wɜːθ] *a* стоящий, заслуживающий
 write (wrote, written) [raɪt], [raʊt], [rɪtn] *v* писать
 wrong [rɒŋ] *a* ошибочный

X

x-rays ['eks'reɪz] *n* рентгеновские лучи

Y

year [jɜ:] *n* год
 yes [jes] да
 yesterday ['jestədi] *adv* вчера
 yet [jet] 1. *adv* еще, все еще; 2. *conj*
 однако

yield [ji:ld] *v* давать
 you [ju:] *pron* ты, вы
 young [jʌŋ] *a* молодой
 your [jɔ:] *pron* ваш

Z

zero ['ziərou] *n* ноль

Раздел для преподавателя

МЕТОДИЧЕСКИЕ РЕКОМЕНДАЦИИ

Приступая к работе с настоящим курсом, преподаватель должен тщательно изучить как структуру и содержание курса в целом, так и структурные особенности отдельного урока и, следовательно, цикла занятий. Последние особенно важны, так как структура урока и цикла меняется трижды на протяжении курса в зависимости от этапа обучения и задач, стоящих перед каждым из трех этапов. В курсе этапам обучения соответствуют три его части: первая часть включает уроки 1—16; вторая — уроки 17—25, третья — уроки 26—30.

В чем же специфика каждого этапа и каким образом она отразилась на структуре урока-параграфа и цикла занятий?

Главная задача первого этапа состоит в том, чтобы выработать у обучаемых произносительные, лексические и грамматические навыки и умения чтения и устной речи, способные лечь в основу дальнейшего обучения. Студенты знакомятся с правилами чтения и получают необходимый минимум сведений по фонетике (уроки 1—6) и словообразованию (уроки 7—12). Грамматика этого этапа содержит основные понятия синтаксиса и морфологии. Сюда входит вся система времен английского глагола в действительном и страдательном залогах, сведения о простом и сложном предложении, в том числе бессоюзного подчинения, модальные глаголы, элементарные сведения о неличных формах глагола и т. д. На этом этапе и в дальнейшем грамматические явления вводятся как в сравнении с русским языком по линии сходства и расхождения, так и в сопоставлении с явлениями английской грамматики. Словарный состав первого этапа представлен главным образом общеупотребительной и общенаучной лексикой и в меньшей степени специальными математическими терминами. Это и понятно, поскольку речь идет о курсе для начинающих. Преимущественное внимание на данном этапе уде-

ляется устной речи. Количество и характер упражнений ствечает поставленной задаче. В каждом уроке имеется по одному тексту (не считая трех первых уроков, не имеющих связанных текстов). Средний объем текста равен 2000 печ. зн.

Грамматика второго этапа знакомит студентов со сложными формами герундия, причастия и инфинитива, сослагательным наклонением — явлениями, характеризующими язык научной прозы. Меняется и лексический состав текстов в сторону уменьшения общеупотребительной лексики и увеличения числа общенаучных и специально-терминологических слов. Удельный вес чтения возрастает. Об этом свидетельствует изменение характера упражнений и предтекстовых и послетекстовых заданий, изменение соотношения упражнений различного типа, а также увеличение числа и объема текстов в уроке. В составе урока по два текста. Объем каждого из них равен в среднем 2500 печ. зн.

Уроки третьего этапа, в отличие от первых двух, не содержат новых сведений по грамматике. Задача заключается в углублении приобретенных знаний и упрочении грамматических и лексических навыков, а также в дальнейшем наращивании словарного запаса, главным образом за счет общенаучной и специально-терминологической лексики. Работа над совершенствованием умения читать научную литературу по специальности (имеются в виду различные виды чтения: с общим охватом содержания, ознакомительное, и наконец, детальное, с полным пониманием) приобретает решающее значение. Этой задаче подчинены устные и письменные тренировочные и речевые упражнения и система целевых заданий в связи с текстами, число которых увеличивается на этом этапе до трех. Из них два текста входят в содержание собственно урока и один текст помещен в разделе для преподавателя. Он предназначен для прослушивания учащимися в ЛУРе*.

Изменение конкретной целевой установки от этапа к этапу определило структуру и содержание цикла занятий. Приводимая ниже схема дает наглядное представление о поэтапном изменении взаиморасположения структурных единиц цикла — аудиторных, домашних и лабораторных занятий и о последовательности появления текстов в системе занятий.

1-й этап*						
I А.З. (один час)	I Л.З.	I Д.З.	II А.З. (два часа)	II Л.З.	II Д.З.	III А.З. (один час)
↑ Текст						

* В группах аспирантов на протяжении третьего этапа обучения по курсу предусмотрена, кроме того, обязательная индивидуально-групповая работа над научными текстами по узкой специальности каждого аспиранта. В течение недели аспирант должен прочесть не менее 10—15 страниц. Средний объем текста на данном этапе равен примерно 4000 печ. зн.

2-й этап						
I А.З. (один час)	I Д.З.	I Л.З.	II А.З. (два часа)	II Д.З.	II Л.З.	III А.З. (один час)
↑ Текст I			↑ Текст II			
3-й этап						
I Д.З.	I Л.З.	I А.З. (два часа)	II Д.З.	II Л.З.	II А.З. (два часа)	
↑ Текст I		↑ Текст II		↑ Текст III		

В интересах эффективности обучения по курсу автор считает необходимым рекомендовать строгое соблюдение предусмотренной последовательности в работе над материалом. Эта последовательность нашла отражение не только во взаиморасположении занятий в рамках отдельного цикла, но и в распределении учебного материала — текстов, упражнений и целевых заданий в связи с текстами на протяжении отдельного занятия и цепочки занятий внутри цикла. Соблюдению последовательности учебных действий с материалом способствует единая, сквозная нумерация, охватывающая все домашние и аудиторные упражнения, в том числе и упражнения для аудирования, помещенные в целях исключения зрительной опоры в раздел для преподавателя. В содержании аудиторного занятия как такового названы лишь номера этих упражнений и сформулировано задание (иногда дан образец выполнения).

ПРОИЗНОШЕНИЕ И ТЕХНИКА ЧТЕНИЯ

Овладение основами произношения происходит на I этапе и начинается с введения преподавателем букв, соответствующих им звуков и правил чтения. Краткие объяснения сопровождаются чтением обучаемыми фонетических упражнений, иллюстрирующих новый материал и способствующих его первичному закреплению. Дальнейшее формирование навыков произношения, звуко-буквенного соотношения и техники чтения происходит на последующих аудиторных и лабораторных занятиях, начинающихся на протяжении курса обучения с соответствующих упражнений.

В предлагаемом курсе придается большое значение имитационным упражнениям. Имитация важна как при выработке произносительных навыков, так и навыков интонирования и выделения смысловых групп внутри предложения. При этом большое место должна занимать работа хором. Целесообразно чтение вслух, вслед за преподавателем не только фонетических упражнений, но

* АЗ — аудиторное занятие; ДЗ — домашнее занятие; ЛЗ — лабораторное занятие (самостоятельное).

и предложений, иллюстрирующих вновь введенное грамматическое явление. Такое чтение способствует более прочному овладению фонетическим и ритмико-интонационным звучанием грамматической конструкции, что очень важно для овладения техникой слитного чтения вслух и про себя и для понимания читаемого. Новый текст урока первого этапа, вводимый на втором аудиторном занятии, должен быть прочитан преподавателем вслух. Обучаемые, читая текст вслед за преподавателем, делают разметку пауз и интонации и затем самостоятельно читают текст про себя. Продолжается отработка техники связного чтения во время второго лабораторного занятия и дома. Формы работы с текстом указаны. На последнем, аудиторном занятии очередного цикла, в ходе выполнения фонетических упражнений и обязательного чтения студентами текста вслух, осуществляется контроль овладения материалом и дальнейшее совершенствование произносительных навыков и техники чтения.

На втором и третьем этапах также предусмотрены обязательные упражнения, формирующие произносительные навыки и навыки звукозрительного соотношения.

На втором этапе желательна самостоятельная отработка техники чтения текста в ЛУРе. Во время аудиторного занятия представляется излишним сплошное чтение текста вслух. Здесь можно ограничиться тщательной отработкой техники чтения одного-двух абзацев.

На третьем этапе работа над текстами параграфа в ЛУРе не предусмотрена. Однако текст для аудирования, помещенный в раздел для преподавателя, должен быть записан на магнитную пленку и включен в состав второго лабораторного занятия цикла. Основное внимание на втором и третьем этапах уделяется формированию умения читать про себя.

ГРАММАТИКА

Весь грамматический материал, отобранный в минимум, вводится преподавателем на первом аудиторном занятии цикла. Самостоятельное ознакомление обучаемых с новыми грамматическими явлениями в описываемых условиях интенсивного курса не рационально, ибо, оно приводит к неоправданно большой потере времени и не дает ожидаемых результатов.

Требования интенсификации процесса обучения диктуют необходимость комплексного введения грамматического материала, с учетом особенностей восприятия и мышления данного контингента и того, что усвоение иностранного языка во взрослой аудитории с неизбежностью протекает на базе родного языка. Комплексного введения требует, в частности, видо-временная система английского глагола. Количество форм, передающих определенные значения в родном и иностранном языках не совпадает: на 12 видо-временных форм глагола в английском языке приходится лишь 3 формы в русском. При комплексном введении системы английского гла-

гола перед учащимися возникает целостная картина значений, передаваемых различными формами глагола, и тем самым раскрывается внутренняя логика системы, столь трудно постигаемая при последовательном, фрагментарном введении времен. После того как (на одном занятии) с помощью условного перевода перед студентами раскрывается в сопоставлении вся система значений, передаваемая средствами двух языков (12 английских времен и 3 русских времени), можно переходить к последовательному формированию навыков владения каждой отдельной группой времен.

Новый грамматический материал целесообразно вводить в виде кратких правил-инструкций, которые указывали бы не только на форму, формальные признаки, и содержание данного грамматического явления, выраженного через эту форму, но и на последовательность умственных действий, которые должны привести к узнаванию грамматического явления и пониманию его в тексте. Упражнения, следующие непосредственно за объяснением, иллюстрируют введенное грамматическое явление, раскрывают его сущность и способствуют его осмыслению и первичному закреплению.

Новое грамматическое явление вводится и подвергается первичному закреплению в упражнениях, содержащих знакомую лексику (исключение составляют несколько первых уроков). В упражнениях, как правило, используются и легко доступные узнаванию интернациональные слова урока. Грамматические упражнения, выполняемые в ходе последующих занятий цикла, наряду с ранее изученной лексикой, включают новые слова урока, что обеспечивает параллельное овладение грамматикой и лексикой, подлежащих усвоению и свидетельствует о комплексном характере упражнений.

ЛЕКСИКА

На всем протяжении курса основным способом семантизации лексики является перевод, так как в описываемых условиях он представляется наиболее экономичным. Используются и другие способы раскрытия значения слов. Так, начиная уже с первого урока, в учебный материал занятий включаются упражнения, формирующие языковую догадку. Это — обязательная для каждого занятия работа над интернациональными словами и над выработкой прочных навыков словообразования с помощью аффиксов и конверсионной деривации. Система заданий к текстам (второй и третий этап) предполагает также формирование у обучаемых контекстуальной и смысловой догадки о значении неизученных слов.

Тексту урока первой части курса и первому из каждой пары текстов урока второй части приданы поурочные лексические списки. В каждом таком списке выделены 2 части: 1) Список интернациональных слов текста и производных от ранее изученных. Слова этого списка снабжены транскрипцией и даны

без перевода. Об их значении учащийся может и должен догадаться. 2) Во второй части списка представлены остальные новые слова и словосочетания (с транскрипцией и однозначным переводом).

Лексические списки используются для чтения обучаемыми слов хором, вслед за преподавателем, и самостоятельно, с целью овладения произносительной стороной слов. Наличие списков в уроке избавит обучаемых от необходимости постоянного обращения к словарю, затруднительного на первых порах в условиях интенсивного прохождения материала. Однако постепенно необходимо приучать учащихся к пользованию словарем — сначала англо-русским словарем пособия, а затем общими и специальными словарями. Характер работы над текстами второй и третьей частей пособия предполагает создание у учащихся требуемого навыка.

Новая лексика, входящая в состав второго из каждой пары текстов уроков второй и третьей частей пособия, не оформлена в виде отдельных списков слов. Новые слова, о значении которых, по мнению автора, обучаемые могут догадаться на основании знания интернациональной лексики, элементов словообразования и конверсионной деривации, вынесены перед текстом. С ними учащиеся должны ознакомиться прежде, чем они приступят к чтению текста с общим охватом содержания. Слова, о значении которых учащиеся не могут догадаться, снабжены в самом тексте русским эквивалентом. Новые слова, значение которых может быть понято из контекста, даются без русского эквивалента. При последующем детальном чтении текста значение этих слов уточняется по словарю.

К словарю обучаемые обращаются и прежде, чем приступить к самостоятельному детальному чтению первого из двух текстов урока третьей части в ходе выполнения предтекстовых упражнений, предназначенных для частичного снятия трудностей.

Работы со словарем потребует и чтение газеты и научных текстов по профилю узкой специальности аспиранта.

Новой лексике урока обеспечивается многократная повторяемость в упражнениях очередного и последующих циклов. Усвоение слов в контексте тренировочных лексико-грамматических, а также речевых упражнений способствует их непроизвольному запоминанию и включению в речь.

Единая общая тематическая направленность текстов курса позволяет обеспечить на всем его протяжении высокую естественную повторяемость лексики (равно как и грамматических явлений, характеризующих данный функциональный стиль).

Реальный объем словаря, которым овладевает обучаемый в результате работы, достигает 3000—3200 лексических единиц. Он складывается за счет: а) 1900 лексических единиц, отражающих словарный состав текстов. Они образуют англо-русский словарь-минимум курса; б) около 400 словосочета-

ний, состоящих из известных учащимся слов-компонентов. Значение словосочетаний легко выводимо и, поэтому, они не включены в словарь-минимум. Значительная часть их встречается в текстах и упражнениях курса; в) 600 слов, производных от слов, входящих в словарь-минимум. Они представлены в виде отдельного списка в разделе для преподавателя. Слова этого списка систематически включаются в упражнения курса, что обеспечивает их усвоение; г) 200 интернациональных слов, также вынесенных списком в раздел для преподавателя*. Этот список представлен, главным образом, словами общенаучного и специально-терминологического слоев, графический рисунок, звучание и объем значений которых совпадают с соответствующими словами русского языка. Это делает их легко доступными узнаванию. Слова этого списка не входят непосредственно в состав текстов и упражнений курса. Работа над ними должна быть организована преподавателем, ведущим занятия (например, предъявление карточек с записанными на них словами — изолированно или в сочетании с одним-двумя известными словами — или узнавание слов в связном контексте при работе над текстом по узкой специальности или газетой и т. д.).

Источником пополнения лексического запаса аспиранта является обязательное индивидуальное чтение им под контролем преподавателя узко-профильной научной литературы и газеты. Эта работа позволяет увеличить словарь на 200—300 лексических единиц, в основном, за счет терминов, типичных для той или иной конкретной области математической науки и слов, характеризующих язык газетной публицистики (часто совпадающих с общенаучной лексикой).

Последовательность работы над учебным материалом в рамках цикла занятий по этапам обучения.

I этап. Введение и первичное закрепление нового материала происходит на первом аудиторном занятии очередного цикла в последовательности, предусмотренной автором (на это отводится один академический час). Все упражнения первого аудиторного занятия должны быть выполнены вслед за введением нового материала. Форма работы, как правило, указана в задании к упражнению. Дальнейшее овладение новым языковым материалом урока происходит сначала в ЛУРе и затем в ходе выполнения домашнего задания. В ЛУРе обучаемые проделывают устные упражнения, главным образом с опорой на печатный текст. Домашние задания — преимущественно письменные и устно-письменные. Продолжается овладение новым материалом на втором ауди-

* Выделение этого списка слов осуществлялось на основе «Учебного словаря-минимума для студентов математиков». М. М. Глушко. М., Изд-во МГУ, 1972. Этот же словарь был использован автором настоящего пособия для наложения на него словаря пособия и проверки достаточности последнего.

торном занятии. В аудитории чрезвычайно эффективной оказывается парная работа. По существу большинство упражнений типа: преподаватель—обучаемый можно выполнять в парах, при условии контроля со стороны преподавателя. Для максимального увеличения времени говорения на занятии можно использовать и другую форму работы: преподаватель последовательно поручает обучаемым свою роль (в вопросо-ответных и других упражнениях) *. После выполнения всех упражнений, предшествующих тексту, обучаемые приступают к работе непосредственно над текстом. К этому моменту, благодаря работе, проделанной учащимися в ЛУРе, дома и в аудитории, большинство трудностей текста оказываются снятыми, что позволяет им осуществить беспереводное чтение, с общим охватом содержания. Проверить понимание обучаемыми основных положений позволяют несколько общих вопросов по содержанию прочитанного. На первом этапе ответы могут быть даны на русском языке. Детальное чтение текста, углубленное овладение языковой и содержательной стороной его, равно как и дальнейшее овладение языковыми навыками и умениями осуществляется в ЛУРе и дома.

Третье аудиторное занятие каждого очередного цикла посвящается дальнейшему углублению знаний, упрочнению навыков, умений, а также контролю усвоения материала. Обучаемые читают весь текст вслух. Что же касается перевода на русский язык, то излишне прибегать к сплошному переводу всех предложений текста. Целесообразно переводить лишь те предложения, которые вызвали затруднения при работе дома, те, которые иллюстрируют изучаемые лексические и грамматические трудности, или те, которые, как подсказывает опыт преподавателя, могут быть ошибочно поняты. Контроль понимания успешно осуществляется и на одноязычных речевых упражнениях. В этом смысле весьма эффективны упражнения, в которых даны утверждения, предполагающие реакцию типа: правильно-ошибочно (да-нет) и вопросо-ответные упражнения.

II этап. В отличие от первого этапа, работа над первым текстом урока начинается дома, во время первого домашнего занятия следующего непосредственно за аудиторным, на котором вводится новый грамматический материал. Упражнения, выполняемые обучаемыми прежде, чем они приступают к работе над текстом, направлены на частичное снятие его трудностей. Первое чтение текста—ознакомительное. Далее следует детальное чтение того же текста, с элементами анализа и, наконец, чтение с полным пониманием.

Для упрощения работы с текстами все предложения текстов пронумерованы. Обучаемые быстро привыкают к этому, и номера, стоящие перед предложениями, не являются помехой при чтении. Вместе с тем такая система помогает выделить и привлечь внима-

* Названные виды работы с учебным материалом могут с успехом применяться на протяжении всех этапов обучения.

ние к нужному предложению. Так, в каждом домашнем задании есть упражнение, в котором указаны номера предложений текста, либо иллюстрирующих вновь введенный языковой материал, либо, по мнению автора, представляющих интерес с точки зрения лексических или грамматических трудностей, типичных для языка английской научной прозы, и поэтому требующих сначала анализа и затем тщательного перевода.

Упражнения первого лабораторного занятия, следующего за домашним, и работа над текстом в ЛУРе способствуют более глубокому овладению языковым и тематическим материалом урока — параграфа.

Второе аудиторное занятие посвящено контролю и речевой практике. Обучаемые не читают текст целиком, и перевод текста выборочный. Контроль понимания осуществляется с помощью упражнений, упомянутых выше, и выборочного перевода. В конце занятия — при условии выполнения всех упражнений и завершения работы над первым текстом — обучаемым предлагается прочесть про себя второй текст урока, всегда тематически связанный с первым. Это ознакомительное чтение, и преподаватель проверяет, понято ли обучаемым основное содержание текста, предлагая им кратко изложить по-английски его суть или ответить на ряд вопросов по существу прочитанного. Упражнения домашнего и лабораторного занятий, следующих за вторым аудиторным, и задания в связи с текстами направлены на углубленное овладение материалом обоих текстов, контроль усвоения которого осуществляется на третьем, завершающем аудиторном занятии цикла.

Преподавателю следует очень тщательно контролировать выполнение письменных домашних заданий, в частности таких, как нахождение в тексте ответов на вопросы, составление планов, выделение основных положений текста и написание суммарных обзоров. Письменная речь, как один из четырех видов речевых умений, должна занять подобающее ей место в процессе обучения языку специалистов, поскольку аннотирование и реферирование научной литературы связано, в частности, с этим умением. Здесь уместно напомнить, что независимо от того, на формирование какого навыка или умения направлено то или иное упражнение, большинство из них, как классных, так и домашних, от тренировочных до творческих выполняются на материале текста, в связи с ним, на одном и том же языковом материале. Иначе говоря, они выполняют комплексную задачу.

На III этапе возрастает роль самостоятельной работы учащихся. В связи с этим первое занятие в рамках цикла на третьем этапе — самостоятельное домашнее занятие, где в процессе выполнения упражнений, предшествующих первому ознакомительному чтению текста, происходит частичное снятие его трудностей. Работа над первым текстом дома проходит стадии, описанные выше (см. второй этап).

Упражнения первого двухчасового аудиторного занятия цикла

и характер послетекстовых заданий позволяют проконтролировать работу, самостоятельно сделанную учащимися дома и в ЛУРе. На этом же, первом занятии в аудитории учащиеся приступают к чтению второго текста, работа над которым продолжается затем дома.

Выше упоминалось о третьем тексте, помещенном в состав учебного материала второго лабораторного занятия цикла данного этапа и предназначенном для аудирования. Тематически каждый такой текст связан с текстами предшествующего урока. Это позволяет вернуть обучаемых к уже проработанному ими материалу, что целесообразно, учитывая интенсивный характер овладения материалом. В этом случае повторение особенно полезно. И, наконец, второе аудиторное занятие цикла содержит речевые упражнения, построенные на языковом и тематическом материале текстов. В ходе выполнения этих упражнений, а также заданий в связи с текстами контролируется сформированность конкретных для данного цикла навыков и умений.

Как показывает опыт обучения по курсу, к самостоятельному, индивидуально-групповому чтению (под контролем преподавателя) научной литературы по узкому профилю специальности студентов целесообразно приступать лишь после полного прохождения ими курса обучения по настоящему курсу*.

В интересах успешности обучения по курсу следует организовать систематическое повторение пройденного. Для этой цели рекомендуется на одном из аудиторных занятий очередного цикла (начиная с 17 урока) выделять несколько минут для повторения языкового материала предыдущих уроков. Так, например, при прохождении 17 урока можно задать обучаемым повторить материал первых трех уроков, при прохождении 18 урока — следующих двух, и так далее, регулируя нагрузку в зависимости от объема и степени трудности материала.

* Группе начинающих аспирантов учебный план аспирантуры на весь курс изучения иностранного языка от «нуля» до кандидатского экзамена предоставляет 150 учебных часов. Условия и конечные цели обучения требуют предельной интенсификации процесса обучения, в частности за счет увеличения удельного веса самостоятельной работы аспирантов. Поэтому, в отличие от студентов, им следует приступать к чтению литературы по их непосредственной узкой тематике уже с начала третьего этапа (т. е. с § 26). Этому виду работы должен отводиться четвертый аудиторный час каждого очередного цикла занятий (см. схему цикла занятий III этапа). На протяжении этого часа преподаватель периодически контролирует индивидуальную работу, сделанную аспирантами самостоятельно в течение недели. Одновременно на занятии аспиранты совершенствуют свое умение в различных видах чтения, в аннотировании (на английском языке) и в реферировании (на родном языке) английской научной литературы.

Время, оставшееся после завершения обучения по курсу как таковому, т. е. 20—30 часов аудиторных занятий (напомним, что курс обучения по курсу рассчитан на 120—130 часов) должно быть целиком посвящено описанным видам работы со специальной литературой, а также чтению газетных материалов. За неделю аспиранты должны прочесть не менее 25—30 страниц (статьи из журналов, сборников, обзоры, главы монографий и т. д.)

LESSON 1

Ex. 8. The name of the child. These tests. The plant's size. The plans of these children. The idea of this plan. The length of the side. The man's help. The size of the ellips. The idea of the film.

Ex. 9. The effect of these ideas. The child's help. The same time. The best test. The man's best film. The ellips of the planet. The man and the children. The man's simple plan. The width and the length of the film. A thin lamp. The wide plane. A set of black pencils. A set of maps. Little data. A nice name. The place of the lamp. The size of the map. The idea of this test. The man's table. These big planets.

Ex. 10. The size of this planet. The length of this film. A wide plane. A fine man. This nice child. The name of the place. A thin black pencil.

LESSON 2

Ex. 7. Let Nina take the long pen. Do not let Nick go. Let Nina open the note. Let Nick show you the problem. Do not let Nina send the data. Let Nick try to stop the girl. Do not let Nina hold that table.

Ex. 8. Take these pencils. Make this line. Hold this bag. Study these data, Name these sides. Help this girl.

Ex. 9. Покажи им лучшее место. Дай ему длинный красный карандаш. Проведи длинную линию. Давайте найдем этот результат. Попытайся помочь этому человеку, пожалуйста. Не заставляйте его идти, пожалуйста. Пусть она попробует. Пусть он найдет этих студентов. Покажите мне их дом, пожалуйста. Помогите мне найти ее семью. Пусть они изучат наш метод и наши результаты.

LESSON 3

Ex. 7. Преподаватель, произнеся предложение, подсказывает студенту вопросительное слово 'who', 'what', 'when'. Упражнение проводить в быстром темпе. Для работы использовать Упр. 2 а) и 3. Например:

T.: He cannot study this problem now.

T.: Who

St.: Who cannot study this problem now?

T.: What

St. What cannot he study now?

Ex. 8. а) The student's paper. The box's size. That man's home. Those boys' family. This girl's hands.

б) The length of this segment. The width of the table. The end of the segment. The names of these girls. The size of the hand.

Ex. 9. а) Вы должны изучить результат его работы. Вам не нужно вставать так рано сегодня. Они не могли спросить его об этом вчера. Ей нельзя изменить план работы. Мы можем попробовать найти их дом. Ему не нужно посылать им эту записку.

б) Кто может найти длину отрезка? Когда он мог сделать эту работу? Что он должен послать ей? Кто может помочь этой девушке? Кто может дать мне длинный черный карандаш? Когда мне можно взять ваши данные? Что я должен сказать ему? Можете ли вы дать мне ту же работу? Можно ей работать дома сегодня? Смог ли он найти эту статью вчера?

LESSON 4

Ex. 10. It is a fine test. The girl's hands are small. The idea was good. The man's method was easy. Their plans were simple and short. These students' room is large. The film is long and thin. These facts were old. Her note was open. The house will be ready soon. I shall be late for the lesson. The boy's family was at home. It was the same paper. They are in the next room. He is ready to read and translate.

Ex. 11. Обращаясь по очереди к студентам, преподаватель произносит предложение, подсказывая вопросительные слова 'what', 'where', 'when', 'who'..., или предлагает задать общий вопрос. (Переспросите)

Her desk is in the room. (what, where) These houses are old. (what) We are in the classroom. (who, where) They are also here now. (who, where, when) They will be ready soon. (who, when) The work will be over tomorrow. (what, when) She was a post-graduate last year. (who, when) I was at the University last week. (where, when) The text is in the note-book. (what, where) They were ready to begin the work. (who, what) They will be students next year. (when)

Ex. 14. Are you at the University? Are you in the classroom or in the corridor? Is this your classroom? Are you at an English lesson or at the lesson of mathematics? Must you study English at the University? Am I your teacher or am I a post-graduate? Is he a student or a teacher? Is she a teacher or a post-graduate? Who was late for the lesson today? Are you ready for the lesson? Is comrade X. young or old? What is Ivanov? (Petrov...). Where are your books? Where are your notebooks? Where are your pens (pencils and bags)? Can you read (write, speak) English? Could you read (write, speak) English last year? Who can translate this text? Is the text long or short? Is it easy? Who is at the teacher's table? May I take your pen (pencil, book)?

Преподаватель подсказывает ответ по-русски.

Where were you yesterday? (дома) What must you read tomorrow? (эту статью) Who is old? (этот человек) Who is young? (эта девушка) Where are we? (на уроке) What lesson is this? (английский) When will the lesson be over? (скоро). When was this student late? (вчера)

Ex. 15. а) Я — аспирант. Я в университете. Этот человек — мой преподаватель. Мы в аудитории. В прошлом году мы были студентами. Они готовы к уроку. Наши книги открыты. Преподаватель за своим столом. Мы должны писать и читать по-английски. В прошлом году она не умела писать по-английски.

б) Это книга девушки? Где ваш преподаватель? Кто в комнате? Что это? Он был студентом в прошлом году? Стол преподавателя в комнате? Это студенты или аспиранты? Вы были дома вчера? Урок скоро закончится? Где книги этих студентов? Она опаздывает? Текст будет легким? Он молод или стар? Где ваш дом?

LESSON 5

Ex. 10. There were not any simple words in the text. There are not any important ideas in that paper. There was not any good map in the room. There were no interesting facts in the book. There will not be any film today. There is not any work for me. There will not be any small rooms in that house. There are not any young men here.

Ex. 11. Работу можно проводить следующим образом.

T.: — There are books on the table. (what)

1 st.: — What is there on the table?

2 st.: — Books.

There are eight departments for sciences. (how many) There was an interesting seminar last week. (when) There are the teacher's note-books on his desk. (whose) There are important data in her bag. (what) There was an old man in the next room. (who) There is another paper for him. (what)

Ex. 15. Преподаватель произносит пары слов по-русски, предлагая студентам определить, какое наречие следовало бы использовать в каждом случае.

Много воздуха, мало радости, немного работы, небольшой эксперимент, много молока, много цветов, мало знаний, кое-какие книги, много возможностей, несколько статей, некоторое количество стульев, немного воды, мало воды, мало чернил, некоторое количество чернил, несколько изменений, мало помощи.

Ex. 16. 1. Are we in the department of mechanics and mathematics or in the department of geography? 2. Are there eight or seven departments of sciences? 3. Is the department of cybernetics new? 4. Is cybernetics a branch of physics? 5. Must you study English, German or French at this department? 6. Can you give us the names of some outstanding scientists in your department? What are they? 7. Were you a student or a post-graduate last year? 8. Are there many or few post-graduates in this department?

Ex. 18. 1. Мы находимся на одном из естественных факультетов. 2. На этом факультете много выдающихся ученых. 3. Я должен заниматься английским. 4. Я умею читать и писать по-английски. 5. Я не умею читать по-английски несколько недель назад. 6. Мне не нужно изучать немецкий или французский. 7. Мы должны посещать лекции по механике. 8. Это важная область науки. 9. Некоторые из нас должны решать такие задачи. 10. Имеется довольно много интересных статей по кибернетике.

LESSON 6

Ex. 9. Используйте упражнение 2 (a, b, c).

- a) 1. — how much, who; 2. — how many, when; 3. — who; 4. — what kind of, when; 5. — who, what kind of; 6. — who.
- b) 7. — who, what teacher; 8. — how many; 9. — how much; when; 10. — how many, what, what kind of; 11. — what kind of; 12. — who, what.
- c) 13. — how many, for what; 14. — what, when; 15. — who, what kind of.

Ex. 10. Had men control of atomic energy in the nineteenth century? Has he a logical answer? Have we automatic control of this process? Shall we have a scientific conference next week? Have old machines automatic programs? Had their department modern machines last year?

Ex. 16. a. 1. We have modern computers today. (what). 2. There are various seminars at our department. (what kind of, where). 3. There were quite a few scientific developments in the 19th century. (how many, when). 4. There are many outstanding scientists the-

re. (where). 5. He may go to England next week. (who, where, when). 6. This is the development of the first magnitude (what kind of). 7. We must discuss the capture of atomic energy (who, what). 8. He could give a logical answer (who, what kind of). 9. Man can make machines perform reasonable operations (who, what kind of). 10. They will have a conference in London next year (where, when). 11. She can handle these data. (who). 12. This is a set of marks. (what). 13. You must show us these marks. (which).

LESSON 7

Ex. 10. 1. He speaks rather well. (who). 2. He teaches algebra. (what). 3. They work in the field of atomic physics. (who). 4. She entered the University the following year. (when). 5. He passed his exam successfully. (how). 6. They came early in the morning. (when). 7. He will come again next spring. (when). 8. I hope to study this language. (what). 9. There are twelve months in a year. (how many). 10. There are 30 or 31 days in a month. (how many). 11. You will get this book in the library. (where). 12. I must go since I have no time. (why). 13. We had very good spring this year. (what kind of). 14. This student failed in this examination. (who). 15. They did important research. (what kind of). 16. She wanted to get their data. (whose).

Ex. 11. 1. Does the term last two months? 2. Will you finish your work till 5 o'clock? 3. Did she fail in her examination? 4. Did they come the following spring? 5. Does he work in the field of atomic physics? 6. Will you go to the English language lab? 7. Was he successful in his research? 8. Do you like winter? 9. Did he go home at half past four? 10. Does he do research in the same field? 11. Will they take the exam again? 12. Do you want to live here till the autumn? 13. Did you go to school in Moscow? 14. Does he come here early in the morning? 15. Do students speak Russian during the English lesson?

Ex. 21. 1. Are you a student or a post-graduate? 2. What is your name? 3. How old are you? 4. What is your mother's name? 5. Have you a brother? 6. How old is he? 7. Where does your father work? 8. What is your mother? 9. When did you enter the University? 10. What year student (post-graduate) are you? 11. Do you study in summer? 12. When do students have their examinations? 13. When must you take your next exam? 14. How often do you come to the University? 15. Is the library open on Sunday? 16. Is the English language lab open on Monday? 17. How often do you go to the lab? 18. When do students have their vacation? 19. Where will you go for your vacation? 20. When does the academic year begin?

LESSON 8

Ex. 11. 1. I looked through the newspapers yesterday. 2. He is sure everything will be all right. 3. All the post-graduate students defend their dissertations. 4. She usually stays up till late in the evening. 5. I usually get up rather early. 6. There are a lot of things to do today. 7. The lesson began exactly at 11 o'clock. 8. He got a special appointment. 9. I am afraid of my exam. 10. He failed in his candidate's degree exam. 11. She became a famous scientist. 12. Our English lesson runs for two hours. 13. I decided to present my dissertation on Tuesday. 14. We have special seminars on Wednesday and Friday. 15. This foreign scientist is going to give us a lecture on Thursday.

Ex. 21. 1. He lived in our hostel last winter. 2. I got up rather early this morning. 3. He usually stays up till late in the evening. 4. He became a famous man. 5. We decided to write an article together. 6. I am afraid to speak to him. 7. Everything was ready on Thursday. 8. I like your abstract. 9. He passed his candidate's degree exams successfully. 10. We dealt with this problem last year. 11. She gives French lessons at that Institute. 12. This subject is rather easy. 13. He has a lot of publications. 14. I am sure everything will be all right. 15. She knew this thing very well.

LESSON 9

Ex. 19. 1. She made an experiment. 2. The student found that information. 3. We shall take the girl home. 4. The teacher began the lesson. 5. They spoke about him. 6. He told me about that automatic computer. 7. The post-graduates read the article. 8. They wrote the program. 9. You must do the whole thing. 10. He must leave everything on the table. 11. She could say it. 12. They could give only the basic facts.

Ex. 20. 1. Why cannot we live without numerals? 2. What are numerals used for? 3. In what way are the numerals in a numeration system grouped? 4. What are these numerals called? 5. Could one and the same number be represented in various ways? 6. Could you give an example? 7. What is an equation? 8. What kind of mathematical sentences do you know? 9. Could you name all the numerals in the equation $8-5=3$. I mean could you say what is what? 10. In the equation $11+12=23$ is 23 the product? Are 11 and 12 factors? What are they? 11. Could you divide 10 by 3 without a remainder? 12. How much is $66:3$? 13. Which number is the divisor in the expression $8:2=4$? 14. What will you get if you divide $0:3$? What will the result be? 15. Could you divide 7 by 0? What will you get as a result of this operation?

LESSON 10

Ex. 18. 1. When did Leibnits do his research? 2. Did he live in Germany or in England? 3. What system did he develop? 4. What is this system called? 5. What did Leibnits actually build? 6. Was his machine extensively used during the seventeenth and the eighteenth centuries? 7. In what kind of computers is the binary numeration system used? 8. What does the numeral 0 correspond to? 9. What does the numeral 1 correspond to? 10. What groups do base two numerals indicate? 11. In what way can a base ten numeral be changed to a base two numerals? 12. Which system of notation does a high-speed electronic computer use? 13. What accounts for the extensive use of electronic computer? 14. Is the binary system the simplest power-position system of numeration? 15. Why are we using 0 and 1? 16. What are the advantages and the disadvantages of the binary numerations system?

LESSON 11

Ex. 15. 1. The property considered is called the existence property. (which property). 2. These are true statements of arithmetic. (what kind of). 3. The existence of this property must be proved. (what). 4. There are three proofs. (how many). 5. They produced very interesting information last month. (when). 6. He points out that the program is complicated. (what). 7. These words were followed by a general definition. (by what). 8. You must do cybernetics instead of mechanics. (who). 9. These axioms were considered during the recent lecture. (when).

Ex. 16. 1. Are 5 and 3 natural numbers? 2. What do we get as a sum if we add two natural numbers? 3. Why do we say that a set of natural numbers is closed under addition? 4. Can we name the sum in each of the given equation? What does it mean? 5. What is the existence property? 6. What is the uniqueness property? 7. Are both existence and uniqueness implied in the definition of closure? 8. Why do we say that $a+b$ is a natural number? 9. Is the difference in the operation of subtraction $11-6=5$ a natural number? And what about $9-9=0$? 10. Can we solve the equation $4-7=n$ if we must have a natural number as an answer? 10. Is the set of natural numbers closed under subtraction? 11. What kind of number do we get as a result of multiplication of two natural numbers? 12. In what way can you define the closure property in general?

LESSON 12

Ex. 15. 1. This question concerns our work. (whose). 2. During the previous seminar we dealt with the associative property. (when). 3. They are to consider the order of the operations. (when). 4. The

teacher allowed him to leave the classroom. (why). 5. These three numbers form an equation. (in what way). 6. You omitted the + sign. (why). 7. In the given set there are only even numbers. (what kind of). 8. If he knows the facts he will be able to summarize them. (how). 9. He was allowed to look through the information. (when). 10. They agreed to make a common statement. (where). 11. They turned to their teacher for an answer. (why). 12. She has to go because it is already late. (why). 13. It is necessary to write the exercises. (what kind of). 14. They have to make the experiment regardless of time. (why). 15. They were allowed to use the information. (when).

Ex. 16 (b). 1. Are there statements in mathematics that are concerned with various sets of numbers? 2. What do we call the set of numbers like 1, 3, 5 and so on? 3. What is the set of numbers like 4, 6, 8 and so on called? 4. What property is common to all odd numbers? 5. What property is common to all even numbers? 6. What is the result of multiplication called? 7. What are the numbers to be multiplied called? 8. Could you name factors of 18? What are they? 9. Why do we call 6 and 3 just one pair of factors of 18? 10. What should the product be if you use 0 as one of the factors? 11. How much is 0 times 5? 12. What is 7 times 0 equal to? 13. In what way will you summarize the answer for the two previous questions? 14. Can more than two factors be used in some cases? 15. Is it possible to say that 60 is the product of 3 factors? Why? 16. Why do we agree to omit 1 as a factor when naming a number in factored form? 17. Is the order in which the factors of the same set is written important? 18. What factors are implied in every whole number? 19. Could you give an example of a number that contains only one and itself as a factor. 20. In what case is a whole number called a prime? 21. What is a composite number?

LESSON 13

Ex. 6. 1. Which do you think is easier English or Russian? 2. Do you work more at your English or at mathematics? Why? 3. Which one of you came earlier today? 4. Who is the youngest in your class? 5. Does N. study English as hard as V? 6. Do S and B study more than H? 7. Which subject do you find the most important of all? 8. Whose lectures do you find the most interesting? 9. Which is the biggest department at the University? 10. Which is the smallest department? 11. Is Moscow bigger than Leningrad? 12. Is New-York as large as Tokio? 13. Could you name the least of the digits 8, 2, 9? Do, please. 14. Do you have to work at your English more than at philosophy? 15. Is your room in the hostel as big as this one? 16. Is tennis as popular as football? 17. Is hockey as popular as football? 18. Is classical music more popular than jazz-music? 19. Is your collection of books bigger or smaller than your father's? 20. Are the days in February longer than the days in July?

Ex. 14. 1. The sentence which contains a sign of non-equality is called an equation. 2. One and the same mathematical sentence can be both true and false. 3. The relation of equality satisfies the transitive axiom. 4. In some branches of mathematics we do not use numbers. 5. If we replace the plus sign with a minus sign we shall not change the meaning. 6. It is impossible to write a false statement in mathematics. 7. Mathematical language is not direct but it is concise. 8. Numerals $3+4$ and 6 name the same number. 9. Numerals 5×2 and 10 name different numbers. 11. Five is greater than 8, 12. Eleven is less than twelve. 13. The signs which express equality or inequality are called relation symbols. 14. These signs indicate how two expressions are related.

Ex. 15. 1. What is an equation? 2. What are the two parts of the equation called? 3. What kind of mathematical sentences may there be? 4. Can a false mathematical sentence be closed? 5. In what way can we decide whether a mathematical sentence is true or false? 6. Why do we check both elements of the equation? 7. Which basic axiom does the relation $a=a$ satisfy? 8. Can you give an example of the relation of equality? 9. Which sign is the opposite of \neq ? 10. What is the important feature about a sentence involving numerals? 11. Is it incorrect to write a false sentence? 12. Why must we have a good understanding of the meaning of each symbol? 13. Does the sign \neq tell which numeral names the greater or the lesser of the two numbers? 14. What do the $<$ and the $>$ symbols indicate? 15. Why are all these symbols called relation symbols?

LESSON 14

Ex. 5. Have you ever studied English? 2. Why have you come to Moscow? 3. Where have you come from? 4. Where has P. come from? 5. Why have you decided to take up mathematics? 6. Have you ever been to Leningrad? 7. Have you been to any museum in Moscow yet? 8. Have you read any books on mathematics in German (French)? 9. Have you seen any new film recently? 10. Has your mother come to see you in Moscow? 11. How many lessons of your English textbook have you studied? 12. Have you learned many words?

Ex. 12. 1. Some fractions have numerators and other fractions have denominators. 2. The denominator tells us how many parts of equal size are taken. 3. The denominator is always greater than the numerator. 4. Fractions like $\frac{2}{3}$ are called proper fractions. 5. Fractions like $\frac{4}{4}$ are called mixed fractions. 6. One and the same fraction can be written in various ways. 7. If we multiply a fraction by a whole number, we shall change it. 8. 1 can be expressed as a fraction.

on. 9. It is impossible to reduce a fraction like $\frac{2}{3}$. 10. In the fraction $\frac{1}{2}$ the denominator and the numerator are relatively prime. 11. When we divide both numbers named in a fraction by 0, we leave the fraction unchanged. 12. Before we reduce a fraction we must first determine the greatest common factor.

Ex. 13. 1. What shall we deal with in this chapter? 2. What does the numerator show? 3. What does the denominator indicate? 4. What is a proper fraction? 5. What kind of fractions are called improper? 6. Can you give an example of a mixed fraction? 7. Are fractions like $\frac{1}{2}$ and $\frac{4}{8}$ called equivalent? 8. What will you get if you multiply $\frac{1}{2}$ by $\frac{2}{2}$? 9. What will you get if you multiply $\frac{2}{5}$ by 1? 10. By which number will you multiply 2 to get 6? 11. Can you change $\frac{2}{3}$ to lower terms? 12. How can you change $\frac{1}{3}$ to higher terms? 13. Will you change the fraction if you divide it by 0 or 1? 14. What must you determine first when you have to reduce a fraction to lowest terms? 15. What is meant by the simplest fraction for a rational number? 16. Of the fractions $\frac{6}{14}$, $\frac{8}{12}$, $\frac{3}{7}$, and $\frac{5}{10}$, which is the simplest form? Which are equivalent fractions? 17. What is the simplest name for the rational number twelve-fourths? 18. Which numeral do you have to put in place of n to make each of the following a true statement? $\frac{16}{4} = \frac{n}{24}$; $\frac{n}{63} = \frac{4}{n}$; $\frac{72}{9} = \frac{n}{1}$. 19. Which properties of multiplication are the same for both the set of integres and the set of rational numbers?

LESSON 15

Ex. 14. 1. In our numeration system we use 9 digits. 2. It is possible to obtain only two combinations of the digits 1, 2, 3. 3. The position of each digit does not affect its value. 4. Diagrams are never helpful. 5. A comma separates each group or period. 6. All digits to the left of the decimal point represent whole numbers. 7. We obtain a tenth by dividing 10 by 1. 8. Decimals like .333 are called repeating decimals. 9. We cannot express rational numbers as decimal numerals. 10. The digits to the right of the decimal point name the numerator of the fraction. 11. Before they begin performing operations with decimals they must have a common denominator. 12. It is impossible to introduce a procedure that reduces all decimal-division situations to one standard situation. 13. Each step of the addition in fractional form has a corresponding step in decimal form. 14. Zero is not the identity element of addition,

Ex. 15. 1. How many digits do we use in our numeration system? 2. How many combinations can be written with the digits 1, 2, 3? 3. Does the position of each digit affect its value? 4. How many place-value positions does the numeral 78641 have? 5. What is a comma used for? 6. What does a point in a numeral like 1.3 mean? 7. What do all digits to the right of the decimal point indicate? 8. What do all digits to the left of the decimal point represent? 9. In what way do you obtain a tenth? 10. Do you read the zeroes in .0081, or do you skip them? 11. What is the name given to a decimal like .323...? 12. Why is this kind of numeral called a repeating decimal? 13. Can you express rational numbers as decimals? 14. What does the numeral .217 denote? 15. Can rational numbers be named by decimal numerals? 16. Must we define a common numerator or denominator when we perform an operation of addition with fractions? 17. Is division of decimal numbers easier or more difficult than division of fractions? 18. What must we do to reduce a decimal-division operation to a standard situation? 19. Where must all the decimal point lie? 20. Why must we place all the decimal points on the same vertical line? 21. Is it necessary to write .26 as .260? 22. What will help you to obtain the correct answer if you subtract 2.13 from 3.348? 23. Are operations with decimals like operations with integers?

LESSON 16

Ex. 9. T.: — Ask Nick (me, her, Ann, etc.)

if he (I, she, Nick...) understands the game of chess.
 if they knew that legend before.
 if the new texts seem interesting.
 if the game of chess seems popular nowadays.
 if she will remain in Moscow during her vocation.
 if the production of computers in the Soviet Union is rapidly increasing.
 if she must study English or she has some other alternative.
 if girls play football.
 if there are any kings in India nowadays.
 if it is necessary to repeat English words constantly.
 if the table is covered with anything.
 if he knows the world's average production of wheat.
 what the average number of students at these departments is.
 why the number of students in the Soviet Union is increasing every year.
 by whom the telescope has been invented.
 what her (his) greatest desire is.

Ex. 16. 1. The game of chess is not popular nowadays. 2. According to an old legend the game was invented in Egypt. 3. It was invented by Sissa Ben Dahir. 4. He was king Shirham's friend. 5. The king did not seem pleased with the present. 6. The king was not going to thank his vizier for the present. 7. Sissa Ben said he did not want anything from the king. 8. The vizier said he wanted a lot of money. 9. His desire seemed easy to fulfil. 10. Sissa Ben wanted 10 grains of wheat to be put on the first square of the chessboard, 20 grains to be put on the second and so on. 12. There are 24 squares on the chessboard. 12. The king agreed to give his vizier what the latter had asked for. 13. The first bag was emptied before the twentieth square was covered with wheat. 14. At this moment the king understood that he would never be able to keep his word. 15. The king thought it best to remain constantly in debt to his vizier.

Ex. 17. 1. I wonder if the game of chess is popular nowadays. 2. Where was the game invented? What does the legend say? 3. I should like to know if the game had been invented by the king or by his vizier. 4. By whom was a chessboard with various figures on it presented to the king? 5. I wonder if the king was pleased with his vizier's present. 6. Why do you think that he was pleased? 7. I wonder what the vizier's desire was. 8. How many squares are there on the chessboard? 9. How many of the 64 squares are black? 10. Did the king think Sissa Ben's desire easy or difficult to fulfil? 12. Why did it seem that his desire was quite easy to fulfil? 13. What did the king ask his men to bring? 14. When did the king understand that he would not be able to keep his word? 15. How many grains are there in a bushel of wheat? 16. What is the world average production of wheat? 17. What was the amount of wheat that the king had to give to his vizier? 18. What were the two alternatives? 19. Which one of these alternatives did the king choose?

LESSON 17

Ex. 10. This exercise is to be done after the text (1) has been read and analysed.

1. Geometry is quite a new subject. 2. Geometry began in Greece. 3. Egyptians applied geometry for measuring land and for defining volumes. 4. It was Euclid who put all the known facts about geometry into a logical sequence. 5. Geometry has not changed since the time of Euclid. 6. Euclid has written other books which are as famous as his Elements. 7. The most fundamental idea in geometry is the idea of a segment. 8. It is impossible to think of a point as an exact location in space. 9. One can see, feel, hold and move a point. 10. Points *D* and *E* of the given segment are referred to as endpoints.

Ex. 11. 1. What does this text deal with? 2. Where did geometry begin? 3. Why did early Egyptians need geometry? 4. What were they mostly concerned with? 5. Where did the knowledge of Egyptians spread to? 6. What did the Greeks think of geometry? 7. What is the name of the man who put all the known facts about geometry into a logical sequence? 8. Which one of his books is one of the most famous books of mathematics? 9. What problems does geometry deal with nowadays? 10. What is the most fundamental idea in the study of geometry? 11. What is a point? 12. Is the dot a point or only a picture of a point? 13. What kind of letters do we use when marking a point? 14. What will you get if you draw a line between two points? 15. What are points *D* and *E* in one of the given figure called? 16. Can you imagine extending a segment indefinitely?

Ex. 12. The ten question words correspond to the number of sentences of *Ex. 6*.

1. Where? 2. Why? 3. With what? 4. Which facts? 5. When? 6. What? 7. What? 8. Why? 9. In what way? 10. Why?

Ex. 21. 1. Can you measure the length of a ray? Why? 2. Can you locate a point on a line segment between endpoints? 3. How many points does a line segment contain? 4. Can a ray and a line segment have a common endpoint? 5. Has a line segment definite length? 6. What do we mean when we say that we draw a geometric figure? 7. Is a geometric figure formed by a set of points an abstract concept? 8. Can such a geometric figure be seen? 9. From what do mathematicians develop their ideas? 10. What do we mean when we use the word line? 11. What can a particle of dust or a dot on a piece of paper represent? 12. What do we usually use the letters of the alphabet for? 13. What do the figures above the letters indicate? 14. What does the symbol indicate? 15. Why can you locate another point between two points on a line? 16. What does a line segment consist of? 17. How does a line segment (a ray) differ from a line? 18. What is a vertex?

LESSON 18

Ex. 8. 1. We examined the interior of the room. 2. You are to draw a rhombus. 3. These three rays originate at point *B*. 4. The given point lies on the straight line. 5. There are three angles in a triangle. 6. All sides of a square are congruent. 7. The acute angle is less than the obtuse angle. 8. A rectangle may be referred to as a quadrilateral. 9. We shall be able to classify all these geometric figures. 10. We can deduce that these angles are acute.

Ex. 10. 1. Every simple closed figure separates a plane into three distinct sets of points: the figure, its interior, its exterior. 2. An angle is formed by two rays having a common endpoint. 3. If two re-

ctangles have the same length the measures of their interiors are the same. 4. If you are going to find the perimeter of any polygon you must add the measures of its sides and angles. 4. A quadrilateral is a polygon having three sides. 6. An angle greater than the right angle is referred to as an acute angle. 7. A right angle has a measure of 95° . 8. An acute angle has a measure which is greater than 0° but less than 90° . 9. The hypotenuse refers only to the side opposite the right angle in a right triangle. 10. A rectangle in which all four sides have the same linear measure is called a square.

Ex. 11. 1. In what way do we form a ray? 2. Is it possible to deduce that two rays originating from the same endpoint form an angle? 3. What kind of angles do you know? 4. Which is greater an acute or an obtuse angle? 5. Into how many sets of points does an angle separate a plane? 6. What other polygons (except for triangles) do you know? 7. Which sides of a trapezoid are called the bases? 8. What do all these geometric figures have in common?

Ex. 22. 1. How is the so-called parallel postulate usually stated now? 2. What is our definition of the special quadrilateral having pairs of parallel sides based upon? 3. What are the names of these mathematicians who developed non-Euclidean geometries? 4. What was Euclid's assumption concerning a given point and a given line? 5. What did Lobachevski assume? 6. What was Riemann's idea of the relation between a given point and a given line? 7. What did those variations of the parallel postulate lead to? 8. What is the difference between Lobachevski's and Riemann's ideas on parallelograms and rectangles? 9. Can we say that the conclusions of non-Euclidean geometry are just as valid as those of Euclidean geometry? Why? 10. What are the intuitive images corresponding to the undefined terms straight line and plane in Euclidean and non-Euclidean geometries?

LESSON 19

Ex. 7. 1. They covered that long distance in two days. (in how many days). 2. The pen has a sharp end. (what kind of). 3. Physicists have discovered a new particle. (who). 4. There are three equidistant circles. (how many). 5. The ratio is designated with a capital letter. (with what). 6. The diameter is twice as long as the radius. (what). 7. The student has to find the measure of the circumference. (who). 8. The diameter passes through the center of the circle. (where).

Ex. 8. 1. Do all radii of the same circle have the same measure? 2. Can we speak of a circle as a set of points? 3. What is the difference between a diameter and a radius? 4. What is an arc? 5. What is another name for a circumference? 6. By what formula do you express the ratio of the circumference (C) to a dia-

meter (d)? 7. What is the length of a diameter equal to? 8. Is $\frac{C}{2r}$ the same for all circles? 9. Does a circle contain any segments? Why not? 10. What is the difference between an arc and a chord?

Ex. 21. 1. If three parts of one triangle are congruent to three parts of another the triangles are congruent. 2. If the intersection of two line in space is an empty set then the lines are parallel. 3. The formula for the perimeter of a regular polygon may be stated as $p = \pi r^2$. 4. A diameter of a circle is a chord of the same circle. 5. Opposite angles of trapezoid are congruent. 6. A radius of a circle is twice as long as a diameter. 7. The area of a rectangle is the product of the length of its base and the length of its altitude. 8. We can inscribe as many polygons in a circle as we desire.

Ex. 22. 1. Can we say that a circle and the circumference of a circle are one and the same thing? 2. How shall we define the circumference here? 3. By what formula is the perimeter of a circle symbolized? 4. What is it necessary to introduce if we are going to arrive at a more precise definition of a circle? 5. In what way can we inscribe a regular octagon in a circle? 6. Does the area of a polygon approach that of a circle as the number of the sides of the polygon increases? 7. Is π a rational number or not? 8. Are all radii of the same circle congruent? Why? 9. Can the number π be expressed exactly as a fraction or as a decimal? Why not? 10. Which is a more accurate approximation of π : 3.14 or $\frac{22}{7}$?

LESSON 20

Ex. 10. 1. What did ancient Egyptians discover by stretching ropes of lengths 3 units, 4 units and 5 units? 2. What were the ancient Greeks able to tell about triangles? 3. What was their method of telling whether a triangle was a right one? 4. How does the number of small triangular regions in the two smaller squares compare with the number of triangular regions in the largest square? 5. Who noticed this relationship? 6. What is the sum of the areas of the two smaller squares equal to if each side of a right triangle is used as a side of a square? 7. Is Pythagorean property true for all right triangles? 8. Is it possible to state the Pythagorean property in mathematical language?

Ex. 21. 1. When the Pythagorean Property is expressed in the form $c^2 = a^2 + b^2$ we can replace any two of the letters with the measure of two sides of a right triangle. 2. Number 5 when used as a factor twice gives a product of 50. 3. If a number is a product of two equal factors, then either of the equal factors is called a square root of the number. 4. The product of two negative numbers is a negative number. 5. There is an integer whose square root is 20. 6. We

could continue the process of squaring some number between 4 and 5 indefinitely and never get the exact value of $\sqrt{20}$.

Ex. 22. 1. How many square roots does every positive integer have? 2. What are the square roots of an integer? 3. What does the radical sign denote? 4. Do you use the division method in finding the square root? 5. Can a square root of an integer be an irrational number? 6. Why are numbers such as 1, 4, 9, 16 and 25 called perfect squares? 7. Is 3 a perfect square? Why not? 8. Do you know any method for finding an approximate square root of a number which is not a perfect square? What is it?

LESSON 21

Ex. 18. 1. The statement $0 \times 1 = 0$ and $1 \times 1 = 1$ are true in any numeration system. 2. The set $\{0 : 1\}$ is closed under both addition and multiplication. 3. The set of natural numbers is closed under all four of the basic operations of arithmetic. 4. Before we begin making replacements * for the variable * we have to know what set of numbers we are allowed to use. 5. The replacement set contains all the possible solutions. 6. Each element of the solution set makes a statement true. 7. There is always a solution to satisfy a given statement. 8. The open sentence $5 + _ > 8$ can be completed with any number less than 3.

Ex. 19. 1. What replacement for the blank in the sentence "there are ... departments at Moscow University" will you give to make this sentence true? 2. What is a solution set? 3. What is each element of the solution set called? 4. Is the sentence "he is an Olympic champion" true or false? What must you do to make it either true or false? 5. Can you find the solution set of $y + 2 < 6$ if the replacement set is the set of integers? 6. Can you find the solution set of $5 + n = 4$ if the replacement set is the set of natural numbers? 7. Can the solution sets contain only one element or they can contain an unlimited number of elements? 8. Why does a solution set have to be a subset of the replacement set? 9. Why is the solution set also called the truth set? 10. What is the set containing no elements called? 11. Can we say that to solve an equation means to find the solution set? 12. Is an open sentence true or false?

LESSON 22

Ex. 9. 1. What are the two number lines as we have used them for a coordinate system called? 2. How is the horizontal number line often referred to? 3. How is the vertical number line usually referred to? 4. Could they just as well be labeled in some other way?

* The meaning of the words «replacement» and «variable» is to be guessed.

5. Into how many parts do the two axes of the coordinate system divide the plane? 6. If both coordinates of a point are 0, where is the point located? 7. If the first number of an ordered pair of numbers is positive, where is the point located? 8. If the second number of an ordered pair of numbers is negative, where is the point located? 9. What does a coordinate of a point tell? 10. What does each of the axes represent?

Ex. 21. 1. Each ordered pair (X, Y) tells you how to locate a point in the coordinate plane, by starting from the origin. 2. We know each of the numbers of a pair to be either positive or negative. 3. The operation of forming the Cartesian product is commutative. 4. To every ordered pair of real numbers there correspond several points on the plane. 5. We hold the elements of the Cartesian product to be ordered pairs of numbers. 6. There is no one-to-one correspondence between the real numbers and the points on a line.

LESSON 23

Ex. 21. a) both the inner and the outer terms; both the sides and the angles; both the binomials and the trinomials; both the ascending and the descending order;

b) either the positive or the negative sign; either division or multiplication; either the abstract or the dissertation; either decimal or complex fractions.

Ex. 22. 1. Which is easier English or French? 2. Do you find geometry as interesting as algebra? 3. Is the Department of Cybernetics as big as the Department of Physics? 4. Which is more important for you: to speak English or to read and understand it? 5. Is the University of Leningrad as old as the University of Moscow?

Ex. 24. 1. A binomial is a polynomial containing two terms. 2. There is no difference between a monomial and a polynomial. 3. A trinomial contains two terms. 4. The terms in a polynomial are arranged either in ascending or descending order. 5. A polynomial containing two terms is referred to as a binomial. 6. It is more convenient to multiply polynomial terms from right to left. 7. There is no difference between a quadratic and a linear equation. 8. The quadratic trinomial is never arranged in descending order. 9. The factors of a quadratic trinomial should be two binomials. 10. In the multiplication of the binomials the product term of the trinomial is the sum of the "inner" and "outer" terms of the factors.

LESSON 24

Ex. 11. 1. What is a geometric progression? 2. If the first and the fourth terms of a G. P. were given, could you, by finding the common ratio, find the second and third terms? 3. Suppose the sum

of the first two terms of a G. P. is 4, and the sum of the third and fourth terms is 36. What would the sum of the first six terms of the G. P. be? 4. What do we mean by a common ratio? 5. What is the formula for finding r ? 6. What is the formula for finding the last term of a G. P.? 7. What must one do if one wishes to insert three geometric means between 3 and 48? 8. Does the ratio of each term in a G. P. to the preceding term change or does it remain constant? 9. Suppose the common ratio is greater than one and the first term of a G. P. is positive, what kind of a progression would it be: increasing or decreasing?

Ex. 22. 1. When a sequence has an unlimited number of terms it is said to be finite. 2. The word infinite has the same meaning as the word limited. 3. The integers of the number system go on forever. 4. It is meaningless to ask for a sum of integers in the number system. 5. It is quite possible to ask for the sum of terms of an arithmetic progression. 6. It is meaningless to ask for a sum of terms of a geometric progression. 7. You could continue writing the terms of a G. P. $1; 1/2; 1/4 \dots$ indefinitely.

Ex. 23. 1. What is another name for an infinite sequence? 2. Is it possible to ask for a sum of integers in the number system? Why? 3. What does the symbol $\rightarrow \infty$ mean? (*The teacher is expected to draw the symbols on the blackboard.*) 4. How do you read the statement $n \rightarrow \infty$? 5. Suppose you have a progression like $1, \frac{1}{2}, \frac{1}{4} \dots$, what happens to the value of n -th term as the number of terms increases? 6. Will S_n ever reach 2 in a sequence like $1, \frac{1}{2}, \frac{1}{4} \dots$? Why? 7. Can we say that a repeating decimal is a sum of an infinite G. P.? 8. Is the relationship between the terms of a binomial series like the relationship in an arithmetic or in a geometric series?

LESSON 25

Ex. 12. 1. What does the article deal with? 2. If you were shown 9 red circles and 6 black circles and were asked to choose one of them which on these circles would you be likely to choose? Why? 3. Does anything favor this particular choice? 4. Can you give the definition of the probability of failure? What is it? 5. What are the odds in case $f > S$? 6. What are the odds when $f < S$? 7. Suppose $S = f$, what would the chances be? 8. Could you give some example to illustrate a case when S and f are equal?

Ex. 22. 1. All events are dependent on one another. 2. If X were successful your chances in the case being described would be increased. 3. Your success or failure depends on the success or failure of X in this particular case. 4. It is quite possible to draw both the number 13 and a number divisible by 5. 5. Drawing the number 13

excludes the other possibility. 6. Many events occur without affecting each other in any way. 7. In tossing two coins the fact that one fell heads would not affect the way the other fell. 8. In the case of tossing two coins the trial may result in six ways. 9. Whatever the events may be, they are all independent.

Ex. 23. 1. Are all events dependent on one another? 2. Is it possible for an event to be entirely independent on some other event? 3. What do we mean by speaking about mutually dependent events? 4. Could you give your own example of mutually dependent events? Do, please. 5. Could you give an example of mutually independent events? Do, please. 6. Would you give an example of mutually exclusive events? 7. Have you ever tossed a coin to call heads or tails? 8. In how many ways could your trial result? Why? 9. Were your chances even? How do you account for that? 10. What is the product of separate probabilities?

LESSON 26

Ex. 9. 1. Does preparatory work for your English lesson take much of your time? 2. Can one foresee all the possible difficulties that may be encountered in one's work? 3. Do you think it is important for a mathematician to have a good memory. 4. Do you like solving complicated tasks? 5. Is it easy or difficult to detect errors in a computer program? 6. Why is accuracy important while writing instructions? 7. Does operating a computer require an intelligent approach? 8. Why do you sometimes make grammar mistakes while speaking English? 9. Does your teacher stress the fact that you must work at your English regularly? 10. Must children always obey their father and mother?

Ex. 11. 1. — true, 2. — true, 3. — false, 4. — false, 5. — false, 6. — false, 7. — false, 8. — true, 9. — true, 10. — false, 11. — false, 12. — true.

Ex. 12. 1. Which property distinguishes a computer from all other kinds of machine? 2. Will you give some examples of the computer's manysidedness? 3. Under what condition can a computer perform a certain task? 4. Why is it a misnomer to apply the term "electronic brain" to an automatic digital computer? 5. With what kind of instructions can a computer deal? 6. Is it possible for a computer to cope with difficulties which have not been foreseen by the programmer? 7. With what must a computer be supplied? 8. Why is it important to supply the computer both with a detailed set of instructions and with the numerical values? 9. What is a program? 10. What is the great merit of computers? 11. Suppose there is a small mistake in the program. Can we expect the computer to correct it? 12. Why does it sometimes happen that we get results which are obviously absurd? 13. What must be stressed as far as programs

are concerned? 14. What tasks does the preparation of the problem for the solution by a computer involve? 15. Which process demands great attention to detail on the part of the programmer? 16. What follows after the program has been read? 17. What happens if there is an error in the original problem? 18. Is it necessary to amend the program in such a case and present it again to the computer?

LESSON 27

Ex. 8. b) 1. What can you say about action and reactions? 2. Is acceleration always constant? 3. Have you ever wanted to be an astronomer? 4. Do you read articles dealing with the latest achievements in your field of science? Why? 5. What kind of books do you collect? 6. Which book impressed you most of all recently? 7. How is it possible to determine the rate of revolution of planets around the Sun? 8. Why does a falling body possess acceleration? 10. Do you know what the acceleration of a falling body is equal to? 11. What compels you to study English? 12. What kind of difficulties do you encounter in working at your translations?

Ex. 10. 1. — false, 2. — true, 3. — false, 4. — false, 5. — true, 6. — false, 7. — true, 8. — false, 9. — false, 10. — true.

Ex. 11. 1. What are the two great achievements that made Newton's name famous? 2. Which concepts introduced by Newton is it important for us to examine? 3. By whom was a great deal of observed data about the motions of the planets collected? 4. What did Kepler's first law amount to? (the second, the third). 5. What is the acceleration of each planet towards the sun proportional to? 6. Under what circumstances do bodies induce in each other mutual acceleration? 7. What principle as far as action and reaction are concerned distinguishes between mass and weight? 8. In what book did Newton formulate his laws of motion? 9. How is the first (second, third) law by Newton formulated? 10. What are the names of the scientists who developed the theory of universal gravitation?

LESSON 28

Ex. 8. 1. Do you need anyone's aid in writing your English exercises? 2. What did Galileo deduce from his observation of planetary motion? 3. Is it possible to say that Lobachevski's geometry was a deviation from Euclidean geometry? Why? 4. What are the most significant subjects studied at the mathematics department? 5. Why are the advances in mathematics extremely important for every field of science? 6. Do you study applied or classical mechanics? Why? 7. Do you understand my questions directly or do you first translate them into Russian? 8. Have you any idea of nuclear physics? 9. How many elementary particles were known to scientists in the beginning

of this century? 10. What is the main source of your knowledge of English? 11. How frequently do you come to the University? 12. Do you frequently make mistakes in English or only occasionally? How do you account for your mistakes? 13. In what year do students learn the relativity theory? 14. Apart from reading books and articles on mathematics what will your knowledge of English permit you to do? 15. Have you ever observed a falling comet?

Ex. 10. 1. — true, 2. — false, 3. — false, 4. — false, 5. — true, 6. — false, 7. — true, 8. — true, 9. — true, 10. — true, 11. — false.

Ex. 11. 1. What problems does the article deal with? 2. How can one classify Newton's deduction of the universal law of gravitation? 3. What provides an extremely successful method for calculating the motion of planets, moons, etc.? 4. With what have such calculations been correlated? 5. What deviation from the predictions of Newtonian theory has been found? 6. Is this deviation significant in the case of all the planets? 7. In terms of what theory is the effect of the advance of perihelia explainable? 8. Have we any reason to state that Newtonian theory represents essentially a perfect description of planetary motion? 9. Why did Newton's theory become a subject of intense interest in the 18th and 19th centuries? 10. Is there any connection between Newton's theory and Laplace's equation (Bessel functions, Legendre polynomials)? What is it? 11. Does this theory find application in applied and classical physics? 12. What does the gravitational law specify? 13. By what is the gravitational field created? 14. Why is the gravitational field a vector field? 15. What does the expression $F=0$ mean? 16. What is a scalar function? 17. What were potentials originally devised for? 18. In what fields of modern physics do potentials play important roles?

LESSON 29

Ex. 9. 1. Do you reduce a fraction or do you abbreviate a fraction? 2. How does one abbreviate the expression "and so on"? 4. What does the word *convention* mean? (an agreement). 4. Do you think that your method of learning English is efficient? 5. Suppose we have brought together two distinct sets of objects. Do we always get a new entity in a case like this? 6. Why do we insert braces in dealing with sets? 7. Does it require a certain amount of intellect to cope with the notion of a set? 8. Can you think of a family whose members are scattered all over the face of our country? 9. Are you a member of a football or a basketball team? Why or why not? 10. Can one know what expects one?

Ex. 11. 1. — false, 2. — true, 3. — false, 4. — true, 5. — false, 6. — false, 7. — true, 9. — true, 10. — false.

Ex. 12. By whom was the notion of a set explicitly introduced first? 2. What did Cantor mean by a set? 3. Must a member of a set

necessarily be a physical object or can it also be a mental object? 4. What do we mean by a specific set? 5. What act creates the set? 6. Can this act be carried out only physically or also conceptually? 7. Could you, possibly, give an example of the act of physical "bringing together" of some objects? 8. What is a superset as far as football is concerned? 9. Will you please give your own example of a group of objects brought together conceptually (mentally)? 10. By what letters do we generally denote sets and members of sets? 11. What is the fundamental statement we can make concerning a particular set and a particular object? 11. When are two sets considered to be the same? 11. What do we do to simplify matters and gain concreteness in dealing with sets? 14. By what letter is the universal set denoted? 15. How many methods of naming a set do you know? 16. What is the first one characterized by? 17. What is the second method characterized by? 18. Can you imagine a set with no members? 19. How is one able to characterize the empty set observing that each object has the property that it is equal to itself? 20. Is the empty set referred to frequently?

Ex. 20. 1. — true, 2. — false, 3. — false, 4. — false, 5. — true, 6. — false, 7. — true, 8. — vice versa, 9. — true, 10. — then μ is said to be a one-one mapping of A into B .

LESSON 30

Ex. 8. 1. Do you like to work alone or in a group? 2. What English words do you memorize with difficulty? 3. What derivatives of the word "use" do you know? 4. What do you think of lazy people? 5. Do you prefer classical or modern music? 6. Do you think there are people who prefer monotonous work? 7. Do you prefer avoiding difficulties or try to cope with them? 8. Do you deal with theoretical or applied mathematics? 9. What important tasks do you expect to accomplish this year? 10. How do you expect to utilize your knowledge of English?

Ex. 10. 1. — false, 2. — false, 3. — true, 4. — false, 5. — false, 6. — false, 7. — false, 8. — true, 9. — false, 10. — true.

Ex. 11. 1. What is the function constructed from a given function called? 2. Is the problem of sketching the graph of a function concerned with the concept of the derivative? 3. Why is there no theoretical difficulty involved in the problem of sketching the graph? 4. Why must the few points actually plotted on the graph be chosen with some care? 5. What does a lazy mathematician think of the job of plotting many points on the graph? 6. In what way can one define the function f' ? 7. In what way may a number of line segments be obtained? 8. How do we join the points on the graph? 9. What do you see in Figure 2 (3)? 10. See Figure 4 and say what the easiest way of sketching a graph is.

DISTRIBUTION OF SEXES

(2-е лабораторное занятие к уроку 26)

Consider families with exactly two children. Letting b and g stand for boy and girl, respectively, and the first letter for the older child, we have four possibilities: bb , bg , gb , gg . These are the four sample points, and we associate probability $\frac{1}{4}$ with each. Given that a family has a boy (event H), what is the probability that both children are boys (event A)? The event AH means bb , and H means bb , or bg , or gb . Therefore $p\{A|H\} = \frac{1}{3}$ in about one-third of the families with the characteristic H we can expect that A also will occur. It is interesting that most people expect the answer to be $\frac{1}{2}$.

This is the correct answer to a different question, namely: A boy is chosen at random and found to come from a family with two children; what is the probability that the other child is a boy? The difference may be explained empirically. With our original problem we might refer to a card file of families, with the second to a file of males. In the latter, each family with two boys will be represented twice, and this explains the difference between the two results.

LANGUAGE TRANSLATION

(2-е лабораторное занятие к уроку 27)

Translating from one language to another has been accomplished by automatic computers. The first successful trial occurred in 1954 when an IBM Type 701 translated from Russian into English.

A total vocabulary consisting of 250 Russian words (in latinized spelling) relating to the fields of politics, law, mathematics, chemistry, metallurgy, communications, and military affairs was punched on punch cards. Associated with each Russian word and punched on the same card were one or two English equivalent words, and three

codes designated *1st*, *2nd*, and *3rd*. These codes (linguistically they can be considered "diacritical marks") together with the program and six "rules of operational syntax" caused appropriate translation. For example, different meanings of words could be selected; the order of words could be left unchanged or altered; a word could be treated as a whole or could be divided into a root and a suffix. The dictionary stored in the machine was equivalent to 6000 machine words of 36 binary digits each, and the program consisted of about 2400 program steps. With about 5 to 8 seconds for each translation such as the following:

Мы передаем мысли с помощью речи
We transmit thoughts by means of speech

There is a long way to go still, of course, but the possibility of effective linguistic translation by automatic computers has been definitely demonstrated.

NEWTON AND HIS FAMOUS LAWS

(2-е лабораторное занятие к уроку 28)

Newton's tremendous scientific authority is primarily based on his book "The Mathematical Principles of Natural Philosophy", commonly called Principia. In 1665—1666, when the University of Cambridge was closed on account of the Great Plague, Newton busied himself with the problem of the attraction between the earth and the moon, hoping to check his calculations by measurements of the force acting between the earth and a freely falling body. The work involved the use of four constants: the time of a complete revolution of the moon about the earth, the radius of the earth, the distance of the moon from the earth, and the distance a body falls in one second. Basing his work on the third of Kepler's Laws, Newton arrived at the hypothesis that the attraction between two bodies varies as the product of their masses and inversely as the square of the distance between their centers of mass.

He also stated the three laws of motion.

1. Every body will continue in its state of rest or of uniform motion in a straight line unless it is compelled to change that state by impressed force.

2. Rate of change of motion is proportional to the impressed force, and takes place in the direction in which the force acts.

3. Action and reaction are equal and opposite.

He showed by rigorous mathematical deduction how the empirically established laws of Kepler on planetary motion resulted from the gravitational law of inverse squares and gave a dynamical explanation of many aspects of the motions of heavenly bodies and of the tides. He solved the two body problem for spheres and laid the beginnings of a theory of the moon's motion. By solving the

problem of the attraction of spheres he also laid the foundation of potential theory. His axiomatic treatment postulated absolute space and absolute time.

THE PROBLEM OF THREE BODIES

(2-е лабораторное занятие к уроку 29)

The problem of three bodies is one of the most famous in mathematics, and justly so. Nevertheless until recently the interest in it was directed toward the formal side, and in particular toward the formal solution by means of series.

It was Poincaré who first obtained brilliant qualitative results, especially with reference to the very special limiting "restricted problem of three bodies" treated first by Hill. As far as the general problem is concerned, the main achievements of Poincaré were the following: (1) he established the existence of various types of periodic motions by the method of analytic continuation; (2) he proved that, by the very structure of differential equations, complete trigonometric series would be available; and (3) he pointed out the asymptotic validity of these series. All of these results hold for any Hamiltonian system as well as for the problem of three bodies. Unfortunately an accessory parameter μ is present always in his researches, where for $\mu=0$ the system is of special integrable type. Thus the difficulties which arise are partly due to the special nature of the integrable limiting case when two of the three bodies are of mass 0, rather than inherent in the problem itself.

It is not too much to say that the recent work of Sundman is one of the most remarkable contributions to the problem of three bodies which has ever been made. He proves that, at least if the angular momentum of the bodies is not 0 about every axis through the center of gravity, the least of the three mutual distances will always exceed a specifiable constant depending on the initial configuration; thus triple collision is proved to be impossible, while it is shown that the singularity at double collision is of removable type.

SEQUENCES

(2-е лабораторное занятие к уроку 30)

A great number of different concepts of mathematics such as the length of a curve, area, instantaneous velocity, an infinite sum, all involve a common idea — the concept of a sequence of real numbers.

The intuitive concept of the notion of a sequence of real numbers is that of a list of real numbers with a beginning but no end. The real numbers appear in a certain order; this order is not accidental but deliberate. Recall that the natural number possesses this same property. Writing down the natural numbers in their obvious order, using the relation "less than", we obtain a list with a beginning but no end. If only we could transform each natural number on this list

into a real number! Let μ be a particular mapping of N into P . Then all we need do is replace each natural number n on the list by $\mu(n)$ — the real number associated with n by the mapping μ . This transforms the list of natural numbers into a list of real numbers as desired. Easy, isn't it?

One final simplifying step. Since the mapping contains the essence of the notion of a sequence of real numbers, let us say that it is a sequence of real numbers, which means in particular, that a sequence of real numbers is a set; this is in accordance with our fundamental program of expressing mathematical objects by means of sets of ordered n -tuples. We have arrived at the following definition.

Definition. Any mapping of the natural numbers into the real numbers is called a sequence of real numbers.

СПИСОК ПРОИЗВОДНЫХ СЛОВ

A

abbreviate — abbreviated;
able — ability, disability, unable;
abstract n, a — abstraction;
absurd — absurdity;
academic — academy, academician;
accelerate — acceleration, accelerator;
accept — acceptable, acceptance, inacceptable;
accomplish — accomplishment;
according — accord, accordance;
accuracy — accurate, accurately, inaccuracy, inaccurate;
actual — act, activity, active, activation, activate, actually, inactive, interact, actor;
acute — acutely, acuteness;
adjust — adjustable, adjustment;
administrative — administration, administer, administrator;
advanced — advance n, v advancement;
adviser — advise, advisable;
aim — aimless;
air n, v — airdrome, air-line, air-man, air-port, air-way;

alphabet — alphabetic(al);
alter — alteration;
alternative — alternation;
analogous — analogy, analog;
analyse — analytic(al);
appear — appearance, disappear, disappearance, reappear;
application — applied, applicable, applicability, inapplicable;
appointment — appoint;
approximation — approximate, approximately;
arrange — arrangement, rearrange;
assistance — assistant, assist;
associate — associated, association;
astronomer — astronomy, astronomical;
atmosphere, atmospheric;
attend — attendance;
attraction — attract, attractive;
automatic — automatically, automation, automobile;
axiom — axiomatic;
axis — axial;

B

bad — badly, badness;
base — basal, baseless, basically, basis;
bisect — bisection, bisectioner, bisectant;

black — blacken;
brain — brainless;
busy — busily, business;

C

capable — capability;
care — careless, carelessly, carelessness;
certain — uncertain, uncertainty;

change — changeless, unchanged, changeable, interchange;
chemical — chemistry, chemist;
child — childless, childlike;

circle — circular, encircle, circulate, circulation;
 class — classic, classical;
 clarify — clarification;
 code *n, v* — codify, decode;
 coincide — coincidence;
 collect — collective, collector;
 communist — communism, community;
 combination — combinatorial;
 compare — comparable, comparability, incomparably;
 compatible — incompatible;
 complicated — complication;
 complete — completely, completeness;
 complex *n, a* — complexity;
 compose — composer, composition, discompose, decomposition;
 computer — computation, computable;
 commutative — commutant, commutation;
 concentrate — concentration, concentric;

death — deathless;
 decide — decidedly, decision, decisive;
 decimal — decimeter;
 deep — deeply, depth;
 democratic — democracy;
 demonstrate — demonstration, demonstrator;
 density — dense, densely;
 depend — interdependent, interdependence;
 derivation — to derive;
 describe — descriptive;
 design — designate, designation;
 desire — desirable;
 detect — detector, detective;

earth — earthly;
 easy — easily, easiness;
 economical — economist, economize, economy;
 effect — effective, effectively;
 Egypt — Egyptian;
 electric — electrician, electricity, electrify, electrification, electron;
 element — elemental;
 empty — emptiness;
 end *n, v* — endless, endlessly, unending;
 energy — energetic;
 English — Englishman;
 entire — entirely;
 equal — equalize, equalization, equally, equator, equilibrium, equivalent;

conclude — conclusive;
 consistent — consistence, consistency, inconsistency;
 construct — constructive, constructively, reconstruct, reconstruction;
 contain — container;
 continue — continuation, continual, continually, continuity, discontinue, discontinuity, equicontinuous;
 cooperate — cooperation, cooperative;
 correct *a, v* — correction, correctly, corrective, correctness, incorrect;
 correlate — correlative, correlation;
 correspond — correspondence, correspondent, corresponding, correspondingly;
 count *n, v* — countability, uncountable;
 cover *n, v* — discover, uncover;
 critical — criticism, criticize;
 cross *n, v* — crosspoint, cross product, cross ratio;

D

determine — determination;
 develop — underdeveloped;
 differ — indifferent, indifferently;
 differential — differentiate, differentiation;
 dimension — dimensional;
 direct *a, v* — indirect, indirectly, unidirectional;
 distinct — distinctive, distinction, distinctly, indistinctly, distinguishable;
 discover — discovery;
 distributive — distribute; distribution;
 doubt — doubtless, undoubtedly;
 draw *n, v* — drawing;

E

error — erroneous;
 essential — essence;
 establish — establishment;
 evaluate — evaluation;
 even — evenly;
 evident — evidence, evidently;
 exact — exactness;
 exceed — exceedingly;
 exclude — exclusion;
 experience — experienced, unexperienced;
 explanation — to explain;
 explicit — explicitly;
 exponent — exponential;
 express — expressive, expressionless;
 extreme — extremity;

F

false — falsification, falsify, falsifier;
 familiar — familiarity;
 favour *n, v* — favourable, favourably, favourite;
 feel — feeling;
 flat — flatly;
 follow — follower;
 foreign — foreigner;
 form *n, v* — formal, formality, formation, formless, to deform, doformation, to reform, reformation, reformer;

formula — formulate, formulation;
 fortunately — fortunate, unfortunately;
 French — Frenchman;
 frequent — frequency, frequently;
 friend — friendly, friendless, friendliness, friendship;
 fulfill — fulfillment;

G

general — generality, generalization;
 generate — degenerate;
 geometry — geometrician;

graduate — graduation, undergraduate;

H

help *n, v* — helpless, helplessly;
 history — historic;
 home — homeless;
 hope *n, v* — hopeful, hopeless, hopelessly;

hypothesis — hypothetic(al), hypothetically;

I

idea — ideal, idealist, idealistic, idealize, idealization;
 identity — identify, identification;
 illustrate — illustrative;
 imagine — imaginary, imagination;
 implicit — implicitly;
 imply — implication;
 important — unimportant;
 impress — impression, impressionist, impressionistic, impressive;
 improve — improvement;
 inadequate — inadequacy, inadequately, adequate, adequately;
 include — inclusion, inclusive;
 indicate — indication, indicative;
 industrial — industry;

information — to inform;
 inscribe — inscription;
 instinct — instinctive, instinctively;
 instruction — to instruct;
 integer — integrable, integrand, integrate, integrated, integrity;
 intelligent — intellect, intelligence, intelligent;
 intersect — intersection;
 introduce — introduction;
 intuitive — intuitively;
 invariable — invariance, invariant;
 invent — inventor, invention, inventive;
 inverse *a, v* — inversion, invertible;
 involve — involution;

L

law — lawful, lawfully, unlawful;
 lazy — laziness;
 lead — leader, leading;
 lecture *n, v* — lecturer;
 limit *n, v* — limitless, limitation, limited, unlimited;

linear — linearity, linearly;
 locate — localize, localization, locally;
 logical — logic, logician, logistics;
 lucky — luck, luckily;

M

main — mainly;
 major — majority;
 material — materialism;
 measure — measurable, measurability;

mechanics — mechanical, mechanization;
 method — methodology;
 minimize — minimization;

mixed — to mix;
modification — to modify, modifier;
monotonous — monotony;
month — monthly;

natural — nature, naturally, unnatural;
need *n, v* — needless;
negative — negation, to negate;

object *n, v* — objective;
observe — observation, observable;
occasion — occasional, occasionally;

part *n, v* — partial, partition;
period — periodically;
person — personal, personally, personify, personification;
philosophy — philosophic(al), philosophically;
physics — physical, physiology, physiologist;
place *n, v* — to displace, to replace;
popular — popularity, population, to populate;
possess — possession;

quantity — quantify, quantitative;
quality — qualitative, qualify, qualification;

rapid — rapidity;
real — reality, realistic, realization, unreal;
recently — recent;
recognize — recognition;
rectangle — rectangular;
reflect — reflection, reflex;
region — regional;
regular — regularly, regularity, regulate, regulation, irregularity;

save — safe;
same — sameness;
satisfy — satisfaction, satisfactory;
select — selected, selection, selective, selectivity;

motion — motionless;
move *n, v* — movement, movable, immovable;
multiply — multiple;

N

normal — norm, normalize, normalization;
numeral — numerable, innumerable, numerically;

O

operation — to operate;
opposite — to oppose, opposition;

P

power — powerful, powerless;
precise — precisely;
prefer — preference, preferable, preferably;
pressure — to press;
previous — previously;
probability — probable;
problem — problematic;
product — productive, productivity;
prove — provable, to disprove;
publish — public, publicly, publicity;
purpose — purposeful, purposeless;

Q

question — questionable, unquestionable;

R

remove — removal, removable;
repeat — repetition;
represent — representation, representative;
require — requirement;
restrict — restriction;
result *n, v* — resultant;
reverse *n, v* — reversible, irreversible;
revolution — to revolve;
rotation — to rotate;

S

sense — senseless, sensibility;
separate — separation, separable, separability, separatrix;
serve — service;
shape — shapeless;

similar — similarity;
simple — simplify, simplification, simply;
single — singularity;
slow — slowly, slowness;
small — smallness;
smooth — smoothly, smoothness;
solid — solidify;
solve — solvable, unsolvable;
special — speciality, specialization, specialize, specialist;
specific — specify, specific;
sphere — spherical, sphericity, spheroid;

tangent — tangency;
technology — technical, technique;
theory — theoretic(al), theoretically, theorist;
thin — thinness;
total *n, a* — totality, totally, totalitarian;

unfortunately — fortunately, fortune;
uniform — uniformity, uniformly, unified;

valid — invalid;
value — valuable, valueless, valuation;

square *n, v* — squarable;
substitute — substitution;
suggest — suggestion;
suitable — to suit, suitably, suitability;
suppose — supposition;
suppress — suppression;
symbol — symbolic, symbolically, symbolize, symbolism;
symmetric — symmetry, symmetrically;
system — systemless, systematic(al), systematically, systematize, systematization;

T

travel — traveller;
treat — treatment;
triangle — triangular;
true — truth, truthful, truthfully;
type — typical, typically;

U

unit — unity, unite;

V

visualize — visual, visible;
vary — variability, invariability

A

abacus
abscissa
absolute
absolutely
accent
accompany
accumulate
address
affine
agent
aggregate

analog
analogy
apothem
apparatus
argument
assamblage
asymptote
attack
bisectrix
bit

C

calendar
cardinal
cardinality
cisoid
collaps
co linear
co linearity
command
communication
community
compact
component
conic
configuration
conjunction

conservative
constituent
contract
contrast
contribute
contribution
converge
convergent
convergence
cosecant
cosine
cotangent
crisis
cylinder
cylindrical

D

defective
diagnose
dialectical
dialectics
discrete
discriminant
discriminate
discrimination

disintegrate
divergence
divergent
dominate
dominant
dominance
domination

eccentricity
efficiency
efficient
extract

facultative
faculty
fashion

gradation

guarantee

harmonic
hemisphere
heterogeneous

imitate
imitation
incidence
index
infinum
initial
inspect
inspection

K

kinematic
kinetic

mantissa
manufacture

nation
national

occupy

E

extraction
extrapolation
extrapolate

F

fibre
forward

G

gradient

H

homogeneous
hyperbola

I

instrument
interference
interpolate
interpolation
isolate
isolation
isomorphic
isomorphism

L

locuna
latent

M

metric
motive *n*

N

nationalize
nomenclature

O

occupation

P

parabola
paragraph
paralelepiped
parity
pentagon
percent
permanent
perspective
polyhedron
primitive

priority
prism
pro forma
profile
project
protection
protect
prototype
punctual
punctuality

Q

quadrant
quadrate
quadrature

qualification
quasi

R

report
reserve
resolution

retrospect
revise

S

sextant
social
socialist
socialism
speculate
speculation
speculative
spin
spiral
spontaneous
stability
stable
stabilization
stabilize

static
statics
stationary
stimulate
stimulation
stimulator
strategy
substance
symposium
symptom
synchronous
synchronize
synthesis
synthetic

T

tensor
topology
topological
trajectory
transform
transformation

transmission
transport
transposition
traverse
turbulence

V

vacancy
vacant

vulgar

Z

zone

ОГЛАВЛЕНИЕ

Предисловие	3
Part I	7
Lesson One	7
Lesson Two	13
Lesson Three	17
Lesson Four	22
At the Lesson	22
Lesson Five	22
Moscow University	29
Moscow University	33
Lesson Six	35
Computers	40
Lesson Seven	42
I am a Student	47
Lesson Eight	51
I am a Post-graduate	55
Lesson Nine	59
Four Basic Operations of Arithmetic	64
Lesson Ten	68
Base Two Numerals	73
Lesson Eleven	77
Closure Property	81
Lesson Twelve	84
Whole Numbers	87
Lesson Thirteen	91
Something about Mathematical Sentences	94
Lesson Fourteen	97
Fractions	101
Lesson Fifteen	104
Decimal Numerals	113
Lesson Sixteen	113
The Game of Chess	117

Part II.	121
Lesson Seventeen	121
The Meaning of Geometry	124
Points and Lines	126
Lesson Eighteen	113
Rays, Angles, Triangles and Quadrilaterals	132
Something about Euclidean and Non-Euclidean Geometries	134
Lesson Nineteen	138
Circles	140
Circumference of a Circle	143
Lesson Twenty	146
The Pythagorean Property	148
Square Root	151
Lesson Twenty One	154
Set Theory	156
Solution Sets	158
Lesson Twenty Two	161
The Coordinate Plane	163
More about the Coordinate Plane	165
Lesson Twenty Three	168
Polynomials	170
Trinomials that are Quadratic Trinomials	172
Lesson Twenty Four	176
Sequences Obtained by Repeated Multiplication	178
Unending Progressions	180
Lesson Twenty Five	184
Probability of Occurrence	186
Dependent, Mutually Exclusive and Independent Events	188
Part III	193
Lesson Twenty Six	193
Computers	194
An Introduction to Algol 60	197
Lesson Twenty Seven	200
Isaac Newton	201
More about Newtonian Laws	204
Lesson Twenty Eight	207
Gravitational Attraction and Potentials	208
The Gravitational Potential	211
Lesson Twenty Nine	215
Sets	216
Mappings	220
Mappings	220
Lesson Thirty	225
The derivative of a Function and Some Applications of the Derivative	226
Max-Min Problems	230

Раздел лабораторных заданий	235
Грамматический справочник	298
Урок 1	298
Существительное. Прилагательное.	
Урок 2	300
Указательные местоимения Личные местоимения. Притяжательные местоимения. Повелительное наклонение	
Урок 3	302
Модальные глаголы	
Урок 4	303
Глагол <i>to be</i> во временах Present, Past, Future Indefinite	
Урок 5	305
Оборот <i>There is</i> (there are)	
Урок 6	307
Глагол <i>to have</i>	
Урок 7	308
Основные способы словообразования. Времена группы Indefinite (Active) (Present, Past, Future)	
Урок 8	314
Future Indefinite в придаточных условия и времени. Местоимение <i>it</i>	
Урок 9	315
Времена группы Indefinite (Passive)	
Урок 10	317
Местоимения <i>some, any, no, every</i> . Participle I. Времена группы Continuous (Active) (Present, Past, Future)	
Урок 11	320
Continuous Passive	
Урок 12	321
Эквиваленты модальных глаголов	
Урок 13	321
Степени сравнения прилагательных и наречий. Некоторые значения слова « <i>most</i> »	
Урок 14	323
Времена группы Perfect (Active)	
Урок 15	325
Времена группы Perfect (Passive). Времена группы Perfect Continuous	
Урок 16	326
Согласование времен	
Уроки 17, 18	329
Неличные формы глагола Герундий (The Gerund)	
Уроки 19, 20	332
Причастие (The Participle)	

Уроки 21, 22, 23	335
Инфинитив (The Infinitive)	
Инфинитив в составе сложного дополнения (Complex Object)	
Инфинитив в составе сложного подлежащего (Complex Subject)	
Уроки 24, 25	339
Сослагательное наклонение (The Subjunctive Mood)	
Условные предложения (Conditional Sentences)	
Таблица словообразовательных суффиксов	343
Таблица словообразовательных префиксов	344
Таблица нестандартных глаголов	344
Англо-русский алфавитный словарь	346
Раздел для преподавателя	367
Методические рекомендации	367
Упражнения для аудирования в аудитории	377
Список производных слов	403
Список интернациональных слов	408

ШАНШИЕВА СУСАННА АКОПОВНА

АНГЛИЙСКИЙ ЯЗЫК
ДЛЯ МАТЕМАТИКОВ

Редактор И. Д. Лепешова

Переплет художника Н. А. Князькова
Технический редактор Т. Е. Светличная

БЗ № 27—69—1976

Сдано в набор 1/XII 1975 г. Подписано к печати 10/IX 1976 г. Формат 60×90^{1/16}
Бумага тип. № 1 Усл. физ. печ. л. 26,0
Уч.-изд. л. 25,55 Изд. № 2254 Зак. 315
Тираж 30 000 экз. Цена 1 руб.

Издательство
Московского университета.
Москва, К-9, ул. Герцена, 5/7.
Типография Изд-ва МГУ.
Москва, Ленинские горы