

ENGLISH

АНГЛИЙСКИЙ ЯЗЫК ДЛЯ ТЕХНИЧЕСКИХ ВУЗОВ **УЧЕБНИК**

Т.А. Карпова, Т.В. Асламова, Е.С. Закирова, П.А. Красавин



Introduction Course
 Different Types of Education
 Science and Technology
 Engineering in the 21st Century
 Flexible Manufacturing Systems
 Computers
 Engineering Materials
 Engineering Materials Technology
 Different Types of Vehicles
 Motor Car Components
 Engines
 Oil&Gas and Petrochemical Industries
 Industrial and Environmental Biotechnology

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АНГЛИЙСКИЙ ЯЗЫК для технических вузов

Под общей редакцией проф. **А.В. Николаенко**

Рекомендовано ФГБОУ ВПО

«Московский государственный технологический университет «СТАНКИН»

в качестве **учебника** для студентов вузов,
обучающихся по укрупненной группе специальностей
и направлений подготовки

«Инженерное дело, технологии и технические науки»
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Разработан на основе компетентностного подхода к обучению иностранному языку для специальных целей в соответствии с ФГОС ВПО и отвечает требованиям учебных программ третьего поколения по дисциплине «Иностранный язык» для бакалавров неязыковых высших учебных заведений.

Учебник включает в себя: курс повторения с тестами; основной курс, в состав которого входят тексты для развития навыков всех видов чтения, аудирования, аннотирования, реферирования; тексты-диалоги; разговорные клише для развития навыков устной и письменной речи; лексико-грамматические упражнения и тесты; грамматические пояснения ко всем разделам учебника; англо-русский словарь контекстуальных значений активной лексики.

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Для студентов технических направлений высших учебных заведений.

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Предисловие

Целью данного учебника является интеграция языковой и профильной подготовки студентов в контексте их профессионального становления, обеспечения их академической мобильности, проектирования индивидуальных учебных траекторий, развития их рефлексии и автономии в обучении иностранному языку для специальных целей. Учебный материал по своей структуре и методической организации является частью целостной интегрированной системы обучения и ориентирован на активные методы овладения знаниями, развитие творческих способностей студентов, переход к индивидуализированному обучению с учетом потребностей и возможностей личности.

Учебник отражает основной принцип модульного подхода к обучению, который предполагает четкое структурирование учебной информации, систематизацию содержания обучения и организацию работы студентов с полными, логически завершенными учебными блоками (модулями). Ввиду логической последовательности и преемственности всех этапов языковой подготовки, модульный характер обучения способствует системному овладению лингвистическим материалом, расширению фоновых (лингвострановедческих, профессиональных, культурологических и др.) знаний студентов, совершенствованию умений и навыков по основным видам речевой деятельности.

Учебник включает:

- Модуль 1 — курс повторения, состоящий из пяти разделов (Units 1–5), которые содержат тренировочные упражнения и тестовые задания в пределах базовой грамматики английского языка.

- Модули 2–14 — основной курс. Основной дидактической единицей каждого модуля является текст (социально-бытовой, научно-популярный, профессионально ориентированный), который является, с одной стороны, источником информации, а с другой стороны — арсеналом речевых форм. На основе иноязычного текста происходит изучение языкового материала, позволяющего принимать участие в коммуникативном акте профессионального общения на иностранном языке: осуществлять обмен информацией как в устной, так и письменной фор-

ме, порождать и воспринимать иноязычную речь. Система упражнений основного курса является типовой для всех модулей. Каждый модуль рассчитан на 10 часов аудиторной работы (5 практических занятий) и 10 часов внеаудиторной самостоятельной работы студентов:

№ п/п	Содержание занятия	Домашнее задание
1	Ознакомление с целями по данному модулю. Ознакомление с лексическим материалом: упр. 1—7. Ознакомление с грамматическим материалом: упр. 8—9. Ознакомительное чтение текста: упр. 10—11	Изучающее чтение текста
2	Изучающее чтение текста: упр. 12—19. Аудирование: упр. 20	Подготовка к лексико-грамматическому тесту
3	Лексико-грамматический тест. Говорение (ответы на вопросы, диалоги): упр. 21—25	Упр. 25
4	Говорение (диалоги): упр. 25. Ролевая игра: упр. 26. Письмо: упр. 27—28	Упр. 29, 30
5	Говорение: сообщения по теме. Аннотирование, реферирование текста: упр. 32. Обсуждение проектов: упр. 31	Аннотация/реферат текста в письменной форме

Текстовый материал, система упражнений и тестов учебника предназначены для взаимосвязанного развития навыков и умений основных видов речевой деятельности, систематизации грамматического материала, расширения словарного запаса обучающихся.

- Разговорные клише для развития навыков устной и письменной речи с диалогами-образцами. Данный раздел учебника включает также задания по развитию навыков написания официальных писем и писем личного характера, составления резюме.

- Грамматический справочник, содержащий грамматические пояснения как к разделам курса повторения, так и основного курса.

- Список неправильных глаголов, который разбит на четыре группы: глаголы, у которых все три формы совпадают; глаголы, у которых совпадает первая и третья формы; глаголы, у которых совпадают вторая и третья формы; глаголы, у которых все три формы не совпадают.

- Список наиболее употребительных суффиксов и префиксов, который необходим для выполнения некоторых заданий как в курсе повторения, так и в основном курсе.

- Англо-русский словарь контекстуальных значений активных лексических единиц учебника.

Коллектив авторов выражает уверенность в том, что предлагаемый учебник, в основу которого положены дидактические и лингвистические принципы модульного обучения иностранному языку для специальных целей, будет способствовать формированию компетентной профессиональной языковой личности, владеющей специальной лексикой и отраслевой терминологией, позволяющими облегчить коммуникацию в профессионально значимых ситуациях общения.

Module 1

INTRODUCTION COURSE

UNIT 1

PRONOUNS. VERBS “TO BE”, “TO HAVE”, “TO DO”

Exercises

(transformation of the sentences according to the models)

1. Replace with the pronouns.

My father is a teacher. My mother is a teacher. My parents are teachers.
He is a teacher. She is a teacher. They are teachers.

1. Your sister is a journalist. 2. His brother is a driver. 3. His mother and father are doctors. 4. Her grandfather is a scientist. 5. Their grandparents are pensioners. 6. My mother is a dentist. 7. Our parents are artists. 8. Your cousin is a student. 9. Her grandmother is a pensioner. 10. Your brother is a manager.

2. Open the brackets.

I (to be) a student. He (to be) a student. She (to be) a student.
I am a student. He is a student. She is a student.
We (to be) students. You (to be) students. They (to be) students.
We are students. You are students. They are students.

1. I (to be) a pupil. 2. He (to be) a worker. 3. He (to be) an employee. 4. They (to be) teachers. 5. We (to be) journalists. 6. You (to be) fitters. 7. They (to be) engineers. 8. She (to be) an actress. 9. I (to be) a doctor. 10. We (to be) scientists.

3. Transform into the plural.

He is a student. She is a student. I am a student.
They are students. They are students. We are students.

1. I am a pupil. 2. She is a manager. 3. He is a businessman. 4. He is a fitter. 5. She is a physicist. 6. I am musician. 7. She is an actress. 8. I am an artist. 9. He is a carpenter. 10. She is a teacher.

4. Transform into the plural.

This is a book.

That is a book.

These are books.

Those are books.

1. This is a notebook. 2. This is a clip. 3. That is a pen. 4. This is an article. 5. That is a ruler. 6. This is a composition. 7. That is a pin. 8. This is a journal. 9. That is a disc. 10. This is a cassette.

5. Replace with the absolute forms of the pronouns.

*This is **my** book.*

*This is **her** book.*

*This is **his** book.*

*This is **mine**.*

*This is **hers**.*

*This is **his**.*

*This is **your** book.*

*This is **our** book.*

*This is **their** book.*

*This is **yours**.*

*This is **ours**.*

*This is **theirs**.*

1. This is my pen. 2. This is her pencil. 3. This is your dictionary. 4. This is our magazine. 5. This is his newspaper. 6. This is their journal. 7. This is my disc. 8. This is her cassette. 9. This is your composition. 10. This is our ruler.

6. Translate into English.

Он учитель.

*Он **был** учителем.*

*Они **были** учителями.*

He is a teacher.

*He **was** a teacher.*

*They **were** teachers.*

1. Он врач. 2. Его жена — учитель. 3. Их сын — бизнесмен. 4. Их дочь — студентка. 5. Мой папа — юрист. 6. Его брат был музыкантом. 7. Они были музыкантами. 8. Он был студентом. 9. Мои бабушка и дедушка — пенсионеры. 10. Мы были студентами.

7. Open the brackets.

I (to have) a book.

He (to have) a book.

She (to have) a book.

***I have** a book.*

***He has** a book.*

***She has** a book.*

We (to have) a book.

You (to have) a book.

They (to have) a book.

***We have** a book.*

***You have** a book.*

***They have** a book.*

1. I (to have) a disc. 2. You (to have) a cassette. 3. They (to have) a newspaper. 4. We (to have) a magazine. 5. He (to have) a notebook. 6. She (to have) an eraser. 7. She (to have) a ruler. 8. I (to have) a clip. 9. You (to have) a composition. 10. He (to have) an article.

8. Open the brackets.

My sister (to have) a book.

Our students (to have) books.

*My sister **has** a book.*

*Our students **have** books.*

1. His cousin (to have) a composition. 2. Your pupils (to have) rulers. 3. Our parents (to have) magazines. 4. Her mother (to have) journals. 5. My teacher (to have) pencils. 6. My grandparents (to have) newspapers. 7. Their

parents (to have) notebooks. 8. My pupils (to have) compositions. 9. Our students (to have) marks. 10. Our sister (to have) discs.

9. Translate into English.

У меня есть книга.	У нас есть книга.	У них есть книга.
<i>I have a book.</i>	<i>We have a book.</i>	<i>They have a book.</i>
У него есть книга.	У нее есть книга.	У вас есть книга.
<i>He has a book.</i>	<i>She has a book.</i>	<i>You have a book.</i>

1. У меня есть сочинение. 2. У них есть журналы. 3. У нее есть линейка. 4. У нас есть газеты. 5. У него есть диски. 6. У них есть кассеты. 7. У вас есть карандаши. 8. У меня есть словарь. 9. У нас есть кнопки. 10. У них есть книги.

10. Translate into English.

У меня была эта книга.	У них были эти книги.
<i>I had this book.</i>	<i>They had these books.</i>

1. У меня был этот диск. 2. У них были эти кассеты. 3. У нее была эта линейка. 4. У него был этот журнал. 5. У вас были эти сочинения. 6. У нас были эти газеты. 7. У нее был этот блокнот. 8. У него был этот карандаш. 9. У них были эти ручки. 10. У меня были эти булавки.

Test 1.1

A. Replace with the pronouns.

1. *My uncle* is a carpenter.
a) She b) I c) He d) His
2. *His daughter* is a musician.
a) She b) He c) Hers d) It
3. *Their aunt* is a manager.
a) He b) She c) They d) Her
4. *Our parents* are physicians.
a) He b) We c) They d) Our
5. *My grandfather and grandmother* are pensioners.
a) My b) They c) She d) He

B. Choose the suitable forms of the verbs.

1. His uncle (to be) a fitter.
a) are b) is c) am d) to be
2. My aunt (to have) those books.
a) have b) to have c) has

3. I (to be) his cousin.
a) is b) are c) am d) to be
4. Their friends (to be) students.
a) is b) are c) to be d) am
5. His son (to have) this article.
a) has b) have c) to have

C. Choose the correct forms of the plural.

1. Their friend is a dentist.
a) Their friends were dentists.
b) Their friends are dentists.
c) Their friend was a dentist.
d) Their friends is dentists.
2. That was an article.
a) That was articles.
b) Those was articles.
c) Those were articles.
d) These were articles.
3. This is a clip.
a) Those were clips.
b) Those are clips.
c) These are clips.
d) This are clips.
4. He was a teacher.
a) They were teachers.
b) They are teachers.
c) We are teachers.
d) You are teachers.
5. Your daughter is a pupil.
a) Their daughter is a pupil.
b) Your daughters are pupils.
c) Your daughters are a pupil.
d) Their daughters are pupil.

D. Choose the suitable pronouns.

1. My friends have ... discs.
a) this b) theirs c) these d) me
2. ... were students.
a) We b) I c) This d) That

3. This is my notebook, and that is
a) hers b) your c) you d) me
4. ... grandparents are pensioners.
a) Me b) Mine c) My d) Hers
5. ... are my pencils.
a) That b) These c) This d) We

E. Choose the suitable translation of the sentences.

1. У них есть мои кассеты.
a) They had my cassettes.
b) They have mine cassettes.
c) They have my cassettes.
d) They has my cassettes.
2. Мой дядя был музыкантом.
a) My uncle is a musician.
b) My aunt was a musician.
c) My uncle was a musician.
d) My uncle were a musician.
3. Ее брат — бизнесмен.
a) Her brother is a businessman.
b) Her brother was a businessman.
c) His brother is a businessman.
d) His brother was a businessman.
4. У меня был их диск.
a) I had their disc.
b) I have their disc.
c) I has their disc.
d) I had this disc.
5. У него есть эта статья.
a) She has that article.
b) He has this article.
c) She has this article.
d) He has that article.

UNIT 2
NOUNS. SENTENCES INTRODUCED
BY “THERE IS / THERE ARE”.
PREPOSITIONS OF PLACE

Exercises

(transformation of the sentences according to the models)

1. Transform into the plural.

There is a table in the room.

*There **are** tables in the room.*

1. There is a chair near the table. 2. There is a vase on the windowsill.
3. There is a book in the bookcase. 4. There is an armchair in front of the TV set. 5. There is a pencil under the table. 6. There is a cup in the cupboard. 7. There is a fork among the spoons. 8. There is a bench near the blackboard. 9. There is a bottle in the cupboard. 10. There is a jug on the table.

2. Transform into the plural.

*There **was** a table in the room.*

*There **were** tables in the room.*

1. There was a chair near the table. 2. There was a vase on the windowsill. 3. There was a book in the bookcase. 4. There was an armchair in front of the TV set. 5. There was a pencil under the table. 6. There was a cup in the cupboard. 7. There was a fork among the spoons. 8. There was a bench near the blackboard. 9. There was a bottle in the cupboard. 10. There was a jug on the table.

3. Transform into the singular.

*There **are** plates on the table.*

*There **is** a plate on the table.*

1. There are taps above the sink. 2. There are forks on the plate. 3. There are pans in the cupboard. 4. There are knives in the table. 5. There are beds in the room. 6. There are shelves on the wall. 7. There are rugs on the floor. 8. There are spoons among the knives. 9. There are lamps on the ceiling. 10. There are desks in the room.

4. Transform into the singular.

*There **were** plates on the table.*

*There **was** a plate on the table.*

1. There were taps above the sink. 2. There were forks on the plate. 3. There were pans in the cupboard. 4. There were knives in the table. 5. There were beds in the room. 6. There were shelves on the wall. 7. There were rugs on the

floor. 8. There were spoons among the knives. 9. There were lamps on the ceiling. 10. There were desks in the room.

5. Open the brackets.

There (to be) a book on the table.

There (to be) books on the table.

There is a book on the table.

There are books on the table.

1. There (to be) books on the shelf. 2. There (to be) flowers in the vase. 3. There (to be) a magazine under the table. 4. There (to be) a fridge between the stove and the sink. 5. There (to be) chairs near the window. 6. There (to be) chairs around the table. 7. There (to be) a lamp above the table. 8. There (to be) some knives in the cupboard. 9. There (to be) a vacuum-cleaner. 10. There (to be) some children in the room.

6. Open the brackets.

There (to be) a book on the table.

There (to be) books on the table.

There was a book on the table.

There were books on the table.

1. There (to be) books on the shelf. 2. There (to be) flowers in the vase. 3. There (to be) a magazine under the table. 4. There (to be) a fridge between the stove and the sink. 5. There (to be) chairs near the window. 6. There (to be) chairs around the table. 7. There (to be) a lamp above the table. 8. There (to be) some knives in the cupboard. 9. There (to be) a vacuum-cleaner. 10. There (to be) some children in the room.

7. Translate into English.

На столе — книга.

На столе — книги.

There is a book on the table.

There are books on the table.

1. На подоконнике — цветы. 2. Посередине комнаты — стол. 3. Около кресла — пылесос. 4. Над раковиной — краны. 5. В комнате — двери. 6. В тексте — несколько абзацев. 7. На кухне — посудный шкаф. 8. На потолке — лампа. 9. В предложении — несколько слов. 10. На окнах — шторы.

8. Translate into English.

На столе была книга.

На столе были книги.

There was a book on the table.

There were books on the table.

1. На подоконнике были цветы. 2. Посередине комнаты был стол. 3. Около кресла был пылесос. 4. Над раковиной были полки. 5. В комнате были полки. 6. В тексте было несколько абзацев. 7. На кухне был посудный шкаф. 8. Над столом была лампа. 9. В предложении было несколько слов. 10. На окнах были шторы.

9. Transform into the genitive case.

My grandmother, a flat.

My grandmother's flat.

Pupils, compositions.

Pupils' compositions.

1. My father, a notebook. 2. His uncle, a bookcase. 3. Her grandfather, a picture. 4. My friend, a disc. 5. The boy, a dictionary. 6. The students, compositions. 7. The pupils, bags. 8. Their parents, a flat. 9. My grandparents, a room. 10. Our relatives, a fridge.

10. Translate into English.

Комната моего папы (папина комната).

My father's room.

1. Квартира моей бабушки. 2. Сочинение его брата. 3. Мамина чашка. 4. Стиральная машина моей тёти. 5. Квартира писателя. 6. Сумка её брата. 7. Ваза нашей бабушки. 8. Девочкин словарь. 9. Папина газета. 10. Статья преподавателя.

Test 1.2

A. Choose the correct form of the plural.

1. There is a goose in the kitchen.
 - a) There is geese in the kitchen.
 - b) There are geese in the kitchen.
 - c) There are geese in the kitchen.
 - d) There were geese in the kitchen.
2. There is a shelf on the wall.
 - a) There are shelves on the wall.
 - b) There were shelves on the wall.
 - c) There are shelves on the wall.
 - d) There was a shelf on the wall.
3. There is a boy in the room.
 - a) There was a boy in the room.
 - b) There were boys in the room.
 - c) There were a boy in the room.
 - d) There are boys in the room.
4. There was a flower in the vase.
 - a) There were flowers in the vase.
 - b) There are flowers in the vase.
 - c) There is a flower in the vase.
 - d) There are a flower in the vase.

5. There was a window in the room.
- a) There is a window in the room.
 - b) There were windows in the room.
 - c) There are windows in the room.
 - d) There are window in the room.

B. Choose the correct form of the singular.

1. There were magazines under the table.
- a) There is a magazine under the table.
 - b) There was magazine under the table.
 - c) There was a magazine under the table.
 - d) There is magazine under the table.
2. There are teachers in the room.
- a) There were teachers in the room.
 - b) There was a teacher in the room.
 - c) There is a teacher in the room.
 - d) There is an teacher in the room.
3. There are some words in this sentence.
- a) There were some words in this sentence.
 - b) There is a word in this sentence.
 - c) There was a word in this sentence.
 - d) There is a word in that sentence.
4. There were some titles above the text.
- a) There was a title above the text.
 - b) There are titles above the text.
 - c) There is a title above the text.
 - d) There is title above the text.
5. There are discs near the computer.
- a) There is a disc near the computer.
 - b) There was a disc near the computer.
 - c) There is disc near the computer.
 - d) There is a disc in the computer.

C. Choose the correct forms of the verbs.

1. There (to be) paragraphs in the text.
- | | | | |
|-------|--------|---------|--------|
| a) is | b) was | c) have | d) are |
|-------|--------|---------|--------|
2. There (to be) pupils in the room.
- | | | | |
|--------|--------|---------|-------|
| a) are | b) was | c) have | d) is |
|--------|--------|---------|-------|

3. My brother's book (to be) in this bookcase.
a) was b) are c) were d) has
4. There (to be) a ruler behind the wardrobe.
a) be b) is c) were d) are
5. His daughter's bag (to be) on the shelf.
a) was b) are c) be d) were

D. Choose the suitable translation of the sentences.

1. Мамино кресло стоит в углу.
a) There is an armchair in the corner.
b) The mother's armchair is in the corner.
c) The mother's armchair in the corner.
d) There was the mother's armchair in the corner.
2. Ваза — на подоконнике.
a) There was a vase on the windowsill.
b) There is a vase on the windowsill.
c) The vase is on the windowsill.
d) The vase was on the windowsill.
3. Словарь — в книжном шкафу.
a) The dictionary was in the bookcase.
b) The dictionary is in the bookcase.
c) There is a dictionary in the bookcase.
d) There was a dictionary in the bookcase.
4. В посудном шкафу — тарелки и кастрюли.
a) There are plates and pans in the cupboard.
b) There were plates and pans in the cupboard.
c) There is plates and pans in the cupboard.
d) There was plates and pans in the cupboard.
5. В тексте — несколько абзацев.
a) There were some paragraphs in the text.
b) There are some paragraphs in the text.
c) Some paragraphs are in the text.
d) Some paragraphs in the text.

E. Choose the suitable translation of the phrases.

1. Бабушкин холодильник.
a) the grandfather's fridge;
b) the grandmother's fridge;
c) the grandmother's fridges.

2. Картина моего двоюродного брата.

- a) my cousins' picture;
- b) mine cousin's picture;
- c) my cousin's picture.

3. Оценки моей сестры.

- a) mine sister's marks;
- b) my sister's marks;
- c) my sister's mark.

4. Статья её отца.

- a) her fathers' article;
- b) her father's article;
- c) her father's articles.

5. Диски её друга.

- a) her friends' discs;
- b) her friend's disc;
- c) her friend's discs.

UNIT 3

ADJECTIVES. ADVERBS

Exercises

(transformation of the sentences according to the model)

1. Form the degrees of comparison.

Long — longer — (the) longest

1. Small. 2. Tall. 3. Cheap. 4. Short. 5. Quick. 6. Fast. 7. Slow. 8. Loud. 9. Low. 10. Dark.

2. Form the degrees of comparison.

Big — bigger — (the) biggest

1. Hot. 2. Sad.

3. Form the degrees of comparison.

Large — larger — (the) largest

1. Brave. 2. Wide. 3. Fine. 4. Simple.

4. Form the degrees of comparison.

Happy — happier — (the) happiest

1. Busy. 2. Dirty. 3. Easy. 4. Heavy.

5. Form the degrees of comparison.

Interesting — more interesting — (the) most interesting

1. Difficult. 2. Expensive. 3. Necessary. 4. Beautiful.

6. Form the degrees of comparison.

Quickly — more quickly — most quickly

1. Slowly. 2. Beautifully. 3. Kindly. 4. Carefully.

7. Open the brackets.

This pencil is (long) than that one. This book is (interesting) than that one.

*This pencil is **longer** than that one. This book is **more interesting** than that one.*

1. This bag is (heavy) than that one. 2. This book is (expensive) than that one. 3. This dictionary is (thick) than that one. 4. This pencil is (short) than that one. 5. This flower is (beautiful) than that one. 6. This bench is (high) than that one. 7. This room is (big) than that one. 8. This woman is (young) than that one. 9. This washing-machine is (cheap) than that one. 10. This boy is (tall) than that one.

8. Open the brackets.

This pencil is (long) one.

This book is (interesting) one.

*This pencil is **the longest** one.*

*This book is **the most interesting** one.*

1. This bag is (heavy) one. 2. This book is (expensive) one. 3. This dictionary is (thick) one. 4. This pencil is (short) one. 5. This flower is (beautiful) one. 6. This bench is (high) one. 7. This room is (big) one. 8. This woman is (young) one. 9. This washing machine is (cheap) one. 10. This boy is (tall) one.

9. Translate into English.

*Это окно **шире**, чем то.*

*This window is **wider** than that one.*

1. Эта квартира больше, чем та. 2. Эта лампа ярче, чем та. 3. Этот стул выше, чем тот. 4. Этот ковер толще, чем тот. 5. Этот книжный шкаф красивее, чем тот. 6. Этот коврик меньше, чем тот. 7. Этот мальчик выше, чем тот. 8. Эта женщина моложе, чем та. 9. Эта сумка тяжелее, чем та. 10. Этот телевизор дороже, чем тот.

10. Translate into English.

*Это окно **самое широкое**.*

*This window is **the widest** one.*

1. Эта квартира самая большая. 2. Эта лампа самая яркая. 3. Этот стул самый высокий. 4. Этот ковер самый толстый. 5. Этот книжный шкаф самый красивый. 6. Этот коврик самый маленький. 7. Этот мальчик самый высокий. 8. Эта женщина самая молодая. 9. Эта сумка самая тяжелая. 10. Этот телевизор самый дорогой.

Test 1.3

A. Choose the correct forms of the degrees of comparison.

1. sad

- a) sad — sadder — (the) most sad;
- b) sad — sadder — (the) saddest;
- c) sad — more sad — (the) most sad;
- d) sad — more sad — (the) saddest;

2. fine

- a) fine — more fine — (the) finest;
- b) fine — fineer — (the) fineest;
- c) fine — finer — (the) finest;
- d) fine — more fine — (the) most finest;

3. old

- a) old — older — (the) oldest;
- b) old — more older — (the) oldest;
- c) old — older — (the) most oldest;
- d) old — more older — (the) most oldest;

4. young

- a) young — more younger — (the) most youngest;
- b) young — younger — (the) most youngest;
- c) young — more younger — (the) youngest;
- d) young — younger — (the) youngest;

5. bad

- a) bad — more bad — (the) most bad;
- b) bad — better — (the) most bad;
- c) bad — worse — the worst;
- d) bad — more bad — (the) best.

B. Choose the correct sentences.

1. This flat is (small) than ours.

- a) This flat is the smallest than ours.
- b) This flat is smaller than ours.
- c) This flat is more small than ours.
- d) This flat is more smaller than ours.

2. This text is (difficult) than that one.

- a) This text is more difficulter than that one.
- b) This text is difficulter than that one.
- c) This text is most difficult than that one.
- d) This text is more difficult than that one.

3. This duster is (dirty) than that one.

- a) This duster is dirtier than that one.
- b) This duster is most dirty than that one.
- c) This duster is the most dirty than that one.
- d) This duster is more dirtier than that one.

4. This article is (necessary) one.

- a) This article is the most necessary one.
- b) This article is the more necessary.
- c) This article is most necessary one.
- d) This article is necessary one.

5. This magazine is (good) one.
- a) This magazine is gooder one.
 - b) This magazine is more best one.
 - c) This magazine is the most best one.
 - d) This magazine is the best one.

C. Choose the suitable translation of the sentences.

1. Твоя комната холоднее, чем моя.
- a) Your room is colder than my.
 - b) Your room is colder than mine.
 - c) Your room is more colder than my.
 - d) Your room is more colder than mine.
2. Бабушкина квартира дороже, чем наша.
- a) The grandmother's flat is more expensive than ours.
 - b) The grandmother flat is more expensive than ours.
 - c) The grandmother's flat is most expensive than ours.
 - d) The grandmother's flat is the most expensive than ours.
3. Сочинение моего друга длиннее, чем моё.
- a) My friend composition is longer than mine.
 - b) My friend's composition is longer than mine.
 - c) My friends' composition is longer than mine.
 - d) My friend composition is more longer than mine.
4. Его сумка такая же тяжёлая, как и её.
- a) His bag is as heavy as her.
 - b) His bag is as heavy as hers.
 - c) His bag is as heaviest as her.
 - d) His bag is as heavier as hers.
5. Его сочинение лучше, чем ее.
- a) His composition is gooder than hers.
 - b) His composition is best than hers.
 - c) His composition is better than hers.
 - d) His composition is the best than hers.

UNIT 4

MODAL VERBS AND THEIR EQUIVALENTS. PREPOSITIONS OF DIRECTION

Mind the verbs *to be*, *to have*

I have this book at home.	—	У меня есть эта книга дома.
We had these books at home.	—	У нас были эти книги дома.
He has this book at home.	—	У него есть эта книга дома.
I have to answer the questions from this exercise.	—	Я должен отвечать на вопросы из этого упражнения.
He has to answer the questions from this exercise.	—	Он должен отвечать на вопросы из этого упражнения.
He had to answer the questions from this exercise.	—	Он должен был отвечать на вопросы из этого упражнения.
He <i>was</i> a teacher.	—	Он <i>был</i> учителем.
She <i>was</i> happy.	—	Она <i>была</i> счастлива.
The table <i>is</i> big.	—	Стол большой.
The table <i>was</i> big.	—	Стол <i>был</i> большой.
The table <i>was</i> in the room.	—	Стол <i>был</i> в комнате.
There <i>is</i> a table in the room.	—	В комнате стол.
There <i>was</i> a table in the room.	—	В комнате <i>был</i> стол.
There <i>are</i> tables in the room.	—	В комнате столы.
There <i>were</i> tables in the room.	—	В комнате <i>были</i> столы.
He <i>is to go</i> across the road.	—	Он должен перейти через дорогу.
He <i>was to go</i> across the road.	—	Он должен был перейти через дорогу.
We <i>are to go</i> to this shop.	—	Мы <i>должны</i> пойти в этот магазин.
They <i>were to go</i> to this shop.	—	Они <i>должны были</i> пойти в этот магазин.

Exercises

(transformation of the sentences according to the models)

1. 1. Replace with the modal equivalents.

He **can** translate very well.

They **can** translate very well.

He **is able to** translate very well.

They **are able to** translate well.

1. She can jump from that height. 2. They can ask questions quickly. 3. We can watch stars in the sky. 4. He can clean the flowerbed in the yard. 5. He can play computer games at home. 6. We can repeat short and long sounds from this exercise. 7. Their sons can play football well. 8. Her daughter can translate this text from the book. 9. We can walk along this street. 10. He can walk quickly across the road.

2. Replace with the modal equivalents.

*He **may** watch TV.*

*They **may** watch TV.*

*He **is allowed to** watch TV.*

*They **are allowed to** watch TV.*

1. They may take the books from the library. 2. He may play computer games at home. 3. He may get up late tomorrow. 4. Your son may go to the garden. 5. The patient may walk to this green park. 6. Her daughter may put the flowers into the vase. 7. You may share the work with another student. 8. You may help him. 9. Their sons may play football in the yard. 10. She may go out of the room.

3. Replace with the modal equivalents.

*He **must** translate the text.*

*They **should** translate the text.*

*He **has to** translate the text.*

*They **have to** translate the text.*

*He **is to** translate the text.*

*They **are to** translate the text.*

1. She should jump from this height. 2. They must ask questions quickly. 3. We should prepare for the classes. 4. He must clean the flowerbed in the yard. 5. He should do his homework. 6. We must go out of the house. 7. A pedestrian should cross the street when the traffic lights are on green. 8. The students should translate the text from this book. 9. She must answer this question. 10. Our grandfather should go to this office.

4. Replace with the modal verbs.

*He **was to** translate the text.*

*They **were able to** translate the text.*

*He **had to** translate the text.*

*They **could** translate the text.*

*He **should** translate the text.*

1. He was to go to the office. 2. They had to clean the swimming pool. 3. We were able to play computer games. 4. My brother was to perform this task. 5. Our teacher had to change the task. 6. Our relatives had to go to the hotel. 7. The journalist was able to have an interview with this politician. 8. The children were able to jump from that height. 9. His parents had to help their relatives. 10. The lawyer had to ask questions.

5. Open the brackets.

He (to be/to be to) a teacher. They (to be/to be to) happy. We (to be/to be to) go.

*He **is** a teacher.*

*They **are** happy.*

*We **are to** go.*

1. His mother (to be/to be to) an actress. 2. Their sons (to be/to be to) pupils. 3. The curtains (to be/to be to) blue. 4. The students (to be/to be to) translate these sentences from the textbook. 5. My grandparents (to be/to be to) live in this flat. 6. My sister (to be/to be to) go to the university. 7. His uncle's wife (to be/to be to) a junior employee. 8. Her aunt's husband (to be/to be to) work in that joint venture. 9. That girl (to be/to be to) beautiful. 10. These flowers (to be/to be to) very nice.

6. Open the brackets.

He (to have) a book. He (to have/to have to) translate this text.
*He **has** a book. He **has to** translate this text.*

1. She (to have/to have to) wash the floor in this room. 2. The student (to have/to have to) clean the blackboard. 3. His cousin (to have/to have to) three discs. 4. Their grandparents (to have/to have to) a good flat. 5. His friend (to have/to have to) wash the dog. 6. Her sister (to have/to have to) five new magazines. 7. My uncle (to have/to have to) change the hotel. 8. That man (to have/to have to) a good motorcycle. 9. My teacher (to have/to have to) a technical dictionary. 10. I (to have/to have to) a black cat.

7. Translate into English.

*Он **может** работать много.*
*He **can** work very hard.*
*He **is able to** work very hard.*

*Он **должен** работать много.*
*He **must** work very hard.*
*He **has to** work very hard.*
*He **is to** work very hard.*

1. Он может прыгать с этой высоты. 2. Она может повторять слова из этого упражнения. 3. Этот студент должен ответить на эти вопросы из учебника. 4. Мой двоюродный брат может хорошо играть в футбол. 5. Его сестра должна помыть окна в своей квартире.

8. Translate into English.

*Пациентам **разрешают** отдыхать в парке.*

*The patients **are allowed to** rest in the park.*
*The patients **may** rest in the park.*

*Студентам **следует** перевести этот текст.*

*The students **should** translate this text.*

1. Им разрешают пойти в этот зеленый парк. 2. Им следует ответить на эти трудные вопросы из упражнения. 3. Ей следует помыть полы в своей квартире. 4. Ему разрешают смотреть телевизор в той комнате. 5. Ему следует поехать к родителям.

9. Translate into English.

*Он может прыгать **так же** высоко, **как** и она.*

*He can jump **as high as** she.*

1. Он может переводить так же хорошо, как и она. 2. Они могут работать так же быстро, как и мы. 3. Мои студенты могут отвечать на вопросы из этого упражнения так же хорошо, как и ваши. 4. Моя сестра может помыть полы так же хорошо, как и моя мама. 5. Этот ученик может повторять звуки так же медленно, как и вы.

10. Translate into English.

***Чем больше** мы читаем, **тем лучше** отвечаем на вопросы.*

***The more** we read, **the better** we answer the questions.*

1. Чем больше мы смотрим телевизор, тем больше информации получаем. 2. Чем больше мы работаем, тем лучше выполняем задания. 3. Чем больше мы работаем, тем меньше мы отдыхаем.

Test 1.4

A. Choose the sentence which means just the same.

1. They are able to take two chairs from this room.
 - a) They must take two chairs from this room.
 - b) They may take two chairs from this room.
 - c) They can take two chairs from this room.
 - d) They is able to take two chairs from this room.
2. They must go to this hotel.
 - a) They have to go to this hotel.
 - b) They can go to this hotel.
 - c) They may go to this hotel.
 - d) They is to go to this hotel.
3. I can load this game from this site.
 - a) I am able to load this game from this site.
 - b) I is able to load this game from this site.
 - c) I are able to load this game from this site.
 - d) I was able to load this game from this site.
4. They could open this joint venture.
 - a) They are able open this joint venture.
 - b) They are able to open this joint venture.
 - c) They were able to open this joint venture.
 - d) They were able open this joint venture.

5. You have to take the books from the library.
- a) You must take the books from the library.
 - b) You can take the books from the library.
 - c) You may take the books from the library.
 - d) You had to take the books from the library.

B. Choose the correct sentences.

1. Your uncle's flat (to be) large.
- a) Your uncle's flat was to large.
 - b) Your uncle's flat is large.
 - c) Your uncle's flat are large.
 - d) Your uncle's flat to be large.
2. Your parents' office (to have) ten employees.
- a) Your parents' office have ten employees.
 - b) Your parents' office to have ten employees.
 - c) Your parents' office has ten employees.
 - d) Your parents' office to have to ten employees.
3. These books (to be) necessary for the classes.
- a) These books to be necessary for the classes.
 - b) These books are necessary for the classes.
 - c) These books was necessary for the classes.
 - d) These books am necessary for the classes.
4. You (to have) take this magazine from the library.
- a) You to have to take this magazine from the library.
 - b) You have to take this magazine from the library.
 - c) You has to take this magazine from the library.
 - d) You have take this magazine from the library.
5. I (to be) go to the university.
- a) I am to go to the university.
 - b) I are to go to the university.
 - c) I is to go to the university.
 - d) I were to go to the university.

C. Choose the suitable translation of the sentences.

1. Он такой же счастливый, как и она.
- a) He is so happy as she was.
 - b) He was so happy as she was.
 - c) He is as happy as she is.

- d) He were so happy as she was.**
2. Бабушке следует отдохнуть в саду.
- a) The grandmother should rest in the garden.**
 - b) The grandmother can rest in the garden.**
 - c) The grandmother was able to rest in the garden.**
 - d) The grandmother may rest in the garden.**
3. Мне разрешили войти в комнату.
- a) I am allowed to come into the room.**
 - b) I was allowed to come into the room.**
 - c) I am able to come into the room.**
 - d) I are allowed to come into the room.**
4. Этот студент должен ответить на вопросы из этого упражнения.
- a) This student must answer the questions from this exercise.**
 - b) This student can answer the questions from this exercise.**
 - c) This student is allowed to answer the questions from this exercise.**
 - d) This student may answer the questions from this exercise.**
5. Ему разрешили посмотреть телевизор в той комнате.
- a) He is allowed to watch TV in that room.**
 - b) He was allowed to watch TV in that room.**
 - c) He was allowed to watch TV in this room.**
 - d) He were allowed to watch TV in this room.**

UNIT 5

SIMPLE TENSES.

PREPOSITIONS OF TIME AND CASE

Exercises

(transformation of the sentences according to the models)

1. Transform according to the model.

*As a rule, my mother **knits** sweaters on weekends.*

***Yesterday** my mother **knit** a sweater.*

1. My friend usually reads books on weekends. 2. Sometimes he meets her after classes near the school. 3. She cleans windows on weekends every month. 4. My father always buys magazines after work. 5. As a rule, he translates texts after classes.

2. Transform according to the model.

*As a rule, my father **reads** newspapers.*

***Tomorrow** my father **will read** newspapers.*

1. My brother's girlfriend often spends much time in the garden. 2. My sister's boyfriend seldom writes letters (will not). 3. My sister's boyfriend usually calls her after classes. 4. He always brings textbooks from the library of our university. 5. On Mondays he reads newspapers in the reading hall of our university.

3. Transform according to the model.

*Some years **ago** they **built** a house.*

***In a year** they **will build** a house.*

1. They learnt the words yesterday. 2. They left this town long ago. 3. A week ago my relatives bought a car. 4. Last Sunday my friends spent much time in the swimming pool. 5. My grandparents bought a vacuum cleaner last Sunday.

4. Transform according to the model.

***After classes** he **sent** that letter.*

***Tomorrow** he **will send** that letter.*

1. At 5 o'clock we met him at the station. 2. Before the conference I read that article from the newspaper. 3. After the war we left that city. 4. In 2011 we bought a fridge. 5. I saw him in August.

5. Open the brackets.

In two days they (to buy) a TV set.

In two days they will buy a TV set.

1. In a year my friends (to leave) our city. 2. Next summer they (to swim) in this river. 3. Tomorrow I (to find) my brother's disc. 4. Next Thursday I (to bring) my brother's disc. 5. In a week my parents (to buy) a computer.

6. Open the brackets.

He often (to see) her.

They often (to see) her.

He often sees her.

They often see her.

1. Sometimes my father (to buy) magazines in this newsstand. 2. The students usually (to answer) the questions very well. 3. Her daughter rarely (to help) her. 4. Every day they (to watch) TV. 5. As a rule, his grandfather (to read) newspapers in the evening.

7. Open the brackets.

Yesterday they (to write) a composition.

They often (to write) compositions.

Yesterday they wrote a composition.

They often write compositions.

1. An hour ago they (to sing) songs. 2. Last month he (to buy) this rare book. 3. Yesterday she (to find) this book in the bookshop. 4. As a rule, my grandparents (to spend) their time in this green park. 5. The students usually (to learn) the words.

8. Open the brackets.

They (to watch) TV yesterday.

They (to see) this film yesterday.

They watched TV yesterday.

They saw this film yesterday.

1. Last year the students (to study) many subjects. 2. Last year she (to teach) many subjects. 3. Yesterday my mother (to wash) windows of our flat. 4. Yesterday his brother (to write) a composition. 5. A week ago we (to catch) a mouse.

9. Translate into English.

Они обычно получают письма.

Вчера они получили письмо.

They usually get letters.

Yesterday they got a letter.

1. Как правило, они работают в офисе моего дяди. 2. Они всегда гуляют в парке нашего района. 3. Вчера мои родители купили картину известного художника. 4. На прошлой неделе мы плавали в бассейне нашего университета. 5. Они часто продают книги известных авторов.

10. Translate into English.

*Он всегда покупает диски.
He always buys discs.*

*Они всегда покупают диски.
They always buy discs.*

1. Его сын всегда получает хорошие оценки в школе. 2. Они всегда работают в саду по воскресеньям. 3. Мои дедушка и бабушка часто покупают газеты. 4. Наш преподаватель обычно задаёт много вопросов. 5. Эта девочка редко помогает мне.

11. Open the brackets.

The composition(s) about holidays always (to write) by the pupils.

*The composition(s) about holidays **is (are) always** written by the pupils.*

1. The letters often (to write) by him with the pencil. 2. The questions always (to ask) by the teacher. 3. This text usually (to translate) by the students with the teacher's help. 4. As a rule, this journal (to read) by my sister. 5. This newspaper rarely (to buy) by my father.

12. Open the brackets.

The composition(s) about holidays (to write) yesterday.

*The composition(s) about holidays **was (were) written** yesterday.*

1. The letters (to write) by him with the pencil last week. 2. The questions (to ask) by the teacher last Thursday. 3. Yesterday this text (to translate) by the students with the teacher's help. 4. This journal (to read) by my sister last Sunday. 5. A day ago that newspaper (to buy) by my father.

13. Open the brackets.

The composition(s) about holidays (to write) by the pupils next week.

*The composition(s) about holidays **will be written** by the pupils **next week**.*

1. The letters (to write) by him in a month. 2. The questions (to ask) by the teacher next Thursday. 3. In a week this text (to translate) by the students with the teacher's help. 4. This journal (to read) by my sister next Sunday. 5. Tomorrow that newspaper (to buy) by my father.

14. Translate into English.

Хлеб купили вчера.

*The bread **was bought** yesterday.*

Туфли купили вчера.

*The shoes **were bought** yesterday.*

1. Лимоны купили вчера. 2. Овощи принесли вчера. 3. Арбуз был съеден час назад. 4. Кашу давно съели. 5. Сок был выпит час назад.

15. Translate into English.

Платье будет куплено мною завтра.

*The dress **will be bought** by me **tomorrow**.*

1. Виноград будет выращен в следующем году моим дедушкой. 2. Мясо будет куплено им через час. 3. Свитер будет связан мамой весной. 4. Молоко будет выпито маленьким ребенком ночью. 5. Сметана будет куплена ею в субботу.

16. Translate into English.

Масло обычно покупается мамой на рынке.

The butter is usually bought by my mother at the market.

1. Как правило, хлеб покупается нашей бабушкой. 2. Обувь обычно моется мною. 3. Свитер обычно вяжется моей мамой. 4. Кофе часто выбирается моим отцом. 5. Этот журнал, как правило, читается моей сестрой.

Test 1.5

A. Choose the correct sentences.

1. Two years ago my father (to work) in the office of that joint venture.
 - a) Two years ago my father work in the office of that joint venture.
 - b) Two years ago my father works in the office of that joint venture.
 - c) Two years ago my father worked in the office of that joint venture.
 - d) Two years ago my father will work in the office of that joint venture.
2. Next year we (to build) a house.
 - a) Next year we be build a house.
 - b) Next year we build a house.
 - c) Next year we built a house.
 - d) Next year we will build a house.
3. The friend of my sister seldom (to write) letters.
 - a) The friend of my sister seldom write letters.
 - b) The friend of my sister seldom writes letters.
 - c) The friend of my sister seldom wrote letters.
 - d) The friend of my sister seldom shall write letters.
4. In four days he (to take) these books from the library.
 - a) In four days he will take these books from the library.
 - b) In four days he shall take these books from the library.
 - c) In four days he take these books from the library.
 - d) In four days he took these books from the library.
5. Last Thursday I (to spend) much time in the park.
 - a) Last Thursday I spend much time in the park.
 - b) Last Thursday I will spend much time in the park.
 - c) Last Thursday I spent much time in the park.
 - d) Last Thursday I shall spend much time in the park.

6. The juice (to drink) by me some minutes ago.
 - a) The juice drank by me some minutes ago.
 - b) The juice is drunk by me some minutes ago.
 - c) The juice was drunk by me some minutes ago.
 - d) The juice will be drunk by me some minutes ago.
7. The vegetables (to cut) by my grandmother in some minutes.
 - a) The vegetables will cut by my grandmother in some minutes.
 - b) The vegetables will be cut by my grandmother in some minutes.
 - c) The vegetables were cut by my grandmother in some minutes.
 - d) The vegetables shall be cut by my grandmother in some minutes.
8. The boots (to clean) by my brother every day.
 - a) The boots cleaned by my brother every day.
 - b) The boots clean by my brother every day.
 - c) The boots are cleaned by my brother every day.
 - d) The boots shall be cleaned by my brother every day.
9. The fruit ice-cream (to eat) by my younger sister.
 - a) The fruit ice cream was eaten by my younger sister.
 - b) The fruit ice cream shall be eaten by my younger sister.
 - c) The fruit ice cream ate by my younger sister.
 - d) The fruit ice cream was eated by my younger sister.
10. The questions (to answer) by him at the lesson.
 - a) The questions was answered by him at the lesson.
 - b) The questions answered by him at the lesson.
 - c) The questions shall be answered by him at the lesson.
 - d) The questions will be answered by him at the lesson.

B. Choose the suitable translation of the sentences.

1. Вчера он положил этот журнал в книжный шкаф.
 - a) Yesterday he put this magazine into the bookcase.
 - b) Yesterday he putted this magazine into the bookcase.
 - c) Yesterday he will put this magazine into the bookcase.
 - d) Yesterday he puts this magazine into the bookcase.
2. Три дня назад она получила письмо от своего друга.
 - a) Three days ago she get the letter from her friend.
 - b) Three days ago she got the letter from her friend.
 - c) Three days ago she will get the letter from her friend.
 - d) Three days ago she shall get the letter from her friend.
3. Через месяц они покинут этот район нашего города.
 - a) In a month they will left this district of our city.

- b)** In a month they left this district of our city.
 - c)** In a month they will leave this district of our city.
 - d)** In a month they shall leave this district of our city.
- 4. Каждый день он помогает своей маме.
 - a)** Every day he will helped his mother.
 - b)** Every day he shall help his mother.
 - c)** Every day he help his mother.
 - d)** Every day he helps his mother.
- 5. В прошлое воскресенье я потерял тот диск.
 - a)** Last Sunday I lost that disc.
 - b)** Last Sunday I left that disc.
 - c)** Last Sunday I lose that disc.
 - d)** Last Sunday I losed that disc.
- 6. Предложения будут переведены с русского языка на английский.
 - a)** The sentences will be translated from Russian into English.
 - b)** The sentences will translated from Russian into English.
 - c)** The sentences be translated from Russian into English.
 - d)** The sentences shall be translated from Russian into English.
- 7. Задача была выполнена им.
 - a)** The task was performed by him.
 - b)** The task will be performed by him.
 - c)** The task is performed by him.
 - d)** The task performed by him.
- 8. Магазины нашего района обычно открыты в это время.
 - a)** The shops of our district were usually opened at this time.
 - b)** The shops of our district are usually opened at this time.
 - c)** The shops of our district is usually opened at this time.
 - d)** The shops of our district will usually be opened at this time.
- 9. Окна будут вымыты ею завтра.
 - a)** The windows are cleaned by her tomorrow.
 - b)** The windows were cleaned by her tomorrow.
 - c)** The windows will be cleaned by her tomorrow.
 - d)** The windows will cleaned by her tomorrow.
- 10. Перчатки были потеряны ею вчера.
 - a)** The gloves were lost by her yesterday.
 - b)** The gloves are lost by her yesterday.
 - c)** The gloves lost by her yesterday.
 - d)** The gloves were lost by him yesterday.

Module 2

DIFFERENT TYPES OF EDUCATION

Vocabulary: exercises 1—7, 12—16.

Grammar (the Continuous Tenses): exercises 8, 9, 17—19.

Reading: exercises 10, 11, 32.

Listening: exercise 20.

Speaking: exercises 21—26.

Writing: exercises 27—30.

Project Work: exercise 31.

Test 2

KEY VOCABULARY

Exercise 1. Read and guess the meanings of the new words. If you have some difficulties, use the dictionary at the end of this book. It will help you to read and discuss the texts and dialogues, arrange the role-plays and present the projects.

- 1) *learning experiences.* Education includes different kinds of learning experiences.
- 2) *in the broadest sense.* In its broadest sense, education is the ways in which people get knowledge and understanding about the world and about themselves.
- 3) *to learn skills.* Pupils learn different skills.
- 4) *to gain knowledge.* People gain knowledge about the world.
- 5) *scheme.* We'll use this scheme when we discuss the problem.
- 6) *formal, informal.* We'll discuss formal and informal education.
- 7) *daily life.* People are involved in learning during their daily life.
- 8) *with good manners.* Children are taught to eat with good manners.
- 9) *to ride a bicycle.* Children learn to ride a bicycle.
- 10) *to take an exam.* He has to take different kinds of exams at the university.
- 11) *to be in charge of.* The Minister of Education is in charge of education at all the levels.
- 12) *to expect.* I expect she will pass the exam.

- 13) *both ... and ...* Education includes both informal and formal ways of learning.
- 14) *vocational education*. School systems provide both general and vocational education.
- 15) *gifted, physically or mentally handicapped*. Most countries provide education both for gifted and for physically or mentally handicapped children.
- 16) *adult*. The country provides education both for children and for adults.
- 17) *aim*. The aim of vocational education is to prepare students for a job.
- 18) *intelligent*. She is a very intelligent student.
- 19) *responsible*. The Minister of Education is responsible for education at different levels.
- 20) *to transmit*. The information is transmitted from one computer to another through a telephone line.
- 21) *cultural heritage*. The aim of general education is to transmit a common cultural heritage.
- 22) *carpentry*. Students are taught carpentry, metalwork and electronics at technical schools.
- 23) *further education*. After leaving school adults may take up further education.
- 24) *compulsory*. Primary and secondary education is compulsory in most countries.
- 25) *beyond*. The pupils who stay in school at the age of 16 and beyond this age will prepare for the General Certificate of Education examination at Advanced Level.
- 26) *to support*. The higher schools in the UK are mainly supported by public funds.
- 27) *by correspondence*. The Open University in the UK provides degree courses by correspondence.
- 28) *instead*. It's too wet to go for a walk, let's go to the swimming pool instead.
- 29) *junior, senior*. High schools in the USA may be junior and senior.
- 30) *to earn*. He earns much money.

Exercise 2. Read the words following the rules of reading. Pronounce correctly. Practise aloud.

Sense, expect, intelligent, heritage, instead;
 manner, exam, handicapped, adult;
 pass, charge, carpentry;
 compulsory, cultural;
 broad, formal, informal, support;

knowledge, responsible, beyond, correspondence, offer;
scheme, senior;
skill, gifted, transmit;
learning, further;
gain, daily, vocational, education, aim;
experience;
ride, provide.

Exercise 3. Look at the following pairs of words and think if the underlined letters are pronounced in the same way, or if they are pronounced differently. Read aloud.

Pass — manner; sense — experience; ride — transmit; compulsory — junior; both — offer; knowledge — correspondence; adult — charge; watch — handicapped; learning — instead; bicycle — gifted; certificate — skill; library — provide; language — exam; same — aim; car — carpentry.

Exercise 4. Read the international words, mind the stress.

Form, discussion, telephone, initiative, visit, museum, television, show, video, radio, programme, test, exam, instruction, college, university, system, type, diploma, certificate, nation, inform, design, culture, specialist, arithmetic, geography, history, student, electronics, course, profession, career, agriculture, architecture, business, medicine, material, information, public, corporation, institute.

Exercise 5. Try to enrich your vocabulary:

a) analyse the following words with different suffixes and divide them into two groups — nouns and adjectives:

informal, formal, education, different, experience, useful, language, teacher, television, instruction, childhood, learner, nation, general, vocational, special, intelligent, cultural, heritage, specialist, technical, professional, agriculture, architecture, pleasure, educational, public, independent, corporation, correspondence, assistance, Russian, American, conversation, national, attendance;

b) make up as many words as you can by combining different parts of the words

in-	differ	-ent
	use	-ful
	teach	-er
	learn	-ist
	special	
	depend	

Exercise 6. Divide the following words and word combinations into two groups, those which describe a) informal education; b) formal education.

Library, museum, teacher, schools, colleges, universities, television programme, informal manner, to pass exams, certificate, diploma, degree, general education, vocational education, radio programme.

Exercise 7. Think over the definitions of the words which appear in the texts and dialogues and then:

a) *agree or disagree with the following definitions*

1. *Skill* is a special ability to do something well, especially as gained by learning and practice.
2. *Sense* is good and especially practical understanding.
3. *Manner* is the way or method in which something is done or happens.
4. *Adult* is a fully grown person, especially a person over an age stated by law, usually 18 or 21.
5. *Heritage* is an object, custom, or quality which is passed down over many years within a nation, social group, or family, and is thought of as something valuable and important which belongs to all its members.

b) *match each word with its correct definition*

carpentry, to transmit, experience, to gain, intelligent

1. The art of work of a person who is skilled at making and repairing wooden objects, especially one who does this as a job.
2. Having or showing powers of learning, reasoning or understanding.
3. To send or pass from one person, place, thing to another.
4. Knowledge or skill which comes from practice in an activity or doing something for a long time, rather than from books.
5. To get something useful, wanted.

c) *find the definitions for some other words which you consider to be important for the topic "Different Types of Education". Use the website www.macmillandictionaries.com*

EXPLORING GRAMMAR

Exercise 8. Read the sentences, point out the Continuous Tenses. Give the Russian equivalents. If you have some difficulties, use the grammar reference at the end of the book.

1. We use this scheme when we are discussing the problem.
2. Now he is sitting at the lesson.
3. These learners are working now at about the same speed as their classmates.
4. At 10 o'clock tomorrow he will be taking the exam.
5. He is

watching TV at the moment. 6. Primary school pupils are being taught such skills as reading, writing, and arithmetic. 7. They were receiving instructions in different subjects the whole month. 8. At the moment the pictures are being described by the pupils. 9. He was visiting the museum from 4 till 6 o'clock yesterday. 10. The classes are being attended by the students all the term.

Exercise 9. Make up your own sentences according to the models.

Model A: *He was visiting the exhibition the whole morning yesterday.*

The exhibition was being visited by him the whole morning yesterday.

1. The family was watching TV from 9 till 11 o'clock yesterday.
2. The whole morning yesterday she was translating the article. 3. Last morning at 10 o'clock he was buying a newspaper at that newsstand. 4. The student was reading the book all evening yesterday. 5. She was writing an article during 3 hours yesterday.

Model B: *She is writing a composition at the moment.*

She will be writing a composition at 9 o'clock tomorrow.

1. He is speaking English now. 2. The student is answering questions at the moment. 3. At present she is attending English classes. 4. He is writing a composition now. 5. The teacher is solving the problem together with his students now.

READING

Exercise 10. Read the text, try to focus on its essential facts and choose the most suitable heading given below for each paragraph.

- 1) What Is Education?
- 2) Formal Education
- 3) General Education
- 4) Informal Education
- 5) Vocational Education
- 6) Different Kinds of Formal Education

DIFFERENT TYPES OF EDUCATION

Education includes different kinds of learning experiences. In its broadest sense, education is the ways in which people learn skills, gain knowledge and understanding about the world and themselves. A useful scheme for discussing education is to divide these ways of learning into two types: informal and formal.

Informal education involves people in learning during their daily life. For example, children learn their language simply when they listen to others and try to speak themselves. In the same informal manner, they learn to dress themselves, to eat with good manners, to ride a bicycle, or to make a telephone call. Education is also informal when people try to get information or to learn skills on their own initiative without a teacher. They may visit a book shop, library or museum. They may watch TV or listen to the radio. A lot of documentary and educational films and programmes can be watched in the Internet. People do not have to take tests or exams getting informal education.

The learners get formal education at different kinds of schools, colleges, universities. In most countries, people enter a system of formal education during their early childhood. In this type of education, people who are in charge of education decide what to teach. Then learners are studying these things with the teachers' help. Learners should come to school regularly and on time and try to work at about the same speed as their classmates. Learners have to take tests and exams. At the end of their learning, learners may earn a diploma, a certificate, or a degree as a mark of their success over the years.

The school systems of all modern nations provide both general and vocational education. Most countries also offer special education programmes for gifted and for physically or mentally handicapped children. Adult education programmes are provided for people who wish to take up their education after leaving school. Most countries are spending a large amount of time and money for formal education of their citizens.

The aim of general education is to make children intelligent, responsible, well-informed citizens. It is designed to transmit a common cultural heritage rather than to develop trained specialists. Almost all elementary education is general education. In every country, primary school pupils are being taught skills they will use throughout their life, such as reading, writing, and arithmetic. They also receive instruction in different subjects, such as geography, history, etc. In most countries almost all young people continue their general education in secondary schools.

The aim of vocational education is primarily to prepare students for a job. Some secondary schools specialize in vocational programmes. Technical schools are vocational secondary schools, where students are being taught more technical subjects, such as carpentry, metalwork, and electronics. Technical school students take some general education courses and vocational training. Universities and separate professional schools are preparing students for careers in such fields as agriculture, architecture, business, engineering, law, medicine, music, teaching, etc.

Exercise 11. Agree or disagree with the following statements.

1. There are two types of education. 2. A useful scheme for discussing education is to divide the ways of learning into two types. 3. Informal education involves people in learning during their daily life. 4. Formal education is given at different kinds of colleges. 5. General education is designed to develop trained specialists.

KEY VOCABULARY DEVELOPMENT

Exercise 12. Match the adjectives in column A with the nouns in column B to form meaningful phrases and then identify them at the sentence level in the text. It will help you understand the text in detail.

A	B
1) different	a) childhood
2) formal	b) scheme
3) useful	c) amount
4) large	d) education
5) intelligent	e) subjects
6) young	f) heritage
7) good	g) manners
8) early	h) schools
9) cultural	i) citizens
10) technical	j) people

Exercise 13. Decide which of the verbs on the left collocate with the nouns on the right and then identify the word combinations at the sentence level in the text. It will help you understand the text precisely.

1) to include	a) subjects
2) to involve	b) knowledge
3) to learn	c) a call
4) to gain	d) a show
5) to ride	e) exams
6) to make	f) a bicycle
7) to get	g) people
8) to enter	h) skills
9) to watch	i) information
10) to pass	j) the university

Exercise 14. Try to enrich your vocabulary:

a) find words in the text which have the same meanings as the following words:

to contain, to believe, the means, to study, to get, a kind, to talk, data, various, to be responsible for, a diploma, to want, to continue;

b) find words in the text whose meanings are opposite to the meanings of the following words:

informal, narrow, bad, different, the beginning, old, to give up, small, before;

c) replace the words in italics with the words with similar and opposite meanings:

1. This road is rather *broad*. 2. They study *different* subjects. 3. They want to *continue* their education. 4. The children are eating with *good* manners. 5. They were reading the text at *the beginning* of the lesson.

Exercise 15. Complete the sentences: change the word in capitals at the end of each sentence to form a word that fits suitably in the blank space.

1. The British universities are ... on the public system of education **DEPEND**.

2. ... expects students to pass the exam **TEACH**.

3. Students should come to college ... **REGULAR**.

4. Pupils are taught ... subjects **DIFFER**.

5. ... study various subjects with the teacher at the head **LEARN**.

Exercise 16. Insert the words at the sentence level: fill in the blanks with the missing words (the first letter of each word is given).

1. T... their life people are learning different kinds of skills. 2. They g... knowledge about the world. 3. We'll discuss the education using one useful s... 4. Children learn to r... a bicycle. 5. On their own i..., people may visit a museum. 6. The students have to p... exams. 7. They are in c... of education. 8. The students are working at about the same s... 9. Learners may e... a degree. 10. His certificate is a m... of his success over the years.

GRAMMAR DEVELOPMENT

Exercise 17. Point out the sentences with the Continuous Tenses in the text and provide the Russian equivalents. It will help you understand the text in detail.

Exercise 18. Fill in the blanks to streamline the use of the Continuous Tenses. The words in brackets are given to help you.

1. At the moment he ... the street (to cross). 2. Tomorrow at 9 o'clock they ... a composition (to write). 3. The composition ... by him now (to write).

4. Her daughter ... the text from 5 till 6 o'clock yesterday (to translate). 5. The children ... TV now (to watch). 6. At present the students ... the material about the educational system in the country (to study). 7. The material about the educational system ... by the students now (to study). 8. At the moment Mary ... the book into the bookcase (to put). 9. He ... the exam at 10 o'clock tomorrow (to take). 10. The students ... texts during the English classes tomorrow (to translate).

Exercise 19. Make up sentences according to the models to practise the use of the Continuous Tenses.

Model A: *Они пишут сочинение сейчас.*

They are writing a composition now.

1. Они посещают музей сейчас. 2. Студенты посещают лекции на протяжении всего семестра. 3. В данный момент они отвечают на вопросы. 4. В настоящее время обучающиеся сдают экзамены. 5. Они переводят текст сейчас.

Model B: *Он переводил статью вчера весь вечер.*

He was translating an article the whole evening yesterday.

1. Он отвечал на вопросы вчера в течение двух часов. 2. Студент готовился к занятиям весь вечер вчера. 3. Она посещала занятия по английскому языку в течение нескольких месяцев в прошлом году. 4. Преподаватель проверял тесты студентов вчера с 15.00 до 17.00. 5. Он читал газету вчера все утро.

LISTENING

Exercise 20. Listen to the text "Education in the USA".

Before listening: mind the words and phrases given to comprehend better the information you are going to listen to.

Private schools — частные школы;

each state — каждый штат;

to offer — предлагать;

educational institution — образовательное учреждение.

After listening: agree or disagree with the following statements and add some more information if needed.

1. The USA has a national educational system. 2. Each state in the USA has its own educational system. 3. There is no difference between "high schools" and "higher schools". 4. High schools provide only general courses of study. 5. Universities are educational institutions of high education.

SPEAKING

Exercise 21. Try to compare the educational systems of Russia, the UK and the USA and complete the grid. Share your vision using the following phrases: to my mind, in my opinion, it seems to me, as far as I remember, etc.

№	Questions	Russia	The UK	The USA
1	Who is responsible for organizing and regulating the educational system?			
2	What stages is formal education divided into?			
3	What stages of formal education are compulsory?			
4	Are there private schools in the country?			
5	In what types of schools can children get general education?			
6	In what types of educational institutions can people get vocational education?			
7	In what types of educational institutions can people get higher education?			
8	What are specific features of the educational system in the country?			

Exercise 22. Make up general and disjunctive questions, and answer them according to the models to enhance your speaking skills.

Model A: *Education includes different kinds of learning experiences.*

Does education include different kinds of learning experiences? — Yes, it does.

Education includes different kinds of learning experiences, doesn't it? — Yes, it does.

1. Informal education involves people in learning during their daily life. 2. This student comes to college regularly. 3. General education aims at producing intelligent, well-informed citizens. 4. Vocational education prepares students for a job. 5. A student takes some general education courses and vocational training in a technical school.

Model B: *He is learning a foreign language. Is he learning a foreign language? — Yes, he is. He is learning a foreign language, isn't he? — Yes, he is.*

1. He is training different kinds of skills. 2. She is speaking English. 3. She is taking tests and exams at the university. 4. He is making a telephone call. 5. He is working at about the same speed as his classmates.

Exercise 23. Make up special questions according to the models and answer them to streamline your speaking skills.

Model A: *People gain knowledge about the world. What do people gain?*

1. Children learn to ride a bicycle. 2. People get information about themselves. 3. People visit libraries and museums. 4. They often watch a television show. 5. They usually pass all tests.

Model B: *Education includes different kinds of learning experiences. What does education include?*

1. A student in a technical school takes some general education courses and vocational training. 2. At the end of learning, a student earns a diploma. 3. The student does tests and exams regularly. 4. The school system in different countries provides both general and vocational education. 5. This country spends a large amount of money on formal education.

Exercise 24. Ask questions and use the words in italics in your answers. The words in brackets will help you.

1. Informal education involves *people* in learning *during their daily life* (whom, when). 2. In most countries, people enter *a system of formal education during their early childhood* (what, when). 3. Learners show *how well they have progressed in their learning* (what). 4. *At the end of their learning*, learners earn *a diploma, a certificate or a degree* (what, when). 5. Most countries offer *special education programmes* (what).

Exercise 25. Read the following dialogue, sum up the information and act out a similar dialogue.

EDUCATION IN THE UK

A.: Hi, Andrew! Aren't you in a hurry? Let's revise the material for the English classes.

B.: Hi, Daniil! With pleasure. As far as I remember, we are to get information about the educational system in the UK.

A.: You are absolutely right. First of all, we should remember that the system of education in Britain is divided into three stages: primary, secondary, and further education.

B.: And don't forget that there are state and private schools in the UK.

A.: But about 93 per cent of British children go to state-assisted schools. As far as I know, both primary and secondary education between the ages of 5 and 16 is compulsory in Britain.

B.: Yes, I agree with you. And at the age of 15 or 16 pupils take an examination called the General Certificate of Secondary Education, abbreviated GCSE.

- A.: Most pupils who stay at school beyond the age of 16 prepare for the General Certificate of Education examination at Advanced level ('A' level). It is abbreviated GCE. Well, and what about higher education?
- B.: I know exactly that British universities are not part of the public system of education.
- A.: Right! They are independent corporations, but they are mainly supported by public funds.
- B.: And have you heard about the Open University?
- A.: Yes, it is unique in providing distant education for students working at home. They are supported by online materials and communicate with their tutors via the Internet or phone.
- B.: Oh, you know so much about it.
- A.: Thanks for your assistance.
- B.: It was no trouble at all.

Exercise 26. Role-play the following situations.

1. You are the teacher of the foreign language. What and how will you teach your pupils? (The topic for discussion is "Different Types of Education").
2. You are the teacher of the Russian language at one of the lessons in the U.S. school.

WRITING

Exercise 27. Complete the following sentences in a logical way.

1. Education includes different kinds of...
2. People gain knowledge and understanding about...
3. There are two types of...
4. Informal education involves people in...
5. Children learn their language simply by...
6. People get information or learn skills on...
7. Formal education is given at...
8. People enter the system of formal education during...
9. Teachers expect learners to come to school...
10. Learners have to pass the exams to show...
11. General education aims at producing intelligent...
12. Primary school pupils are taught skills they will...
13. Almost all young people continue their general education in...
14. Vocational education prepares students for...
15. Learners may earn a diploma, a certificate, or...

Exercise 28. Translate the following sentences from Russian into English. You will have a story on the topic as a pattern.

1. В широком смысле образование — это способы, при помощи которых люди обучаются различным навыкам, получают знания о себе и об окружающем мире. 2. Образование можно разделить на два вида: неофициальное и официальное. 3. Люди получают неофициальное образование в течение их повседневной жизни. 4. Например, дети учатся говорить, просто когда они слушают других и пытаются говорить сами. 5. Иногда люди по своей собственной инициативе учатся различным навыкам или получают информацию о чем-нибудь. 6. Они могут пойти в библиотеку или музей для получения информации, но при этом они не должны сдавать экзамены. 7. Можно также получить официальное образование в различных школах, колледжах, университетах. 8. В большинстве стран люди поступают в систему официального образования в раннем детстве. 9. Учащиеся должны регулярно посещать школу, приходить вовремя. 10. Они также должны сдавать экзамены. 11. В большинстве стран система образования включает как общее, так и профессиональное образование. 12. Общее образование ставит своей целью передачу культурного наследия нации. 13. В большинстве стран общее образование можно получить в начальных и средних школах. 14. Целью профессионального образования является подготовка обучающихся к получению профессии. 15. Профессиональное образование можно получить на среднем уровне — в средних специальных школах; на высоком уровне — в различных институтах, университетах.

Exercise 29. Make up your own story about different types of education according to the following points of the plan. The words and phrases are supposed to make your story logical and interesting.

1. What Is Education?

Education includes

People gain

There are

2. Informal Education

Informal education involves

Children learn to speak

Children learn to eat

People get

They may visit

They may watch

3. Formal Education

People enter
They come
They take
Learners earn

4. Different Kinds of Formal Education

General education aims
Vocational education prepares
Most countries offer
Adult education programmes are provided for

Exercise 30. Write a letter to your friend about your university.

PROJECT WORK

Exercise 31. Compile information about some universities in the UK and USA and participate in a project. Present the project to your group. You may use the following website: www.topuniversities.com/university-rankings

ADDITIONAL READING

Exercise 32. Make a summary of the text using the following phrases:

1. The title of the text is...
2. The text is about... The text deals with...
3. The text covers such points as... first... second... third...
4. It should be underlined that...
5. In conclusion, I may say that...
6. To my mind... In my opinion...

MOSCOW STATE UNIVERSITY

The university was established on January 25, 1755 by a decree of Russian Empress Elizabeth. January 25 is still celebrated as the Students' Day in Russia. Originally it was allocated in the Principal Medicine Store on the Red Square, and then the university was transferred by Catherine the Great to the present neoclassical building on the other side of the Mokhovaya Street. In 1940 the university was renamed in honour of its founder Mikhail Lomonosov.

At present the main faculties are situated on Vorobjevy Gory. The building was designed by architect Lev Vladimirovich Rudnev. The main building of Moscow State University was by far the largest. It was also the tallest build-

ing in Europe at that time. The central tower (240m and 36-stories high) was flanked by four huge wings of student and faculty accommodations. It contains a total of 33 kilometers of corridors and 5,000 rooms. The star on the top is large enough to provide a small room and a viewing platform; it weighs 12 tons.

There are a lot of faculties now, such as Faculty of Mechanics and Mathematics, Faculty of Physics, Faculty of Chemistry, Faculty of Psychology, Faculty of Foreign Languages, etc.

TEST 2

1. Choose the proper words and fill in the blanks.

- When we were discussing educational systems of different countries we used ...*
A. skills B. scheme C. the ways D. types
- It is not difficult to use good ... when you are eating.*
A. manners B. children C. schemes D. speed
- People ... knowledge about the world.*
A. pass B. gain C. expect D. support
- To transmit a common cultural heritage is ... of general education.*
A. made B. received C. the aim D. the design
- The children are taught skills they will use ... their life.*
A. above B. throughout C. though D. thought
- In most countries almost all young people ... their general education in secondary schools.*
A. continue B. offer C. include D. specialize
- The system of education in Britain is divided into three stages: ..., secondary, and further education.*
A. vocational B. general C. primary D. special
- British universities are ... corporations, but they are mainly supported by public funds.*
A. independent C. various
B. different D. unique
- Each state in the USA. is in ... of organizing and regulating its own system of education.*
A. responsible B. nation C. charge D. system
- High schools, ... and senior, provide secondary education in the USA.*
A. primary B. elementary C. junior D. vocational

2. Fill in the blanks with the proper grammatical forms.

1. *He ... this museum the whole morning yesterday.*
A. were visiting C. was visiting
B. was being visited D. being visited
2. *They ... A. composition all morning yesterday.*
A. are being written C. was writing
B. is writing D. were writing
3. *He ... this text very well.*
A. was translating C. translate
B. is translated D. is being translated
4. *This material ... in the article.*
A. is being used C. uses
B. use D. were being used
5. *At present she ... here.*
A. were studying C. is studying
B. study D. is being studied
6. *The students ... these lectures next week.*
A. will attending C. attends
B. attending D. will be attending
7. *The boys ... this newspaper yesterday.*
A. was reading C. were reading
B. are reading D. were being read
8. *The questions ... by the relatives now.*
A. were being asked C. was asked
B. being askeD D. are being asked
9. *You ... these questions.*
A. were answered C. will answer
B. are answered D. is answering
10. *The text about education ... by the students tomorrow.*
A. were being read. C. will be read
B. read D. will read

3. The text contains different mistakes: 2 — in spelling, 5 — in grammar. Correct the mistakes and rewrite the text.

In most western nations, advanced general education is often called liberal education, which aim at broad mentall development, and teach learners to study a problem from diferent sides. The branches of learning that help

in these development are called liberal arts. This branches includes the humanities, mathematics, and the biological, physical, and social sciences.

4. Answer these multiple-choice questions about science and technology.

1. *What stages is formal education in the USA divided into?*
A general and special education
B elementary, special, adult education
C elementary, secondary, higher education
2. *What stages is formal education in the UK divided into?*
A primary, secondary, and further education
B secondary and vocational education
C state and private schools
3. *At what age do pupils take GCSE examination in the UK?*
A between the ages of 5 and 16
B at the age of 15 or 16
C at the age of 11
4. *At what age do pupils take GCE examination in the UK?*
A beyond the age of 16
B between the ages of 14 and 15
C beyond the age of 10
5. *What kinds of schools provide secondary education in the USA?*
A higher schools
B junior and senior schools
C different kinds of colleges

Module 3

SCIENCE AND TECHNOLOGY

Vocabulary: exercises 1—7, 12—16.

Grammar (the Perfect Tenses): exercises 8—9, 17—19.

Reading: exercises 10, 11, 32.

Listening: exercise 20.

Speaking: exercises 21—26.

Writing: exercises 27—30.

Project Work: exercise 31.

Test 3.

KEY VOCABULARY

Exercise 1. Read and guess the meanings of the new words. If you have some difficulties, use the dictionary at the end of this book. It will help you to read and discuss the texts and dialogues, arrange the role-plays and present the projects.

- 1) *science, scientist, scientific.* Science deals with facts and relationships among these facts. Scientists may try to solve difficult mathematical problems. They use different scientific methods.
- 2) *to search, researcher.* Some scientists search for clues to the origin of the universe. Researchers have examined this problem.
- 3) *to investigate.* Some researchers investigate why we act the way we do.
- 4) *to unify.* Scientists develop theories that help them order and unify the facts.
- 5) *to attempt.* Scientists attempt to solve mathematical problems.
- 6) *to explain.* Scientists try to explain different phenomena.
- 7) *to prove.* A theory becomes a part of scientific knowledge if it has been tested experimentally and proved to be true.
- 8) *complicated.* The theory is complicated and hard to comprehend.
- 9) *to appear.* Many new fields of science have appeared.
- 10) *boundary.* The boundaries between scientific fields have become less clear.
- 11) *to interconnect.* All sciences are closely interconnected.
- 12) *tool.* Different kinds of tools and machines make our life easier.

- 13) *discovery, invention*. Discoveries and inventions made by scientists help shape our views about ourselves and our place in the universe.
- 14) *to satisfy*. Technology means the use of people's inventions and discoveries to satisfy their needs.
- 15) *shelter*. Since people have appeared on the earth, they have had to get food, clothes, and shelter.
- 16) *steam engine*. Industrial technology began to develop with the invention of the steam engine, the growth of factories, and the mass production of goods.
- 17) *to contribute*. Science has contributed much to modern technology.
- 18) *nuclear power*. Some modern technologies, such as nuclear power production and space travel, depend heavily on science.

Exercise 2. Read the words following the rules of reading. Pronounce correctly. Practise aloud.

Invention, investigate, attempt, interconnect, shelter, engine, measure, cell;
fact, examine, animal, act, national, overlap, satisfy;
plants;
study, subject, structure, become, discovery, cover;
 technology, quantity;
true, tool, prove, unity;
field, deal, steam, mean;
 contribute, since;
search, research, refer, universe, word;
way, same, relationship, great, explain, complicated;
boundary;
closely, social, grow;
appear, theory, clear;
wide, try, divide, provide;
science, scientist, variety;
theory, something, mathematical, methods, earth, through, groth,
things;
other, another, clothes, these, they, them;
 relationship, shape, shelter.

Exercise 3. Look at the following pairs of words and think if the underlined letters are pronounced in the same way, or if they are pronounced differently. Read aloud.

Since — science; invention — shelter; animal — plants; overlap — satisfy;
 become — discovery; subject — unify; headquarters — act; quantity — ex-

amine; technology — prove; search — great; refer — universe; deal — steam;
same — complicated; process — social; appear — clear; scientist — variety.

Exercise 4. Read the international words, mind the stress.

Fact, structure, mathematical, problem, systematic, method, theory, principle, test, group, natural, social, technical, basis, technology, machine, material, industrial, aspect, radio, television, telephone, communication, object, metal.

Exercise 5. Try to enrich your vocabulary:

a) analyse the following words with different suffixes and divide them into two groups — nouns and adjectives:

relationship, scientist, structure, researcher, mathematical, systematic, observation, general, scientific, natural, social, technical, numerous, influence, invention, industrial, development, production, different, television, communication;

b) make up as many words as you can by combining different parts of the words:

re-	search	-er	-ly
inter-	experiment	-al	
	close	-ion	
	invent	-ment	
	general	-ent	
	develop		
	connect		
	product		
	differ		
	nation		

Exercise 6. Divide the following words into two groups, those which describe

a) science; b) technology.

Tools, steam engine, knowledge, systematic methods, theory, natural sciences, technical sciences, discoveries, to explain, television, radio, numbers, researchers, scientists, social sciences.

Exercise 7. Think over the definitions of the words which appear in the texts and dialogues and then

a) agree or disagree with the following definitions:

1. *Science* is the study of knowledge which can be turned into a system, and which usually depends on seeing and testing facts and stating general natural laws.

2. *Technology* is a branch of knowledge dealing with scientific and industrial methods and their practical use in industry.

3. *Research* is a serious and detailed study of a subject that is aimed at learning new facts, scientific laws, testing ideas, etc.

4. *Tool* is a piece of equipment that is designed to do a particular type of work.

5. *Shelter* is a building or something of the kind that gives protection.

b) match each word with its correct definition:

to prove, to search, to unify, to explain, to appear

1. To combine parts of something to form a single whole.

2. To make clear or easy to understand, usually by speaking or writing.

3. To become able to be seen, to come into sight.

4. To show to be true by means of facts, documents, information, etc.

5. To try to find something or someone by looking carefully.

c) find the definitions for some other words which you consider to be important for the topic “Science and Technology”. Use the website www.macmillan-dictionaries.com

EXPLORING GRAMMAR

Exercise 8. Read the sentences, point out the Perfect Tenses. Give the Russian equivalents. If you have some difficulties, use the grammar reference at the end of the book.

1. The boundaries between scientific fields have become less clear. 2. Has he ever researched this problem? 3. Scientific theories consist of general principles or laws that attempt to explain how and why something happens or has happened. 4. They will have translated the text by the end of the lesson. 5. The window had already been opened when they entered the room. 6. The scientific article has been recently written by him. 7. He has never told the truth. 8. He has found shelter in a small village. 9. Many fields of science have appeared. 10. Scientific knowledge has grown and become more complicated.

Exercise 9. Make up your own sentences according to the models.

Model A: *He entered the university last year.*

He has already entered the university.

1. He tested it experimentally two days ago. 2. Yesterday he translated the scientific article. 3. They solved complicated mathematical problems not long ago. 4. She read this book last week. 5. She wrote her composition yesterday.

Model B: *She didn't write an article.*

She hasn't written an article yet.

1. He didn't pass the exam. 2. The scientists didn't test this phenomenon experimentally. 3. They didn't solve the problem. 4. She didn't read the article. 5. He didn't explain why it happens.

READING

Exercise 10. Read the text, try to focus on its essential facts and choose the most suitable heading given below for each paragraph.

- 1) The Fields of Scientific Research
- 2) Different Groups of Sciences
- 3) The Connection between Science and Technology
- 4) The Importance of Science
- 5) What Is Science?
- 6) Technology
- 7) Methods of Scientific Research

SCIENCE AND TECHNOLOGY

The word “science” comes from the Latin word “scientia” which means “knowledge”. Science covers the broad field of knowledge that deals with facts and relationships among these facts.

Scientists study a wide variety of subjects. Some scientists search for clues to the origin of the universe and examine the structure of the cells of plants and animals. Other researchers investigate why we act the way we do or try to solve complicated mathematical problems.

Scientists use systematic methods of study to make observations and collect facts. They develop theories that help them order and unify facts. Scientific theories consist of general principles or laws that attempt to explain how and why something happens or has happened. A theory becomes a part of scientific knowledge if it has been tested experimentally and proved to be true.

Scientific study can be divided into three major groups: natural, social, and technical sciences. As scientific knowledge has grown and become more complicated, many new fields of science have appeared. At the same time, the boundaries between scientific fields have become less clear. Numerous areas of science overlap and it is often hard to tell where one science ends and other begins. All sciences are closely interconnected.

Science has great influence on our lives. It provides the basis of modern technology — the tools and machines that make our life and work easier.

The discoveries and inventions made by scientists also help shape our view about ourselves and our place in the universe.

Technology means the use of people's inventions and discoveries to satisfy their needs. Since people appeared on the earth, they had to get food, clothes, and shelter. Through the ages, people invented tools, machines, and materials to make work easier. Nowadays, when people speak of technology, they generally mean industrial technology. Industrial technology began to develop about 200 years ago with the invention of the steam engine, the growth of factories, and the mass production of goods. It influenced different aspects of people's lives. The development of the car influenced the way people lived and worked. Radio and television changed their leisure time. The telephone revolutionized communication.

Science has contributed much to modern technology. Science attempts to explain how and why things happen. Technology makes things happen. But not all technology is based on science. For example, people had made different objects from iron for centuries before they learnt the structure of the metal. But some modern technologies, such as nuclear power production and space travel, depend heavily on science.

Exercise 11. Agree or disagree with the following statements.

1. Scientists make observations and collect facts. 2. The boundaries between scientific fields have become less clear. 3. It is easy to tell where one science ends and other begins. 4. Science provides the basis of modern technology. 5. All modern technologies depend on science.

KEY VOCABULARY DEVELOPMENT

Exercise 12. Match the adjectives in column A with the nouns in column B to form meaningful phrases and then identify them at the sentence level in the text. It will help you understand the text in detail.

A	B
1) broad	a) word
2) systematic	b) problem
3) natural	c) theory
4) Latin	d) principle
5) different	e) groups
6) general	f) methods
7) major	g) field
8) industrial	h) objects
9) scientific	i) technology
10) mathematical	j) sciences

Exercise 13. Decide which of the verbs on the left collocate with the nouns on the right and then identify the word combinations at the sentence level in the text. It will help you understand the text precisely.

- | | |
|-------------------|-------------|
| 1) to cover | a) clues |
| 2) to deal with | b) cells |
| 3) to come from | c) problems |
| 4) to search for | d) tools |
| 5) to examine | e) fields |
| 6) to investigate | f) facts |
| 7) to develop | g) word |
| 8) to divide into | h) theory |
| 9) to provide | i) groups |
| 10) to shape | j) basis |
| 11) to invent ... | k) views |

Exercise 14. Try to enrich your vocabulary:

a) find words in the text which have the same meanings as the following words:

wide, to research, to attempt, to examine, main, complex, difficult, to start, big, a motor, various, to study;

b) find words in the text whose meanings are opposite to the meanings of the following words:

narrow, easy, practice, artificial, old, more, to begin, small, little;

c) replace the words in italics with the words with similar and opposite meanings:

1. He happened to meet her in that *broad* street. 2. They are investigating *complex* problems. 3. It was a very *difficult* experiment. 4. They *started* re-searching this problem. 5. It was a *big* contribution.

Exercise 15. Complete the sentences: change the word in capitals at the end of each sentence to form a word that fits suitably in the blank space.

1. ... examine the structure of the cells SEARCH.
2. The ... of radio and television changed our leisure time INVENT.
3. This theory was ... proved EXPERIMENT.
4. He has won a prize at the ... conference NATION.
5. There are ... scientific fields DIFFER.

Exercise 16. Insert the words at the sentence level: fill in the blanks with the missing words (the first letter of each word is given).

1. Science d... with a variety of subjects. 2. Scientists s... for the answers to the different questions. 3. The structure of the cells is e... by scientists. 4. Dif-

ferent theories u... the facts. 5. The b... of some scientific fields are not clear. 6. Natural, social and technical sciences are closely i... 7. T... the ages, people have invented tools, machines, and materials to make work easier. 8. Science c... much to modern technology. 9. Some modern technologies d... on science. 10. During our l... time we watch TV.

GRAMMAR DEVELOPMENT

Exercise 17. Point out the sentences with the Perfect Tenses in the text and provide the Russian equivalents. It will help you understand the text in detail.

Exercise 18. Fill in the blanks to streamline the use of the Perfect Tenses. The words in brackets are given to help you.

1. He ... already ... this experiment (to do). 2. He ... just ... the exam (to pass). 3. ... you ever ... this book (to read)? 4. The article ... just ... by the students (to translate). 5. The scientific conference ... yet (to start).

Exercise 19. Make up sentences according to the models to practise the use of the Perfect Tenses.

Model A: *Они уже исследовали эту проблему.*

They have already investigated this problem.

1. Он только что доказал это экспериментально. 2. Она уже написала статью. 3. Он только что объяснил, почему это происходит. 4. Они уже доказали, что это правильно. 5. Он уже внес большой вклад в развитие науки.

Model B: *К десяти часам они завершат этот эксперимент.*

By 10 o'clock they will have finished this experiment.

1. К понедельнику она напишет статью. 2. К следующей неделе он докажет это экспериментально. 3. К двум часам они переведут этот текст. 4. К следующему году он завершит исследование. 5. Научная конференция закончится к пяти часам.

LISTENING

Exercise 20. Listen to the text “M.V. Lomonosov”.

Before listening: mind the words and phrases given to comprehend better the information you are going to listen to.

On foot — пешком;

to deliver lectures — читать лекции;

on his initiative — по его инициативе;

to be named after — быть названным в честь;
it is impossible to name a phenomenon — невозможно назвать явление;
to foretell (foretold) — предсказывать;
scientific activities — научная деятельность.

After listening: agree or disagree with the following statements and add some more information if needed.

1. M.V. Lomonosov was born in Arkhangelsk. 2. He delivered lectures on physics in English. 3. Moscow University was founded on M.V. Lomonosov's initiative. 4. M.V. Lomonosov tried to explain a lot of phenomena. 5. He systematized knowledge in natural science and history.

SPEAKING

Exercise 21. Share your vision about science and technology using the following phrases: to my mind, in my opinion, it seems to me, as far as I remember, etc.

1. What is science?
2. What is technology?
3. Are they interconnected?
4. Is all technology based on science?
5. What modern technologies depend heavily on science?
6. When did industrial technology begin to develop?
7. When was a steam engine invented?
8. Who invented the steam engine?
9. When was radio invented?
10. Who invented the radio?
11. When was television invented?
12. Who invented the television?
13. When was the telephone invented?
14. Who invented the telephone?
15. When was the first car invented?
16. When was the first digital computer invented?
17. Who invented the first digital computer?
18. What famous scientists do you know?
19. What famous inventors do you know?
20. What scientific fields are you interested in? Why?

Exercise 22. Make up general and disjunctive questions and answer them according to the models to enhance your speaking skills.

Model A: *Science covers the broad field of knowledge.*

Does science cover the broad field of knowledge? — Yes, it does.

Science covers the broad field of knowledge, doesn't it? — Yes, it does.

1. Science deals with the facts and relationships among these facts. 2. A theory becomes a part of scientific knowledge. 3. Science attempts to explain how and why things happen. 4. Technology makes things happen. 5. Technology influences different aspects of people's lives.

Model B: *Scientists study a wide variety of subjects.*

Do scientists study a wide variety of subjects? — Yes, they do.

Scientists study a wide variety of subjects, don't they? — Yes, they do.

1. Some scientists search for clues to the origin of the universe. 2. Scientists examine the structure of the cells of living plants and animals. 3. Other researchers investigate why we act the way we do. 4. They solve complicated mathematical problems. 5. Scientists use systematic methods of study.

Exercise 23. Make up special questions according to the models and answer them to streamline your speaking skills.

Model A: *Technology influences all aspects of people's life.*

What does technology influence?

1. Science provides the basis of modern technology. 2. Technology means the use of people's inventions and discoveries to satisfy their needs. 3. This scientist uses systematic methods of study. 4. He usually tests any theory experimentally. 5. He proves it to be true.

Model B: *Scientists can study a wide variety of subjects.*

What can scientists study?

1. Scientists can examine the structure of the cells of living plants and animals. 2. Scientists can solve different mathematical problems. 3. Scientists can use systematic methods of study. 4. They can make observations. 5. They can develop theories.

Exercise 24. Ask questions and use the words in italics in your answers. The words in brackets will help you.

1. The word "science" means "*knowledge*" (what). 2. Scientists can order *facts* (what). 3. Scientists can unify *facts* (what). 4. They usually test *the theory* experimentally (what). 5. Technology influences *different aspects of our life* (what).

Exercise 25. Read the following dialogue, sum up the information and act out a similar dialogue.

PREPARATION FOR THE STUDENTS' SCIENTIFIC CONFERENCE

- A.: I've heard you are preparing a report about science and technology for the students' scientific conference.
- B.: You are absolutely right.
- A.: What are the main points of your report?
- B.: First of all, I am going to begin my report with the definitions of science and technology.
- A.: If I am not mistaken, the word 'science' is the Latin word and means 'knowledge'. And what meaning of the word 'technology' will you provide?
- B.: I'll say that technology means the use of people's inventions and discoveries to satisfy their needs.
- A.: I see. Will your report include any information about famous scientists?
- B.: No, it won't. It is the topic for other reports. I'll only mention what scientists study and which methods of study they use.
- A.: And are you going to describe the major groups of scientific study?
- B.: Of course. Though all sciences are closely interconnected they may be divided into three major groups: natural, social and technical sciences.
- A.: Good for you! Your report seems to be very interesting. You'll be great at the conference tomorrow.
- B.: Let's hope for the best.
- A.: I'll be present at the conference by all means and try to take part in the discussions.
- B.: You are welcome.

Exercise 26. Role-play the following situations.

1. You are at the International scientific conference for the first time. You meet a famous U.S. scientist there and have a talk with him. 2. You are talking with your teacher of the English language about preparation for the students' scientific conference.

WRITING

Exercise 27. Complete the following sentences in a logical way.

1. The word "science" comes from the Latin word which means...
2. Science deals with facts and...
3. Scientists study a wide variety of...
4. Some scientists search for clues to...
5. Other researchers solve complicated...

6. Scientific theories consist of general principles or...
7. A theory becomes part of...
8. Scientific study can be divided into three major groups: ...
9. The boundaries between scientific fields have become...
10. Science provides the basis of...
11. Technology means the use of...
12. Industrial technology began to develop about 200 years ago with...
13. Technology influenced different aspects of...
14. Science attempts to explain how and why...
15. Technology makes things...

Exercise 28. Translate the following sentences from Russian into English. You will have a story on the topic as a pattern.

1. Слово “science” происходит от латинского слова “scientia”, которое означает «знание». 2. Ученые изучают широкий круг проблем. 3. Некоторые ученые ищут разгадку происхождения Вселенной. 4. Другие изучают строение клетки. 5. Некоторые исследуют причины нашего поведения. 6. Ученые используют систематические методы исследования проблем. 7. Науки могут быть разделены на три главные группы: естественные, общественные, технические науки. 8. Но границы между научными областями становятся все менее и менее четкими. 9. Все науки тесно взаимосвязаны. 10. Наука оказывает огромное влияние на нашу жизнь. 11. Она является основой современной технологии. 12. Сегодня, когда люди говорят о технологии, они имеют в виду промышленную технологию. 13. Промышленная технология начала развиваться около 200 лет назад с появлением парового двигателя, ростом фабрик и массовым производством товаров. 14. Радио и телевидение изменили наш досуг; телефон произвел революцию в общении. 15. Открытия и изобретения ученых помогают нам формировать наши взгляды на себя и наше место во Вселенной.

Exercise 29. Make up your own story about science and technology according to the following points of the plan. The words and phrases are supposed to make your story logical and interesting.

1. What Is Science?

The word “science” comes from
Science covers

2. The Fields of Scientific Research

Scientists search for
Scientists examine

Scientists investigate

Scientists solve

3. Different Groups of Sciences

Sciences can be divided into

Scientific knowledge has become

Different sciences overlap

All sciences are interconnected

4. Science and Technology

Science provides

Technology means

Industrial technology began to develop

Science and technology influence

Exercise 30. Write an e-mail to your friend about preparation for the students' scientific conference at your university.

PROJECT WORK

Exercise 31. Compile information about the field of science you are interested in and participate in a project. Give reasons why this field of science is of interest to you. Present the project to your group. You may use the following website: www.britishtscienceassociation.org

ADDITIONAL READING

Exercise 32. Make a summary of the text using the following phrases:

1. The title of the text is...
2. The text is about... The text deals with...
3. The text covers such points as... first... second... third...
4. It should be underlined that...
5. In conclusion, I may say that...
6. To my mind... In my opinion...

ISAAC NEWTON (1642—1727)

Sir Isaac Newton, English mathematician and physicist, one of the foremost scientific intellects of all time, was born at Woolsthorpe, near Grantham in Lincolnshire where he attended school. He entered Cambridge University in 1661. In two years he already made a number of important contributions to mathematics, physics (optics, mechanics) and astronomy. He was elected a Fellow of Trinity College in 1667 and Professor of Mathematics in 1669.

Newton is the discoverer of the Law of Gravitation. Once he saw how an apple is falling from the tree and began thinking about it. Gradually he came to conclusion that the force which pulled the apple to the ground was the same as the force which kept the Moon to its orbit around the Earth. He extended his theory of gravitation to the movements of the planets round the Sun. Among fundamentals to mechanics are the three laws of motion formulated by I. Newton.

He summarized his theories in his masterpiece "The Principia" which was published in 1687. He could unite various phenomena of the universe by means of his Universal Law of Gravitation.

Newton was highly appreciated by scientists both at home and abroad. In 1699 he was elected a foreign member of the French Academy of Sciences. In 1703 he was elected President of the Royal Society. In 1705 he was given the title of knight for his great contribution to the world science.

TEST 3

1. Choose the proper words and fill in the blanks.

- Scientists solve a ... of complicated mathematical problems.*
A. origin B. variety C. universe D. cell
- The researchers always try to ... the facts.*
A. refer B. measure C. satisfy D. unify
- When people speak of technology they usually mean ... technology.*
A. medical B. nuclear C. educational D. industrial
- ... make our life and work easier.*
A. Principles B. Laws C. Tools D. Facts
- People had to get food, clothes and*
A. shelter B. machines C. cars D. technologies
- Science is ... much to modern technology.*
A. doing B. making C. contributing D. explaining
- Science has great ... on our lives.*
A. attempt B. influence C. boundary D. discovery
- Industrial technology began to develop with the ... of the steam engine.*
A. technology B. discovery C. invention D. structure
- The boundaries between scientific fields have become ... clear.*
A. less B. more C. most D. almost

10. *All sciences are closely ...*

- A. investigated B. unified C. explained D. interconnected

2. Fill in the blanks with the proper grammatical forms.

1. *The experiments ... by him.*

- A. has been done C. have been done
B. were been done D. have done

2. *The scientists ... a wide variety of subjects.*

- A. were studied C. has studied
B. have studied D. are studied

3. *The cell structure of the plants ... by the scientists.*

- A. has been examined C. have examined
B. has examined D. had examined

4. *... they already solved the problem?*

- A. Are B. Have C. Do D. Is

5. *... he made observations?*

- A. Have B. Is C. Does D. Has

6. *This theory has ... a part of scientific knowledge.*

- A. become B. became C. becomes D. been become

7. *Scientific knowledge has ... greatly.*

- A. grow B. grown C. grew D. grows

8. *All branches of science ... closely interconnected.*

- A. have B. has C. are D. had

9. *The tools and machines ... our life and work easier.*

- A. makes C. have made
B. have been made D. are made

10. *Since ancient times people ... tools and machines.*

- A. have invented C. are invented
B. invented D. invents

3. The text contains different mistakes: 2 — in spelling, 5 — in grammar. Correct the mistakes and rewrite the text.

Computers has changed the way people work. Many tasks which was performed by a large number of people is done now by computers. They provide scintists with understanding of nature. Computers produces new information so quikly that they have change people's views on the world.

4. Answer these multiple-choice questions about science and technology.

1. *What does the word 'science' mean?*
 - A. broad field
 - B. Latin word
 - C. knowledge
2. *What do scientists do?*
 - A. develop theories
 - B. only collect facts
 - C. only make observations
3. *When does a theory become a part of scientific knowledge?*
 - A. after experiments
 - B. after tests
 - C. after it has been tested experimentally and proved to be true
4. *What do scientific theories consist of?*
 - A. different technologies
 - B. observations and facts
 - C. general principles and laws
5. *What groups can scientific study be divided into?*
 - A. social and technical sciences
 - B. natural and technical sciences
 - C. natural, social, and technical sciences
6. *Why have many new fields of science appeared?*
 - A. because scientific knowledge has grown and become more complicated
 - B. because sciences influence our lives
 - C. because it proved to be true
7. *When did industrial technology begin to develop?*
 - A. with the development of the radio
 - B. with the development of the computer
 - C. with the development of the steam engine

Module 4

ENGINEERING IN THE 21st CENTURY

Vocabulary: exercises 1—7, 12—16.

Grammar (the Infinitive): exercises 8—9, 17—19.

Reading: exercises 10, 11, 32.

Listening: exercise 20.

Speaking: exercises 21—26.

Writing: exercises 27—30.

Project Work: exercise 31.

Test 4.

KEY VOCABULARY

Exercise 1. Read and guess the meanings of the new words. If you have some difficulties, use the dictionary at the end of this book. It will help you to read and discuss the texts and dialogues, arrange the role-plays and present the projects.

- 1) *to design*. Engineers design structures, machines, apparatus, or manufacturing processes.
- 2) *cognizance*. They construct machines with full cognizance of their design.
- 3) *to utilize, utilization*. Utilization of advanced systems and devices simplify our life.
- 4) *to encompass*. Engineering encompasses chemical, electrical, civil engineering, and mechanical engineering.
- 5) *predecessor*. This society was a predecessor of that one.
- 6) *processing*. Chemical engineering covers areas from biotechnology and nanotechnology to mineral processing.
- 7) *to overlap*. In each new field, considerable overlap takes place.
- 8) *core concepts*. Engineering applies the core concepts of mechanics, kinematics, material science, structural analysis to mechanical systems.
- 9) *to maintain*. Mechanical engineering tries to apply the core concepts of different sciences to design, manufacture and maintain mechanical systems.

- 10) *computer-aided engineering, product lifecycle management*. These tools include both computer-aided engineering and product lifecycle management to design manufacturing plants.
- 11) *heating and cooling systems, robotics*. They design heating and cooling systems, robotics and medical devices.
- 12) *to emerge*. Mechanical engineering emerged as a field during the industrial revolution in Europe.
- 13) *to incorporate advancement*. Mechanical engineering incorporates advancements in technology.
- 14) *to pursue*. Mechanical engineers pursue developments in technology.
- 15) *to proceed*. They proceed to work on both power-producing and power-using machines.
- 16) *internal combustion engines*. Mechanical engineers work with power-producing machines such as electric generators, internal combustion engines, steam and gas turbines.
- 17) *material handling systems*. Material handling systems and robotics are used in manufacturing.
- 18) *artificial joints, heart valves*. Engineers should design products that are both challenging and exciting, for example, artificial joints and heart valves just to name a few.
- 19) *tough, flexible, responsive, smart*. Engineers can make materials that are not just lighter, tougher and more flexible but also responsive and smart.
- 20) *tiny*. They manufacture complex nanocomponents from these materials in order to create tiny machines.
- 21) *to cope with*. The student has managed to cope with his task.

Exercise 2. Read the words following the rules of reading. Pronounce correctly. Practise aloud.

Creative, application, apparatus, maintain, naval;
 predecessor, proceed;
 overlap, manage, handling;
 device, mining, combine, science, tiny;
 encompass, cognizance, concept, responsive;
 tool, cooling;
 utilize, pursue;
 structure, function, industrial, combustion;
 certain, emerge, internal, turbine;
 civil, process, construct, cover, especially, cope;
 chemical, machine, mechanical, technology.

Exercise 3. Look at the following pairs of words and think if the underlined letters are pronounced in the same way, or if they are pronounced differently. Read aloud.

Maintain — apparatus, handling — creative, structure — utimize, chemical — machine, device — civil, cover — especially, pursue — turbine, machine — technology, machine — mechanical, core — tool, predecessor — proceed, device — science, cognizance — concept, tool — cooling, certain — emerge, combustion — petroleum.

Exercise 4. Read the international words, mind the stress.

Civilization, process, visualize, robotics, thermodynamics, structural analysis, architect, mechanical, electronic, protect, zone, vibroacoustic, information technology, automatically operated system, logical problem, reduce, optimum design, dynamics, machine.

Exercise 5. Try to enrich your vocabulary:

a) analyse the following words with different suffixes and divide them into two groups — nouns and adjectives:

combination, safety, energy, scientific, difference, mechanical, chemical, automation, engineering, pollution, consumption, considerable, structural, production, operation, different, industrial, advancement, development, generator;

b) make up as many words as you can by combining different parts of the words:

auto-	technology	-er	-ly
re-	design	-ance	
mis-	vision	-al	
nano-	structure		

Exercise 6. Divide the following terms into two groups, those which describe a) engineering; b) mechanical engineering.

Chemical engineering, to maintain mechanical systems, electrical engineering, machinery, mechanical power, civil engineering, mechanical engineers, to test tools, engines, mechanical devices, internal combustion engines.

Exercise 7. Think over the definitions of the words which appear in the texts and dialogues and then:

a) agree or disagree with the following definitions

1. *Engineering* is application of scientific principles aiming at designing and developing structures, machines, and manufacturing processes.

2. *Mechanical engineering* is the science or profession dealing with studying, designing, or building machines.

3. *Biotechnology* is the use of bacteria and plant/animal cells for industrial or scientific purposes.

4. *Valve* is the part of a machine or piece of equipment that opens and closes in order to control the flow of air or liquid.

5. *Automation* is the process easing working environment.

b) match each word with its correct definition

competence, CAD (computer-aided design), cognizance, tool, concept

1. The process by which you recognize and understand something.

2. A piece of equipment that is designed to do a particular type of work.

3. The process of using drawings made by a computer to design machines, building, etc.

4. Skills, knowledge and suitable experience.

5. The idea of something that exists.

c) find the definitions for some other words which you consider to be important for the topic “Engineering”. Use the website www.macmillandictionaries.com

EXPLORING GRAMMAR

Exercise 8. Read the sentences, point out the infinitive. Give the Russian equivalents. If you have some difficulties, use the grammar reference at the end of the book.

1. They decided to design advanced machines. 2. To utilize these principles is not easy. 3. Some companies hope to create streamlined, in terms of efficiency, safety devices. 4. To reduce hard physical labour engineers should design and develop smart machines. 5. Mechanical engineers plan to use highly energy-efficient machines. 6. The programme targeted on assisting with the design and manufacture of any kind of vehicles. 7. It is our plan to maximize the performance of the car. 8. They have to work together. 9. They should work hard to make a good progress. 10. It is a good question to be discussed.

Exercise 9. Make up your own sentences according to the models.

Model A: *To employ advanced technologies is our target.*

Our target is to employ advanced technologies.

1. To develop machines on the base of advanced materials is a completely new model. 2. To maintain performance excellence is a new concept.

3. To process all parts according to the design is an integral part of modern requirements. 4. To rely on old tools is quite a wrong approach. 5. To gain the lead in many technical fields is our plan.

Model B: *They decided to work on the structural integrity of the vehicle.*

They did not decide to work on the structural integrity of the vehicle.

1. They agreed to use those machines. 2. They wanted to work on power-producing machines. 3. They planned to apply those tools. 4. We advised to test other devices. 5. He wanted to produce all the components.

READING

Exercise 10. Read the text, try to focus on its essential facts and choose the most suitable heading given below for each paragraph.

- 1) Mechanical Engineering Developments
- 2) Mechanical Engineering as a Branch of Engineering
- 3) The Definition of Engineering
- 4) Branches of Engineering

Engineering is *“the creative application of scientific principles to design or develop structures, machines, apparatus, or manufacturing processes, or works utilizing them singly or in combination; or to construct or operate the same with full cognizance of their design; or to forecast their behavior under specific operating conditions; all as respects an intended function, economics of operation or safety to life and property. One who practices engineering is called an engineer, and those licensed to do so may have more formal designations such as Professional Engineer, Chartered Engineer. The broad discipline of engineering encompasses a range of more specialized subdisciplines, each with a more specific emphasis on certain fields of application and particular areas of technology”*. The American Engineers’ Council for Professional Development (ECPD), the predecessor of ABET (Accreditation Board for Engineering and Technology).

Engineering has the following branches: chemical engineering (covering areas from biotechnology and nanotechnology to mineral processing), electrical engineering, civil engineering, mechanical engineering. Beyond these four, historically, naval engineering and mining engineering claim on being major branches as well as aerospace, petroleum, biosystems, biomedical, industrial, and nuclear engineering. New fields are combined with the traditional fields and then form new branches, for example, Earth Systems Engineering and Management that involve such subject areas as anthropology, engineering, environment science, ethics, and philosophy. In each new

field, considerable overlap takes place, especially in the areas of application of science to such disciplines as physics, chemistry, and mathematics.

Within our interests lies mechanical engineering. **Mechanical engineering** is known as a branch of engineering that tries to apply the core concepts of physics, mechanics, kinematics, thermodynamics, materials science, structural analysis, materials science to the analysis, design, manufacture, and maintenance of mechanical systems. It is a well-known fact that mechanical engineering involves production and usage of heat and mechanical power for design, production, and operation of machines and tools. To use these core concepts along with different tools, mechanical engineers use both computer-aided engineering and product lifecycle management to design and analyze manufacturing plants. They use them in industrial equipment and machinery, heating and cooling systems, transport systems, aircraft, watercraft, robotics, medical devices, etc.

Mechanical engineering emerged as a field during the industrial revolution in Europe in the 18th century. As for mechanical engineering science, it emerged in the 19th century as a result of developments in the field of physics. Mechanical engineering has managed to incorporate advancements in technology. As a result, today mechanical engineers pursue developments in such fields as composites, mechatronics, and nanotechnology. Mechanical engineering manages to overlap with aerospace engineering, civil engineering, electrical engineering, petroleum engineering, and chemical engineering to various extents. Mechanical engineers' tasks are to research, design, develop, manufacture and to test tools, engines, machines, and other mechanical devices. They proceed to be working on both power-producing machines such as electric generators, internal combustion engines, steam and gas turbines and on power-using machines such as refrigeration and air-conditioning equipment, machine tools, material handling systems, elevators and escalators, industrial production equipment, and robots used in manufacturing. Mechanical engineers also seek to design tools that other engineers need for their work.

Exercise 11. Agree or disagree with the following statements.

1. Engineering encompasses only chemical, electrical, and civil engineering. 2. Mechanical engineering applies core concepts of physics, mechanics, materials science to the design, manufacture, and maintenance of mechanical systems. 3. Mechanical engineers use these core concepts along with different tools. 4. Mechanical engineering emerged in the 17th century. 5. Mechanical engineering overlaps with aerospace engineering, mechatronics, and nanotechnology.

KEY VOCABULARY DEVELOPMENT

Exercise 12. Match the words in column A with the words in column B to form meaningful phrases and then identify them at the sentence level in the text. It will help you understand the text in detail.

A	B
1) scientific	a) advancements
2) manufacturing	b) principle
3) power-using	c) science
4) material	d) machines
5) forecast	e) behaviour
6) computer-aided	f) product
7) product lifecycle	g) management
8) advanced	h) structures
9) incorporate	i) knowledge

Exercise 13. Decide which of the verbs on the left collocate with the nouns on the right and then identify the word combinations at the sentence level in the text. It will help you understand the text precisely.

1) to utilize	a) apparatus
2) to design	b) structures
3) to forecast	c) behaviour
4) to encompass	d) machines
5) to create	e) areas
6) to cover	f) subdisciplines
7) to overlap	g) concepts
8) to apply	h) physics
9) to maintain	i) systems

Exercise 14. Try to enrich your vocabulary:

a) find words in the text which have the same meanings as the following words:

use, to use, main, to construct, predict, wide, to embrace, field, to produce, various, to investigate, job, to look for;

b) find words in the text whose meanings are opposite to the meanings of the following words:

less, within, old, external, to lose, narrow, the same, unknown;

c) replace the words in *italics* with the words with similar meanings:

1. Engineering is the creative use of scientific principles *to construct* structures. 2. They planned *to use* those machines. 3. Engineering *embraces* some

fields. 4. Mechanical engineers *produce* and maintain mechanical systems. 5. Mechanical engineers' tasks are *to investigate*, design, develop, manufacture, and to test tools.

Exercise 15. Complete the sentences: change the word in capitals at the end of each sentence to form a word that fits suitably in the blank space.

1. Many ... do their best to produce advanced machines MANUFACTURE.

2. Social and ... damage is also caused by the growing discrepancy between technical competences in different regions ECONOMY.

3. Very small machines, gears, and robots will be applied ... in medicine BROAD.

4. A number of problems in different areas will have to be solved within mechanical engineering to turn these still-visionary concepts into ... REAL.

5. Mechanical engineering maintains its predominant role thanks to the ... and use of new materials and advanced technologies DEVELOP.

Exercise 16. Insert the words at the sentence level: fill in the blanks with the missing words (the first letter of each word is given).

1. It is the branch of e... that involves the production and usage of heat and mechanical power for the design, production, and operation of machines and t... . 2. Mechanical engineering has managed to incorporate a... in technology. 3. Mechanical engineers are pursuing developments in such fields as composites, mechatronics, and n... . 3. Considerable o... exists in each new field. 4. Mechanical engineering tries to apply the c... c... of different sciences. 5. Mechanical engineers design, manufacture and m... mechanical systems. 6. This field e... in the 19th century. 7. They usually use i... c... engines.

GRAMMAR DEVELOPMENT

Exercise 17. Point out the sentences with the infinitive in the text and provide the Russian equivalents. It will help you understand the text in detail.

Exercise 18. Fill in the blanks to streamline the use of the infinitive. The words in brackets are given to help you.

1. At the moment the engineers should ... new methods in their fields (использовать). 2. They have decided ... tools (проектировать). 3. We need ... a completely new model (испытать). 4. Nowadays mechanical engineers have ... developments in such fields as mechatronics and nanotechnology (продолжать). 5. The engineers have managed ... more efficient machines (конструировать).

Exercise 19. Make up sentences according to the models to practise the use of the infinitive.

Model A: *The device which we should use is very complex.*

The device to be used is very complex.

1. The proposal which they should discuss is wrong. 2. The progress that she should make is pretty tough. 3. The way which we should choose is the right one. 4. The idea which they should come up with is too promising. 5. The project which we should sign is very profitable.

Model B: *Чтобы подготовить этот доклад, вы должны пойти в библиотеку.*

To prepare this report you should go to the library.

1. Чтобы использовать новые материалы, вы должны установить новое оборудование. 2. Чтобы продвигаться успешно, мы должны провести эксперимент вовремя. 3. Чтобы сконструировать эту модель, вы должны много работать. 4. Чтобы использовать эти машины, их нужно испытать. 5. Чтобы исследовать эту проблему, они должны использовать новые приборы.

LISTENING

Exercise 20. Listen to the text “Automotive Engineering”.

Before listening: mind the words and phrases given to comprehend better the information you are going to listen to.

To undergo significant changes — подвергаться значительным изменениям;

a key role — основная, ключевая роль;

responsibility — ответственность;

to ensure the safety of the vehicle — обеспечивать безопасность транспортного средства;

to assist — помогать, содействовать;

performance maximization — максимизация рабочих характеристик;

to make up — являться частью, составлять;

overseer — контролер, инспектор, мастер.

After listening: agree or disagree with the following statements and add some more information if needed.

1. The automobile has undergone significant changes due to advancements in the automotive engineering. 2. Automobile engineers play a key role in the design and construction. 3. If a vehicle is as aerodynamic as possible,

it leads to performance maximization. 4. There is nobody who is responsible for making sure that a vehicle functions properly. 5. A development engineer has not got an overseer role.

SPEAKING

Exercise 21. Share your vision of engineering using the following phrases: to my mind, in my opinion, if I am not mistaken, as far as I remember, it seems to me, etc.

1. What is engineering?
2. What branches does engineering encompass?
3. Are there any new fields in engineering? If there are, list them.
4. What is mechanical engineering?
5. What tools are employed by mechanical engineers?
6. What are these tools used for?
7. When and how did mechanical engineering emerge?
8. Has mechanical engineering managed to incorporate advancements in technology? If it has, say why. If it has not, give grounds.
9. What do mechanical engineers work on?
10. What role do automobile engineers play in design and construction?
11. What are the most significant responsibilities of the automotive engineering industry?
12. What can lead to performance maximization in automotive industry?
13. Who is responsible for making sure that a vehicle functions properly?
14. What role does a development engineer have?

Exercise 22. Make up general and disjunctive questions, and answer them according to the models to enhance your speaking skills.

Model A: *Engineering encompasses several branches.*

Does engineering encompass several branches? — Yes, it does.

Engineering encompasses several branches, doesn't it? — Yes, it does.

1. Mechanical engineering uses the core concepts of physics, mechanics, material science, structural analysis, and materials science. 2. A mechanical engineer uses the core concepts along with different tools. 3. An engineer utilizes computer-aided engineering and product lifecycle management in his work. 4. Mechanical engineering overlaps with aerospace engineering, civil engineering, electrical, petroleum, and chemical engineering. 5. A mechanical engineer researches, designs, develops, manufactures and tests tools, engines and other mechanical devices.

Model B: *They try to manufacture different kinds of vehicles.*

Do they try to manufacture different kinds of vehicles? — Yes, they do.

They try to manufacture different kinds of vehicles, don't they? — Yes, they do.

1. Engineers try to play a key role in design and production. 2. They try to work on the body and safety of the car. 3. They seek to maximize the performance of the car. 4. We want to be responsible for the structural integrity of the vehicle. 5. They plan to develop advanced materials.

Exercise 23. Make up special questions according to the models, and answer them to streamline your speaking skills.

Model A: *Engineering encompasses several branches such as chemical engineering, electrical, civil, and mechanical engineering.*

What branches does engineering encompass?

1. Naval engineering manages to be a major branch. 2. Mechanical engineering involves such processes as production and usage of heat and mechanical power for machines and tools. 3. The engineer plans to pursue developments in such areas as composites, mechatronics and nanotechnology. 4. He manages to work on different advanced machines. 5. Mechanical engineering manages to overlap with electrical engineering.

Model B: *Engineering should apply scientific principles to design machines and manufacturing processes.*

What should engineering apply to design machines and manufacturing processes?

1. Mechanical engineering should use scientific and technical advancements to streamline new machinery. 2. Engineering should meet many goals to create new machinery. 3. Machines should pass strict tests to comply with high ecological and safety standards. 4. Mechanical engineering should solve a number of problems to move ahead. 5. Modern engineering should pursue production automation tendency to streamline all manufacturing processes.

Exercise 24. Ask questions and use the words in italics in your answers. The words in brackets will help you.

1. *Engineering* is a *creative* application of *core* concepts for the needs of every engineering branch (what kind of, what). 2. *Engineering* encompasses a range of more *specialized* branches (what, what kind of). 3. *Workers* who practice *engineering* are called engineers (who, what). 4. In each new field, *considerable overlap* takes place (what). 5. *Mechanical engineers* design *tools* that other engineers need *for their work* (what, what for, who).

Exercise 25. Read the following dialogue, sum up the information and act out a similar dialogue.

- Jim: Hi, Tom ! It's Jim here. I'm calling to find out how our project's coming along.
- Tom: Not bad. We're mostly on schedule.
- J.: When do you plan to finish your material about nanotechnology, robotics and bioengineering?
- T.: Just a moment, I'll look at the planner. Here it is, um... I believe by the end of the month.
- J.: Why so late? What's come up?
- T.: You see, I'm not a top specialist in these areas, as you know! So I've got some problems.
- J.: How could you keep me so long completely in the dark about this? But take it easy, I'll help you! I wonder what you fail to know about nanotechnology and robotics.
- T.: Let's start with their application.
- J.: Well, just general remarks! Nanotechnology brings together engineers, chemists, biologists and allows them to control the molecules of a material.
- T.: Does it mean that they can make materials that are not just lighter, tougher and more flexible but also responsive and smart as well?
- J.: Right you are! They manufacture complex nanocomponents from these materials in order to create tiny machines.
- T.: OK. I see. Let's go through some information about bioengineering then.
- J.: If I am not mistaken, bioengineering is the application of engineering to biological systems.
- T.: It means engineers should design products that are both challenging and exciting. Say, artificial joints, heart valves, just to name a few.
- J.: Sure. What is left? Oh, yes, robotics! Robots are used for all sorts of things. Actually they can be used where human life may be put at risk. For sure you know the fields of application of robotics, just rack your brains.
- T.: I think they can range from unmanned planes or submarines to robotic arms on production lines.
- J.: Yes, you are absolutely right! As you see, you've managed to cope with your tasks yourself!
- T.: Thanks a lot, Jim! Bye.
- J.: You're welcome. I'll get back to you in a week. Bye for now.

Exercise 26. Role-play the following situation.

You are at the International scientific conference for the first time. You meet a famous scientist there and have a talk in English with him about the branches of engineering that you are going to work in.

WRITING

Exercise 27. Complete the following sentences in a logical way.

1. Engineering is the application of scientific principles to...
2. Engineering encompasses the following branches...
3. Historically naval engineering and mining engineering are...
4. Mechanical engineering is known as a branch of engineering that uses the core concepts of...
5. Mechanical engineers use these core concepts to...
6. These tools include both ... and...
7. Mechanical engineering emerged as a field in...
8. Mechanical engineering began to pursue developments in such fields as...
9. Mechanical engineering overlaps with civil engineering...
10. Mechanical engineers research, design...
11. They work on both ... and...
12. Automobile engineers play a key...
13. Automotive engineers have a lot of responsibility...
14. Aerodynamic car design leads to...
15. It is clear that there is someone who is responsible for...

Exercise 28. Translate the following sentences from Russian into English. You will have a story on the topic as a pattern.

1. Инженерное искусство («инжиниринг») означает творческое применение достижений науки и техники для решения задач конкретной отрасли. 2. «Инжиниринг» охватывает такие отрасли, как химическое производство, электротехника, гражданское строительство, машиностроение. 3. Морская и горнодобывающая инженерия, аэрокосмос, биосистемы также считаются базовыми отраслями. 4. Машиностроение применяет основные понятия физики, механики, термодинамики, материаловедения, структурного анализа, чтобы проектировать, производить и эксплуатировать механические системы. 5. В машиностроении инженеры используют основные научные разработки при проектировании различных производственных систем. 6. Они используют компьютерные системы, чтобы проектировать станки, робототехнику, медицинские устройства и т.д. 7. Машиностроение появилось как отрасль во время промышленной революции в Европе в 18-м веке. 8. Машиностроение постоянно развивается, чтобы применять в своих технологиях появляющиеся усовершенствования в таких областях, как композиционные материалы, мекатроникс, нанотехнологии. 9. Машиностроение

имеет перекрестные области с электротехникой, аэрокосмической и химической промышленностями в различной степени. 10. В машиностроении инженеры исследуют, проектируют, производят и испытывают различные приборы, двигатели, машины и другие механические устройства. 11. Они совершенствуют как энергогенерирующие машины (электрогенераторы, двигатели внутреннего сгорания, паро- и газотурбины), так и энергопотребляющие машины (холодильное оборудование и оборудование для кондиционирования, станки, системы погрузки-разгрузки материалов и др.). 12. Автомобиль претерпел значительные изменения в результате усовершенствований в автомобильной технике. 13. Инженер в автомобилестроении играет основную роль в проектировании и конструировании автомобилей, грузовиков, автобусов и др. 14. Автомобильное машиностроение несет ответственность как за безопасность транспортных средств, так и за их эффективность. 15. Аэродинамичный автомобиль позволяет достичь максимальных рабочих характеристик транспортного средства, что, в свою очередь, приводит к меньшему потреблению топлива. 16. Если представить все узлы автомобиля, то становится очевидным, что должен быть кто-то, кто отвечает за должную работу транспортного средства.

Exercise 29. Make up your own story about engineering according to the following points of the plan. The words and phrases are supposed to make your story logical and interesting.

1. What Is Engineering?

Engineering is

Engineering encompasses

2. Mechanical Engineering Is a Branch of Engineering

Mechanical engineering uses

Mechanical engineers apply

Mechanical engineers research, design, develop and manufacture

Mechanical engineers work on

3. Automotive Engineering

Automobile engineers play

They have

They are in charge of

Exercise 30. Write an e-mail to your friend about a forthcoming test of new mechanical devices applied at your plant.

PROJECT WORK

Exercise 31. Compile information about any field of engineering you are interested in and participate in the project. Give reasons why this field of engineering is of interest to you. Present the project to your group. You may use the following websites: www.williamsf1.com , www.segway.com , www.shadow.org.uk , www.arup.com/millenniumbridge , www.nano.org.uk.

ADDITIONAL READING

Exercise 32. Make a summary of the text using the following phrases:

1. The title of the text is...
2. The text is about... The text deals with...
3. The text covers such points as... first... second... third...
4. It should be underlined that...
5. In conclusion, I may say that...
6. To my mind... In my opinion...

MANKIND DEVELOPMENT ON THE BASIS OF SCIENTIFIC AND TECHNOLOGICAL PROGRESS

The current global state of engineering technologies reflects foremost the progress made during the 20th century. Striking results have been achieved in many fields, but there are also signs of a surging number of negative by-products — environmental pollution, accidents, ever-increasing depletion of global resources, etc. Thus, a new concept for scientific and technological progress is urgently required. It is to assure consistent development of the mankind on the basis of scientific and technological progress. Within this context, mechanical engineering plays a very important role.

Mechanical engineering is seen as the scientific and technological basis for new machinery enhancements due to the development and use of new materials and advanced technologies. The key goals of engineering are to create new machines that are streamlined in terms of efficiency, reliability, safety, economical and ecological performance.

In other words, machines should comply with high ecological and safety standards. It triggers development of new and advanced materials with properties such as high strength and stiffness, low density, high internal damping, high corrosion and wear resistance, and radiation stability. An example of this could be the common use of highly energy-efficient machines based on vibration action in mining and in the construction of roads and buildings. A lot of problems in different areas are to be solved within mechanical engineering.

Another tendency in modern engineering is to automate all production processes in order to reduce or eliminate hard physical labour, to increase productivity, to enhance the quality of products, and to ensure maximum output in production on large scale; to support or replace human intellectual work by using machines for solving logical problems. Mechanical engineering gained the lead in many engineering fields such as optimum machine design, computer-aided design (CAD), experimental mechanics, vibroacoustics, bio-mechanical systems comprising “man, machine and environment”, strength of materials, problems of reliability and wear resistance, engineering safety, environmental protection, and information technologies.

TEST 4

1. Choose the proper words and fill in the blanks.

1. ... *is the creative application of scientific principles to particular branch.*
A. engineering C. aerospace
B. civil engineering D. petroleum
2. *One who practices engineering is called*
A. a chartered engineer C. an engineer
B. a professional engineer D. a respected engineer
3. *Engineering encompasses ... branches.*
A. two C. four
B. three D. four main and other branches
4. *New fields are combined together with the traditional ones*
A. to form new branches C. to use new concepts
B. to advance existing D. to overlap
5. *In each new field, considerable ... exists.*
A. overlap C. breakthrough
B. gap D. cover
6. *Mechanical engineering is known as a branch of... .*
A. engineering C. aerospace
B. civil engineering D. industrial engineering
7. *Mechanical engineering uses core concepts for the entire life cycle of*
A. mechanical systems C. equipment
B. tools D. transport system
8. *Mechanical engineers pursue developments in such fields as*
A. composites C. nanotechnology
B. chemistry D. composites, mechatronics, nanotechnology

9. *Mechanical engineers design tools that other ... need for the work.*
 A. engineers B. scientists C. managers D. devices
10. *Mechanical engineers design, manufacture, and ... mechanical systems.*
 A. respect B. heat C. combine D. maintain

2. Fill in the blanks with the proper grammatical forms.

1. *It is a good question*
 A. to be discussed C. was discussed
 B. discuss D. discusses
2. *It must ... a very serious problem.*
 A. to be B. be C. been D. to being
3. *We will continue ... the tools.*
 A. to test B. test C. to be test D. have tested
4. *We need ... productivity.*
 A. increase C. are increasing
 B. to increase D. have increased
5. *They have ... mechanical systems.*
 A. maintain C. to be maintained
 B. to maintain D. maintaining
6. *They proceed ... on power-producing machines.*
 A. to be working C. to have worked
 B. works D. worked
7. *New fields have ... with the traditional fields.*
 A. to be combined C. combining
 B. combine D. to combine
8. *Chemical engineering began ... areas of nanotechnology.*
 A. to cover C. cover
 B. covered D. to be covering
9. *Mechanical engineering tries ... the core concepts of physics, mechanics, etc.*
 A. to have used C. to use
 B. used D. have use
10. *They should ... them in industrial equipment.*
 A. use B. is using C. to use D. to be used

3. The text contains different mistakes: 4 — in spelling, 3 — in grammar. Correct the mistakes and rewrite the text.

Mechanical engineering are a scientific and technical basis for machinery advancements. It is due to the fact that it use new materials and enhanced technologies. The main goals of engineering is to streamline machines in terms of efficiency, safety, reliability and ecological performance.

4. Answer these multiple-choice questions about engineering and mechanical engineering.

1. *What does 'engineering' mean?*
 - A. application of scientific principles to each particular engineering branch
 - B. type of industry widespread nowadays
 - C. knowledge
2. *What branches does engineering have?*
 - A. engineering education
 - B. electrical engineering devices
 - C. chemical, electrical, civil, and mechanical engineering
3. *What is mechanical engineering?*
 - A. branch of engineering
 - B. subject for discussion
 - C. core concept
4. *What does mechanical engineering use core concepts for?*
 - A. to analyse and design mechanical systems
 - B. to analyse, design, and manufacture mechanical systems
 - C. to analyse, design, manufacture, and maintain mechanical systems
5. *What other engineering branches does mechanical engineering overlap with?*
 - A. aerospace, mining, petroleum, marine engineering
 - B. aerospace, civil, electrical, and chemical engineering
 - C. aerospace, civil, electrical, petroleum, and chemical engineering.

Module 5

FLEXIBLE MANUFACTURING SYSTEMS

Vocabulary: exercises 1—7, 12—16.

Grammar (the Gerund): exercises 8—9, 17—19.

Reading: exercises 10, 11, 32.

Listening: exercise 20.

Speaking: exercises 21—26.

Writing: exercises 27—30.

Project Work: exercise 31.

Test 5.

KEY VOCABULARY

Exercise 1. Read and guess the meanings of the new words. If you have some difficulties, use the dictionary at the end of this book. It will help you to read and discuss the texts and dialogues, arrange the role-plays and present the projects.

- 1) *flexible manufacturing system (FMS)*. FMS is a manufacturing technology.
- 2) *to incorporate*. FMS incorporates a system view of manufacturing.
- 3) *to evolve*. The concept of FMSs went on evolving at that time.
- 4) *to succeed in*. Computerized numerical controls succeeded in bringing a controlled environment to the factory floor.
- 5) *numerically controlled, direct-numerically-controlled machines*. They managed to control the manufacture using numerically-controlled and direct-numerically-controlled machines.
- 6) *sophisticated material-handling systems*. Early FMSs contained sophisticated material-handling systems.
- 7) *incredibly*. Early FMSs were controlled by incredibly complex software.
- 8) *flexible cell*. The trend in FMS is towards small versions of the traditional FMS called flexible manufacturing cells (FMC).
- 9) *to introduce a wide scale automation*. The progress of computing machines allowed introducing a wide scale automation of all branches of industry.

- 10) *independent development*. The progress of computing machines led to independent development of automation process.
- 11) *computer-aided designing (CAD)*. Automated data processing includes automated control systems and computer-aided designing.
- 12) *computer-aided manufacturing (CAM)*. Automation of production technology includes numerically-controlled equipment, computer-aided manufacturing, and industrial robots.
- 13) *to be interconnected*. The various cells for machining are interconnected by an automated transport system.
- 14) *loading, unloading stations*. The various machining cells are interconnected via loading or unloading stations by an automated transport system.
- 15) *possibility*. This prospect of automation and flexibility presents the possibility of producing non-standard parts.
- 16) *competitive advantage*. They employ different competitive advantages to maintain a lead in this industry.
- 17) *to approach*. The general objectives of FMS are to approach the efficiencies and economies of mass production.
- 18) *small- and medium-lot-size production*. FMS maintains the flexibility required for small- and medium-lot-size production of variety of parts.
- 19) *to fall within*. Two kinds of systems for manufacturing fall within the FMS spectrum.
- 20) *generic*. A generic FMS consists of some components.
- 21) *set-up time, change-over*. A set of stations do not require significant set-up time or change-over between successive jobs.
- 22) *milling, boring, drilling*. These machines perform operations of milling, boring, drilling, etc.
- 23) *routing*. Computers direct the routing of jobs through the system.
- 24) *to be capable of*. Computers are capable of performing complex tasks.
- 25) *to track*. Computers track the status of all jobs in progress.
- 26) *to ensure*. A network of supervisory computers and microprocessors is to ensure that the right tools are available for the job.
- 27) *to provide the monitoring*. Computers provide the monitoring of correct performance of operations.
- 28) *to require attention*. Computers signal problems requiring attention.
- 29) *to make customizations*. Machines can be used to assemble different parts and to make customizations.
- 30) *to implement*. Several companies decided to implement flexible manufacturing systems.
- 31) *agility*. The common word for today's manufacturer is agility.

Exercise 2. Read the words following the rules of reading. *Pronounce correctly. Practise aloud.*

Incorporate, numerically-controlled, system, via, speed, succeed, routine, customer, track, handling, cell, process, incredibly, scale, control, flexible, complex, enhance, machine, change, approach, technology, equipment, nutshell, sophisticated, within, loading, milling, boring, drilling.

Exercise 3. Look at the following pairs of words and think if the underlined letters are pronounced in the same way, or if they are pronounced differently. Read aloud.

Final — machine, cells — control, numerically-controlled — customer, speed — succeed, could — without, human — under, manufacturing — computer, much — produce, incredibly — complex, scale — consider, process — computer.

Exercise 4. Read the international words, mind the stress.

Computer, control, technology, philosophy, concept, system, version, machine, group, product, problem, central, component, operation, result, cooperation, material, final, automation, complex, instruction, signal.

Exercise 5. Try to enrich your vocabulary:

a) analyse the following words with different suffixes and divide them into two groups — nouns and adjectives:

numerical, technological, automation, operation, flexibility, possibility, arrangement, conversion, requirement, different, flexible, numerical, environment, expensive, version, traditional, development, industrial, various, famous, production, significant, computer, instruction, station, performance;

b) make up as many words as you can by combining different parts of the words:

re-	move	-or/er	-ly
	operate	-ance	
	perform	-tion	
	tradition	-al	
	develop	-ment	

Exercise 6. Divide the following words into two groups, those which belong to a) automated data processing; b) automation of production technology.

Computer-aided manufacturing, industrial robots, automated control systems, CAM, computer-aided design, numerically-controlled equipment, CAD.

Exercise 7. Think over the definitions of the words which appear in the texts and dialogues and then:

a) agree or disagree with the following definitions

1. *FMS (flexible manufacturing system)* is a manufacturing system in which there is some amount of flexibility that allows the system to react in the case of changes, whether predicted or unpredicted.

2. *CNC (computer numerical control)* is the method of controlling machines by the application of digital electronic computers and circuitry (design or detailed plan for an electric circuit).

3. *Agile manufacturing* is the manufacturing that has created the processes, tools, to respond quickly to customers' needs and market changes while still controlling costs and quality.

4. *Flexible* means able to make changes or to deal with the situation that is changing.

5. *A network* is a set of computers that are connected to each other so that each computer can send and receive information to and from other computers.

b) match each word with its correct definition

scale, system, manufacture, robot, component

1. A machine that can do work by itself.

2. One of the different parts that a machine or piece of equipment consists of.

3. A set of connected things that work together for a particular purpose.

4. The size of something, especially when it is big.

5. The process of making goods in large quantities in a factory.

c) find the definitions for some other words which you consider to be important for the topic "Flexible Manufacturing Systems". Use the website www.macmillandictionaries.com

EXPLORING GRAMMAR

Exercise 8. Read the sentences, point out the gerund. Give the Russian equivalents. If you have some difficulties, use the grammar reference at the end of the book.

1. By changing the speed of machining they significantly increased the performance. 2. We apply different technologies for performing two or more functions simultaneously. 3. They have to analyse manufacturing of automobiles. 4. You may use these technologies for maximizing the performance of the machines. 5. We are interested in producing non-standard parts. 6. It is worth installing new machinery. 7. On checking the set of work stations we found

the reason of their failure. 8. Providing monitoring of operations we identified the problems requiring special attention. 9. They are thinking of saving huge amounts of money by switching to flexible manufacturing systems. 10. They missed the opportunity of producing low quality products.

Exercise 9. Make up your own sentences according to the models.

Model A: *They designed that model. They did not use the computer.
They designed that model without using the computer.*

1. They assembled the car parts. They did not use FMS. 2. They improved the processes. They did not increase the price. 3. They performed different operations. They did not make production more flexible. 4. They controlled the production. They did not apply incredibly complex software. 5. They tried to attach doors to the car. They did not use special equipment.

Model B: *When they introduced wide scale automation, independent automation processes began to develop.
On introducing wide scale automation, independent automation processes began to develop.*

1. When we came to the plant, we installed new machinery. 2. When they returned to the workshop, they installed the necessary equipment. 3. When the idea of FMS was proposed, computerized numerical controls succeeded in bringing a controlled environment to the factory floor. 4. When they started to use FMS, they increased the number of units produced per hour. 5. When they completed the manufacturing, they faced many problems.

READING

Exercise 10. Read the text, try to focus on its essential facts and choose the most suitable heading given below for each paragraph.

- 1) FMS Is an Automated Production System
- 2) Early FMSs
- 3) Modern FMSs
- 4) Generic FMS Components

FLEXIBLE MANUFACTURING SYSTEM

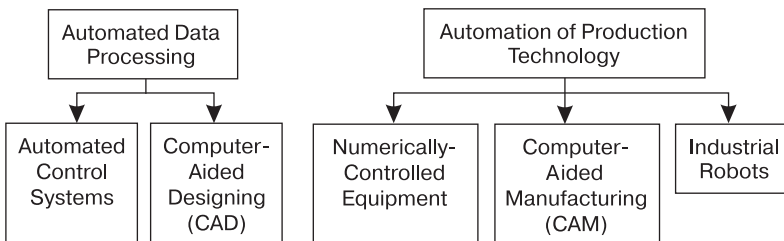
Flexible Manufacturing System (FMS) is famous for being both a manufacturing technology and a philosophy. “System” is the key word for a flexible manufacturing system. FMS incorporates a system view of manufacturing. The FMS idea was proposed in England (1960s) under the name “System 24”. It was a flexible machining system that could operate without human operators 24 hours a day but being controlled by a computer.

The concept of flexible manufacturing systems went on evolving at that time when robots, programmable controllers, and computerized numerical controls succeeded in bringing a controlled environment to the factory floor in the form of numerically-controlled and direct-numerically-controlled machines. Early FMSs were large and very complex, consisting of dozens of Computer Numerical Controlled machines (CNC) and sophisticated material-handling systems. They were too expensive and they were controlled by incredibly complex software.

Currently, the trend in FMS is towards small versions of the traditional FMS, called flexible manufacturing cells (FMC). Today two or more CNC machines are considered a flexible cell and two or more cells — a flexible manufacturing system. The progress of computing machines allowed to introduce a wide scale automation of all branches of industry and led to independent development of automation processes:

- Automated Data Processing: the appearance of Automated Control Systems and Computer-Aided Designing (CAD);
- Automation of Production Technology: the appearance of Numerically-Controlled Equipment, Computer-Aided Manufacturing (CAM) and Industrial Robots.

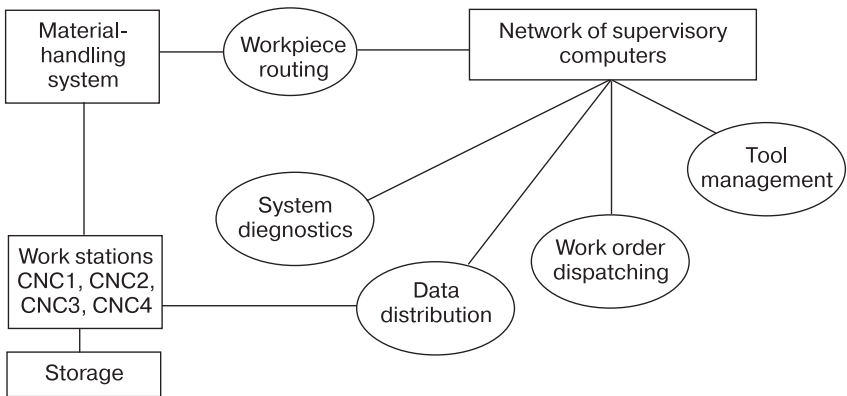
Thus, a flexible manufacturing system is a group of numerically-controlled machine tools, interconnected by a central control system. The various cells for machining are interconnected via loading and unloading stations by an automated transport system. Simply defined, it is an automated production system that produces one or more families of parts in a flexible manner. Today, this prospect of automation and flexibility presents the possibility of producing non-standard parts to create a competitive advantage. Stated formally, the general objectives of FMS are to approach the efficiencies and economies of mass production, and to maintain the flexibility required for small- and medium-lot-size production of a variety of parts. Two kinds of systems for manufacturing fall within the FMS spectrum: assembly systems for assembling components into final products and systems of forming, which actually form components or final products.



General trends of automation

A generic FMS consists of the following components:

- a set of work stations which contain machine tools that do not require significant set-up time or change-over between successive jobs; typically, these machines perform operations of milling, boring, drilling, etc.;
- a material-handling system allowing to move between any pair of machines so that any job routing can be followed;
- a network of supervisory computers and microprocessors which are capable of performing some or all of the following tasks: directing the routing of jobs through the system; tracking the status of all jobs in progress so it is known where each job is to go next; passing instructions for the processing of the operation to the station; ensuring that the right tools are available for the job; and providing the monitoring of correct performance of operations and signaling problems requiring attention;
- a storage, locally at the work stations, and (or) centrally at the system level.



Generic FMS

Exercise 11. Agree or disagree with the following statements.

1. FMS is both a manufacturing process and a philosophy. 2. Early FMSs were small with several CNC machines. 3. Today two or more CNC machines are thought of being a flexible cell and two or more cells make up a flexible manufacturing system. 4. FMS is a group of numerically-controlled machine tools interconnected by a central control system. 5. The main components of FMS are: a set of workstations with machine tools, a material-handling system, a network of supervisory computers and storage.

KEY VOCABULARY DEVELOPMENT

Exercise 12. Match the words in column A with the words in column B to form meaningful phrases and then identify them at the sentence level in the text. It will help you understand the text in detail.

A	B
1) controlled	a) software
2) various	b) system
3) sophisticated	c) scale
4) wide	d) environment
5) flexible	e) controllers
6) programmable	f) robots
7) human	g) controls
8) numerical	h) operator
9) manufacturing	i) technology
10) industrial	j) cells

Exercise 13. Decide which of the verbs on the left collocate with the nouns on the right and then identify the word combinations at the sentence level in the text. It will help you understand the text precisely.

1) to incorporate	a) system
2) to propose	b) changes
3) to assemble	c) tools
4) to require	d) functions
5) to perform	e) change-over
6) to interconnect	f) idea
7) to respond to	g) parts
8) to present	h) components
9) to provide	i) environment
10) to produce	j) possibility

Exercise 14. Try to enrich your vocabulary:

a) find words in the text which have the same meanings as the following words:

main, to continue, to develop, complex, nowadays, adaptable, information, different, manufacture, purpose, type, to include, to fulfil, through, work, considerable;

b) find words in the text whose meanings are opposite to the meanings of the following words:

unknown, indirect, modern, simple, cheap, less, standard, beyond, disadvantage;

c) replace the words in italics with the words with similar meanings:

1. We are to install a set of work stations containing machine tools which do not require *considerable* set-up time or change-over between successive jobs. 2. They were automated, too expensive and controlled by incredibly *complex* software. 3. They *continue* installing the equipment. 4. There are *different* tools in the workshop. 5. The system *includes* some components.

Exercise 15. Complete the sentences: change the word in capitals at the end of each sentence to form a word that fits suitably in the blank space.

1. The general objectives of FMS are to approach the ... and economies of mass production and to maintain the flexibility required for small- and medium-lot-size production of a variety of parts EFFICIENT.

2. It provides essential monitoring of correct ... of operations and signals problems which require attention PERFORM.

3. It led to ... development of automation processes DEPEND.

4. FMS is an automated ... system PRODUCT.

5. It led to the ... of automated control systems APPEAR.

Exercise 16. Insert the words at the sentence level: fill in the blanks with the missing words (the first letter of each word is given).

1. Early FMSs were large and very complex, consisting of dozens of C... N... C... machines (CNC) and s... material-handling systems. 2. A material-handling system is automated and f... . 3. Supervisory computers and micro-processors p... different tasks. 4. FMS i... a system view of manufacturing. 5. The concept of FMS went on e... . 6. Computerized numerical controls s... in bringing a controlled environment to the factory floor. 7. Early FMSs were controlled by i... complex software. 8. The progress of computing machines allowed introducing a wide s... automation of all branches of industry. 9. Flexibility presents the p... of producing non-standard parts. 10. Two kinds of systems for manufacturing fall w... the FMS spectrum.

GRAMMAR DEVELOPMENT

Exercise 17. Point out the sentences with the gerund in the text and provide the Russian equivalents. It will help you understand the text in detail.

Exercise 18. Fill in the blanks to streamline the use of the gerund. The words in brackets are given to help you.

1. The microprocessors are capable of ... several functions (to perform). 2. FMS is famous for ... a manufacturing technology (to be). 3. FMS incor-

porates a system view of ... (to manufacture). 4. The concept of FMS continued ... (to evolve). 5. ... the monitoring of operations is very important (to provide).

Exercise 19. Make up sentences according to the model to practise the use of the gerund.

Model: *Прочитав эти данные, они рассмотрели вопрос о совершенствовании системы.*

After reading these data they decided to upgrade this system.

1. Изучив данные о применении нового оборудования, производители решили установить новые станки с числовым управлением на все производственные линии. 2. Прочитав информацию о ГАП (гибкое автоматизированное производство), они изменили свое решение. 3. После того как идея ГАП была представлена, она продолжала развиваться. 4. После того как производители изучили все недостатки и преимущества этой системы, они были готовы поддержать новый проект. 5. После того как он рассмотрел схему, он мог назвать компоненты этой системы.

LISTENING

Exercise 20. Listen to the text “FMS in the Automobile Industry”.

Before listening: mind the words and phrases given to comprehend better the information you are going to listen to.

To sacrifice — жертвовать;
to reduce expenses — уменьшать затраты;
to attach — прикреплять, монтировать;
approximately — приблизительно;
to estimate — подсчитать;
updated models — современные модели;
to assemble — производить сборку;
to speed up — ускорять;
to bring down the price — уменьшать цену.

After listening: agree or disagree with the following statements and add some more information if needed.

1. The main goal of FMS is to offer fast adaptation of manufacturing processes to changing market environment without sacrificing the quality. 2. Manufactures are unlikely to save money by using FMS. 3. The same line and equipment can be used to attach doors to any type of vehicle, having

done some simple adjustments. 4. Ford Motor Company managed to save substantial amount of money through using new systems. 5. Flexible machines speed the processes up, improve customer satisfaction, and bring the price down.

SPEAKING

Exercise 21. Share your vision of FMS using the following phrases: to my mind, in my opinion, if I am not mistaken, as far as I remember, it seems to me, etc.

1. What is FMS?
2. When did the idea of FMS appear?
3. What kind of machines were the first FMSs?
4. What is a flexible cell?
5. How are the various machining cells interconnected?
6. What is the prospect for the automation and flexibility if any?
7. What are the goals of FMS?
8. What are the main components of a generic FMS?

Exercise 22. Make up general and disjunctive questions, and answer them according to the models to enhance your speaking skills.

Model A: *FMS incorporates a system view of manufacturing.*

Does FMS incorporate a system view of manufacturing? — Yes, it does.

FMS incorporates a system view of manufacturing, doesn't it? — Yes, it does.

1. FMS consists of several CNC machines and material handling systems. 2. FMS incorporates two or more cells. 3. Central control system interconnects a group of numerically-controlled machine tools. 4. Automated production system produces one or more families of parts in a flexible manner. 5. The prospect presents the possibility of producing non-standard parts.

Model B: *FMSs create a competitive advantage.*

Do FMSs create a competitive advantage? — Yes, they do.

FMSs create a competitive advantage, don't they? — Yes, they do.

1. Flexible machining systems operate without being controlled by a person. 2. FMSs approach efficiencies and economies of mass production. 3. FMSs maintain the flexibility required for small-size production. 4. Work stations contain machine tools, performing such operations as milling, boring, drilling, etc. 5. Computers and microprocessors perform several tasks.

Exercise 23. Make up special questions according to the models, and answer them to streamline your speaking skills.

Model A: *FMS allows the system to react in case of changes.*

What does FMS allow?

1. Agile manufacturing creates the processes and tools, responding to customers' needs and market changes. 2. FMS adapts manufacturing with relative ease. 3. Company estimates risks before attempting to use a new approach for their operations. 4. This system minimizes labour costs. 5. The new approach calls for changing the corporate culture.

Model B: *One of the main benefits of FMS is to adapt the processes to new requirements.*

What is one of the main benefits of FMS?

1. The common word for today's manufacture is "agility". 2. Agile manufacturing is the fastest on the market. 3. FMS is simply one of the ways to achieve this agility. 4. FMS is a right option. 5. The final result is efficient operation.

Exercise 24. Ask questions and use the words in italics in your answers. The words in brackets will help you.

1. *FMS* is a *manufacturing* technology (what, what kind of). 2. *The idea of FMS* was proposed *in England in 1960s* (what, where, when). 3. *Supervisory computers* and microprocessors correct performance of operations and signal *about problems* (what, what kind of, what about). 4. These *systems* assemble *components* into *final* products (what, what, what kind of). 5. *Computers* track *the status of all jobs* in process (what, what, what kind of).

Exercise 25. Read the following dialogue, sum up the information and act out a similar dialogue.

FMS APPLICATION

A.: Today we hear about flexible manufacturing systems more and more often. Could you, mr Smith, clear up the situation about this system, please!

B.: With great pleasure! As you know, our company is doing its best to streamline the manufacturing processes. One of the potential to do is to make production more flexible.

A.: What does it mean? What do you mean saying "to make production more flexible?" How can you make it more flexible?

B.: Well, em... In short, our equipment can be used for more than one purpose, though they may be somewhat related. The equipment is often used to make customized parts, or make different parts for different models of product.

A.: Really? If I've got it right, in some cases, the machines may not only be used to produce or assemble different parts for different models, but to make customizations.

- B.: Yes, that's it! And in terms of automobile industry potential savings are incredibly huge! Just some facts if you don't mind!
- A.: Sure! It'll be super!
- B.: Ford's decision to implement flexible manufacturing systems in 2004 helped them avoid a financial crisis. Ford didn't need any federal help.
- A.: I guess that more and more automobile makers are likely to switch to flexible manufacturing technology, as any other type of industry is likely to do that can use it.
- B.: You are quite right! Moreover any significant amount of money could be saved in the manufacturing process, and it would likely result in more job security for our citizens.
- A.: Thanks a lot, Mr Smith! I'm pretty sure this information will be of great help for everyone who deals with manufacturing processes.
- B.: Thank you for your greatest concern about the production sector. Nice to meet you! Good-bye!

Exercise 26. Role-play the following situations.

1. You are at the International scientific conference for the first time. Ask about main automation processes implemented in different industrial fields.
2. You meet a famous Australian scientist and discuss with him why the manufacturers are interested in developing FMSs.

WRITING

Exercise 27. Complete the following sentences in a logical way.

1. FMS is a manufacturing system famous for...
2. FMS is a philosophy the key word of which is...
3. FMS incorporates a system view of...
4. The idea of FMS was proposed under the name...
5. Early FMSs were large and very complex, consisting of...
6. A flexible cell consists of two or...
7. FMS is a group of numerically-controlled machine tools, interconnected by...
8. The machining cells are interconnected via stations of loading and ... by...
9. The prospect of automation and flexibility presents the possibility of producing...
10. The general objectives of FMS are to approach the efficiencies and economies of mass production and to maintain...
11. FMS consists of the following components: ...

12. A set of work stations contains machine tools that...
13. A material-handling system allows to move between...
14. Supervisory computers and microprocessors are capable of performing such tasks as...
15. One of the most common examples of FMS can be seen in...

Exercise 28. Translate the following sentences from Russian into English. You will have a story on the topic as a pattern.

1. Гибкая производственная система (ГПС) — это интегрированный комплекс станков с числовым программным управлением (ЧПУ). 2. ГПС состоит из разных сочетаний гибких производственных модулей и (или) гибких производственных ячеек. 3. Гибкая производственная ячейка является совокупностью нескольких гибких производственных модулей, управляемых средствами вычислительной техники. 4. Гибкая производственная ячейка (ГПЯ) способна работать автономно. 5. Основной характеристикой ГПЯ является то, что она способна работать не только автономно, но и в составе ГПС. 6. В состав ГПС входят ГПЯ, автоматическая складская и транспортная система, система автоматизированного управления. 7. Система обладает свойством автоматизированной переналадки при изменении программы производства изделий. 8. ГПС может изготавливать мелкосерийные и среднесерийные единичные изделия. 9. Эта система нацелена на удовлетворение нужд конкретного потребителя. 10. ГПС быстро реагирует на изменения на рынке. 11. Внедрение ГПС на начальном этапе обходится дороже, чем установка обычного оборудования. 12. Общеизвестный факт, что конечной целью производителя является снижение затрат. 13. ГПС нацелена на экономию средств производителя и направлена на конкретного потребителя. 14. Применение ГПС может ускорить производственные процессы. 15. Использование ГПС позволяет снизить цену на изделие.

Exercise 29. Make up your own story about FMS according to the following points of the plan. The words and phrases are supposed to make your story logical and interesting.

1. *What Is FMS?*

FMS is

Early FMSs were

The trend is

2. *The Definition of FMS*

FMS is

Simply defined, it is

The prospect of automation and flexibility presents

The general objectives of FMS are

3. *The Main Components of FMS*

A set of work stations contains

A material-handling system does not require

A network of supervisory computers is capable of

Storage is performed

Exercise 30. Write an e-mail to your friend about your visit to the plant accommodating automated cells for milling, drilling, and other operations.

PROJECT WORK

Exercise 31. Compile information about FMS and participate in a project. Give reasons why this field is of great interest to you as a future engineer. Present the project to your group. You may use the following websites: www.magnetomotion.com , www.ikaprocess.com, www.atab.se

ADDITIONAL READING

Exercise 32. Make a summary of the text using the following phrases:

1. The title of the text is...
2. The text is about... The text deals with...
3. The text covers such points as... first... second... third...
4. It should be underlined that...
5. In conclusion, I may say that...
6. To my mind... In my opinion...

FMS BENEFITS AND DRAWBACKS

A flexible manufacturing system (FMS) is an approach to arranging the production effort of a business so that it is possible to change or adapt manufacturing policies and procedures with relative ease. The idea behind this type of flexibility is often to allow the business to anticipate and shift priorities depending on innovations in technology or shifts in demand for the company's products. There are some benefits and liabilities associated with a flexible manufacturing system that should be considered before attempting to use this approach for company operations.

One of the main benefits of a flexible manufacturing system is the change to adapt the operation to meet emerging demands for certain products by customers. Doing so can aid the business in capturing a significant market share

and enjoying increased revenues for as long as the demand for those products remains in place. For example, a textile plant that operates with a flexible manufacturing system may be able to adapt quickly carding and spinning machinery to accommodate the production of corduroy instead of terry cloth, if the general public begins to demand more clothing made with corduroy, then shift back to the production of terry cloth once the trend has subsided. Another advantage of a flexible manufacturing system is the chance to minimize labour costs during seasonal downturns, and then to increase the labour force during busy seasons. This approach can be achieved by cross training employees who can take on additional responsibilities during lean seasons, and then turn a portion of those responsibilities over to part-time personnel during busy seasons. The end result is efficient operation that still helps keep the cost of production for each unit produced under a certain level.

While there are some benefits of a flexible manufacturing system, there are also a few potential drawbacks that should be taken into consideration. Converting to this type of arrangement often has a significant up-front cost, since machinery may have to be modified to allow for an easier conversion of goods produced. This approach also often calls for changing the corporate culture, a process that can take a lot of time and result in some loss of efficiency in the short-term. Technological barriers may also slow the efforts to be more adaptable, requiring additional planning to overcome those obstacles and creating additional expense for the company. Before deciding that a flexible manufacturing system is the right option, company owners should weigh the benefits against the liabilities and decide if the effort will ultimately be in the best interests of the company.

The common word for today's manufacturer is "agility". An agile manufacturer is one who is the fastest on the market, operates with the lowest total cost and has the greatest ability to "delight" its customers. FMS is simply one of the ways for manufacturers to achieve this agility.

TEST 5

1. Choose the proper words and fill in the blanks.

1. *FMS is*

A. a technology

C. a cell

B. an idea

D. a manufacturing technology and a philosophy

2. *The idea of FMS was proposed under the name*

A. "system 24"

C. "system 01"

B. "system 12"

D. "system 007"

3. *Early FMSs were...*
 - A. internal
 - B. electrical
 - C. chemical
 - D. large and very complex
4. *Two or more CNC machines are...*
 - A. a flexible cell
 - B. a flexible element
 - C. FMS
 - D. a set of CNC
5. *Two or more cells are ...*
 - A. FMS
 - B. a set of cells
 - C. a control system
 - D. a handling system
6. *FMS is a group of ...*
 - A. NC machine tools
 - B. CNC
 - C. control system
 - D. automated controllers
7. *The prospect of flexibility is to produce ...*
 - A. non-standard parts
 - B. defective parts
 - C. spare parts
 - D. units
8. *Supervisory computers signal about ...*
 - A. problems
 - B. shortage
 - C. assessment
 - D. report
9. *An agile manufacturer is ... manufacturer on the market.*
 - A. the fastest
 - B. the slowest
 - C. the shortest
 - D. the lowest
10. **FMS allows to achieve ...**
 - A. agility
 - B. barriers
 - C. obstacles
 - D. labour force

2. Fill in the blanks with the proper grammatical forms.

1. *They succeeded in ... controlled environment in the form of NC and CNC machines.*
A. to bring B. bringing C. brought D. was brought
2. *Two or more CNC machines are thought of a flexible cell.*
A. is B. are C. being D. been
3. *Their tasks are*
A. tracking and monitoring C. be and do
B. track and monitor D. cut and signal
4. *The automobile industry keeps on ... money by using FMSs.*
A. saves B. saving C. being saved D. was saving
5. *... machines can not only speed the process up, but bring the price down.*
A. To use B. Using C. Is used D. Having used

6. *The idea of FMS went on ...* .
A. evolving B. evolve C. having evolve D. was evolving
7. *They succeed in ... a controlled environment to the factory floor.*
A. to bring B. bringing C. having bring D. bring
8. *We entered the hall without ...* .
A. to be seen B. is seen C. was seen D. being seen
9. *This car needs ...* .
A. to repair B. repairing C. is repairing D. have been repaired
10. *This film is worth ...* .
A. see B. seeing C. is to seen D. to seeing

3. The text contains different mistakes: 2 — in spelling, 4 — in grammar. Correct the mistakes and rewrite the text.

One of the ideas behind FMS are allowing the business to forsee and to prioritize the goals of inovations in technology. Technological barriers are involve in slowing the efforts of be more adaptable. It require additional planning to cope with these obstacles.

4. Answer these multiple-choice questions about FMS.

1. *What does the word FMS mean?*
A. a manufacturing system
B. a sequence of operations
C. knowledge
2. *What is CNC?*
A. a method of controlling machines
B. a system of knowledge
C. an intraorganizational cooperation
3. *What is a flexible cell?*
A. a new trend
B. parts
C. two or more CNC machines
4. *What is FMS?*
A. two or more cells
B. machine tools
C. work stations
5. *What is the goal of the agile manufacturing?*
A. to quickly respond to needs and market changes
B. to arrange inventory management
C. to install a material handling system

Module 6

COMPUTERS

Vocabulary: exercises 1—7, 12—16.

Grammar (the Participle I, II): exercises 8—9, 17—19.

Reading: exercises 10, 11, 32.

Listening: exercise 20.

Speaking: exercises 21—26.

Writing: exercises 27—30.

Project Work: exercise 31.

Test 6.

KEY VOCABULARY

Exercise 1. Read and guess the meanings of the new words. If you have some difficulties, use the dictionary at the end of this book. It will help you to read and discuss the texts and dialogues, arrange the role-plays and present the projects.

- 1) *to embed.* Computers have deeply embedded in our lives.
- 2) *analog computer, digital computer.* We can speak about analog computers and digital computers.
- 3) *to measure a quantity.* Analog computers worked with physical quantities, such as weight, speed, temperature. They solve problems by measuring a quantity in terms of another quantity.
- 4) *to deal with numbers.* Digital computers deal with numbers.
- 5) *at the appropriate time.* A memory unit stores information and makes it available at the appropriate time.
- 6) *random-access memory (RAM), read-only memory (ROM).* The memory consists of the two main parts called the primary memory — RAM and the secondary memory — ROM.
- 7) *to perform calculations.* An arithmetic-logical unit performs calculations.
- 8) *processing unit.* The term “computer” refers to the central processing unit (CPU).
- 9) *to issue commands.* The central processing unit issues commands to other parts of the system.

- 10) *to be termed*. An input/output unit is collectively termed I/O.
- 11) *to insert, to remove*. An input/output unit inserts data into a machine and removes data from it.
- 12) *hardware*. The visible units are physical components of a data processing system, or hardware.
- 13) *to house the motherboard*. The case or chassis houses the motherboard.
- 14) *systems software, application software*. Software programmes are of two types: system software and application software.
- 15) *indispensable, irreplaceable*. Computers have become indispensable and irreplaceable in many spheres of our life.

Exercise 2. Read the words following the rules of reading. Pronounce correctly. Practise aloud.

Computer, control, impossible, processing, command;
 performing, information, storage, formulae;
 system, keyboard, youth;
 about, application, called, parts;
 instructions, unit, further, put, function;
 issuing, precisely, item;
 feed, need, keep, speed;
 society, scientific;
 means, greater, widespread, read (read, read), measure, increasing;
 obtain, main;
 arithmetic, together, motherboard.

Exercise 3. Look at the following pairs of words and think if the underlined letters are pronounced in the same way, or if they are pronounced differently. Read aloud.

Amount — mouse; but — business; appropriate — intermediate; since — science; device — final; system — by; all — actions; machine — semiconductor; circuit — third; further — adjustment; media — voicemail.

Exercise 4. Read the international words, mind the stress.

Modern, manual, computer, idea, calculate, mathematician, automatic, control, progress, electronics, commercial, terminal, instruction, winchester, disc, result, component, industry, business, scanner, service, voicemail, machine, automatic, system, analog, communication, operation, primitive, data.

Exercise 5. Try to enrich your vocabulary:

- a) analyse the following words with different suffixes and divide them into two groups — nouns and adjectives:

specialist, general, important, memory, advantage, regular, digital, calculation, available, additional, electronic, visible, processor, communication, basic, numerical, information, computation, initial, likeness, performance, visual, magnetic, arithmetic, general, logical, storage, solution, environment, scanner, adaptable, printer;

b) make up as many words as you can by combining different parts of the words:

non-	digit	-ize	-er/-or
un-	adapt	-al	-tion
ir-	standard	-able	
in-	replace	-ive	
	put		

Exercise 6. Divide the following words into two groups, those which describe a) computer systems; b) functional units of the computer.

Analog, input/output devices, control unit, measurement, application software, digital, software, arithmetic-logical unit, programmes, system programmes, memory, pocket computer, notebook, central processing unit.

Exercise 7. Think over the definitions of the words which appear in the texts and dialogues and then:

a) agree or disagree with the following definitions

1. *Computer* is a programmable machine that can store, retrieve, and process data.
2. *Memory* is a physical device to store such information as data or programmes on a temporary or permanent basis.
3. *Hardware* is mechanical and electronic parts that constitute a computer system, as distinguished from the computer programmes that drive the system.
4. *CPU (central processing unit)* is a principal part of any digital computer system, generally composed of the main memory, a control unit and an arithmetic-logical unit.
5. *Data processing* is manipulation of data by a computer.

b) match each word with its correct definition

character, data, to feed, random, to house

1. Information given in the form of characters.
2. A written language symbol.
3. To place, to locate something.
4. To insert information into the computer.
5. Chosen or happening without any particular method, pattern or purpose.

- c) find the definitions for some other words which you consider to be important for the topic “Computers”. Use the website www.macmillandictionaries.com.

EXPLORING GRAMMAR

Exercise 8. Read the sentences, point out Participle I and Participle II. Give the Russian equivalents. If you have some difficulties, use the grammar reference at the end of the book.

1. When entering the Internet, I always find the required information. 2. If compared with the analog computer, digital computers have other functions. 3. When used, voltage represents other physical quantities in analog computers. 4. While dealing with discrete quantities, digital computers count rather than measure. 5. At the moment our computer systems are inputting, storing, processing, controlling, and outputting data. 6. Combined capabilities of both analog and digital computers belong to hybrid computers. 7. Having finished the research, they analysed the data obtained. 8. Having translated the programme into the machine language, he put it into a computer. 9. Having been well prepared for the test, postgraduates managed to answer all the questions the tutor asked them. 10. When entering data correctly into the computer system, they avoid the need for further adjustments by a person.

Exercise 9. Make up your own sentences according to the models.

Model A: *When properly programmed, computers don't err.*

Having been properly programmed, computers don't err.

1. When well regulated, the equipment operates well. 2. When documents correctly filled in, they don't need extra checks. 3. When loaded, the numbers are stored on the platforms of storage. 4. When loaded with cargo, cars can move between stations. 5. When moved, the ball located on the bottom side of the mouse turns rollers.

Model B: *A smartphone is a mobile phone that offers a more advanced computing ability.*

A smartphone is a mobile phone offering a more advanced computing ability.

1. A smartbook is a concept of a mobile device that falls between smartphones and netbooks. 2. A smartbook is a gadget that delivers features found in smartphones. 3. BlackBerry is a line of mobile e-mail that functions as a Personal Digital Assistant (PDA). 4. Twitter is a social and micro blogging service that enables users to send and read other users' messages called tweets. 5. An iPhone is a camera phone that includes text messages, visual voicemail, a portable media player, and web browsing facilities.

READING

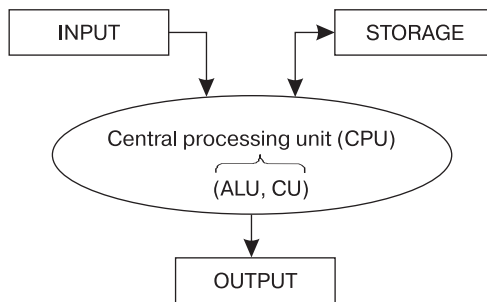
Exercise 10. Read the text, try to focus on its essential facts and choose the most suitable heading given below for each paragraph.

- 1) Hardware
- 2) CPU
- 3) Software
- 4) The Functional Units of the Computer
- 5) Input/Output Devices
- 6) Memory

COMPUTER LITERACY

A computer is one of the most important items society possesses today. Computers have deeply imbedded in our lives, so we can hardly imagine our life without them. But what is a computer? What are the main parts of this gadget? Let's try to sort it out. As we know, all computer systems perform functions of inputting, storing, processing, controlling, and outputting. So, there should be units performing these functions. The functional units of a digital computer are:

- storage or memory — to store information and make it available at the appropriate time;
- arithmetic-logical unit (ALU) — to perform the calculations;
- control unit (CU) — to control and coordinate data movements within the central processing unit (CPU), between the CPU and the other components of the computer system;
- input/output unit (collectively termed I/O) — to insert data into a machine or to remove them from it for further consideration.



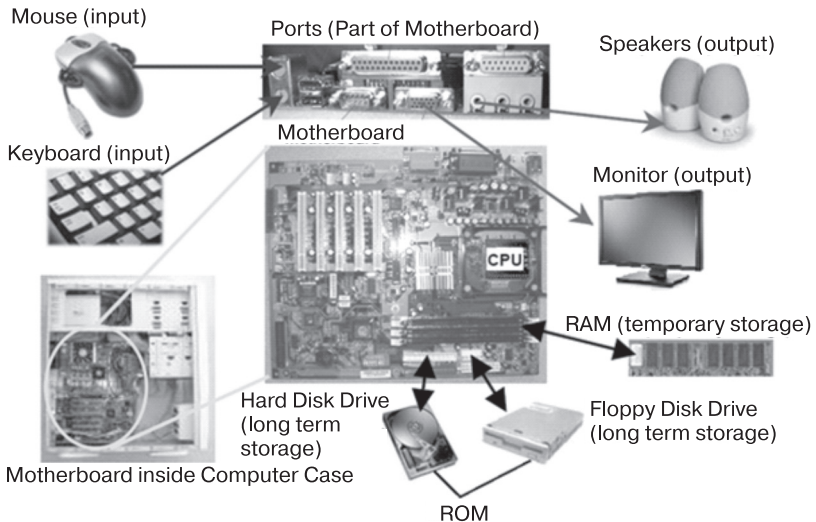
Functional units of a computer

Speaking more precisely, “computer” refers to the central processing unit together with the internal memory. The CU and ALU are collectively known as CPU. The CPU coordinates all the actions performed by various compo-

nents of the computer, by issuing commands to other parts of the system and by acting on responses.

The memory, one of the basic components, is often called storage. It stores calculation programmes, calculation formulae, initial data, intermediate and final results. Generally, memory consists of two main parts called the primary, or internal memory (RAM), and the secondary, or external memory (ROM). The advantage of the primary memory is an extremely high speed. The secondary memory in its turn has a comparatively low speed, but it can store a far greater amount of information than the primary memory.

Now if we look at the computer, what can we see? The case, or chassis, houses the following units: motherboard holding the CPU and physically connecting all the other main parts of the computer; HDD (hard disc drive, commonly called “winchester” in the youth slang); and a power supply unit. The visible units are physical components of a data processing system, or hardware.



Relationship between 4 parts of the computer

Not visible is the software. Software programmes are of two types: system software and application software. System software is the programmes designed to control the operation of a computer system. They do not solve specific problems. Application software is the programmes written to solve specific tasks.

Output devices rendering information in the form of words, sounds, and pictures are a monitor, printers, speakers, etc. Input devices, enabling infor-

mation to pass into a computer are a keyboard, a mouse, scanners, digital cameras, sound cards, etc.

Exercise 11. Agree or disagree with the following statements.

1. Computers have deeply embedded into our lives. 2. All computers perform functions of inputting, storing and controlling. 3. The functional units are storage, a control unit, and input/output. 4. The memory is often called storage. 5. The visible units are hardware, whereas invisible ones are software.

KEY VOCABULARY DEVELOPMENT

Exercise 12. Match the adjectives in column A with the nouns in column B to form meaningful phrases and then identify them at the sentence level in the text. It will help you understand the text in detail.

A	B
1) appropriate	a) speed
2) functional	b) results
3) digital	c) units
4) internal	d) time
5) initial	e) information
6) high	f) tasks
7) specific	g) memory
8) intermediate	h) computer
9) available	i) components
10) various	j) data

Exercise 13. Decide which of the verbs on the left collocate with the nouns on the right and then identify the word combinations at the sentence level in the text. It will help you understand the text precisely.

A	B
1) to control	a) problems
2) to solve	b) operations
3) to insert into	c) parts
4) to imagine	d) information
5) to connect	e) data
6) to remove	f) calculations
7) to perform	g) units
8) to house	h) life
9) to store	i) machine
10) to issue	j) commands

Exercise 14. Try to enrich your vocabulary:

a) find words in the text which have the same meanings as the following words:

significant, to name, device, to fulfil, to insert, parts, storage, different, to contain, to join, to keep, exactly, basic, to get;

b) find words in the text whose meanings are opposite to the meanings of the following words:

with, to input, beyond, external, into, approximately, final, low, disadvantage, hardware, invisible;

c) replace the words in italics with the words with similar meanings:

1. What are the *basic parts* of this *device*? 2. An arithmetic-logical unit *fulfils* the calculations. 3. The case *contains* several units. 4. The motherboard *joins* the main parts of the computer. 5. Output devices *present* information in the form of words, sounds, and pictures.

Exercise 15. Complete the sentences: change the word in capitals at the end of each sentence to form a word that fits suitably in the blank space.

1. A ... computer deals with numbers DIGIT.
2. An input unit inserts data into a machine for further ... CONSIDER.
3. A computer has several ... units FUNCTION.
4. The secondary memory has a ... low speed COMPARE.
5. The secondary memory can store a far ... amount of information GREAT.

Exercise 16. Insert the words at the sentence level: fill in the blanks with the missing words (the first letter of each word is given).

1. The memory, one of the basic components, is also called s... . 2. M... stores programmes and formulae. 3. The C... coordinates all functions of the computer. 4. The memory consists of RAM and R... . 5. The C... and ALU are known as the CPU. 6. Memory makes information available at a... time. 7. The ALU performs c... . 8. The CPU i... commands to other parts of the system. 9. RAM is an i... memory. 10. ROM is an e... memory.

GRAMMAR DEVELOPMENT

Exercise 17. Point out in the text the sentences with the Participle I and Participle II and provide the Russian equivalents. It will help you understand the text in detail.

Exercise 18. Fill in the blanks to streamline the use of the Participle I and Participle II. The words in brackets are given to help you.

1. A computer is ... numbers and orders into memory (to insert).
2. An electronic digital computer is a system ... and ... a very large amount of

data (to process, to store). 3. The computer is a system ... numerical computations (to perform). 4. The computer is a device ... instructions with extreme speed (to follow). 5. The numbers and the instructions are ... in the computer memory (to store). 6. The arithmetic-logical unit is a device ... circuits ... the arithmetic computations (to contain, to perform). 7. The codes ... by computer designers are ... on number of systems (to use, to base). 8. Having been coded the instruction ... to the central processing unit (to be transmitted). 9. ... the functions of storage units, we controlled the processing unit (to discuss). 10. ... to the CPU, the instructions made an arithmetic-logical unit perform some operations (to deliver).

Exercise 19. Make up sentences according to the models to practise the use of the verbals.

Model A: *Вам следовало бы прочитать об удивительных свойствах компьютера раньше.*

You should have read about wonderful features of computers earlier.

1. Вам следовало бы заказать эти устройства раньше. 2. Ему следовало бы ввести данные в запоминающее устройство раньше. 3. Вам следовало бы раньше рассмотреть эту систему как крупномасштабную цифровую систему. 4. Вам следовало бы знать об этом устройстве раньше. 5. Вам следовало бы выполнить вычисления раньше.

Model B: *Для того чтобы выполнять тысячи вычислительных действий в минуту, были разработаны компьютеры.*

To perform thousands of computations per second computers were designed.

1. Использовались транзисторы для того, чтобы сделать компьютеры более надежными. 2. Для того чтобы сократить время для вычисления, были применены эти устройства. 3. Аналитический двигатель был изобретен для того, чтобы хранить данные. 4. Для того чтобы интегрировать большое количество элементов электронной цепи в маленький чип, транзисторы были уменьшены в размерах. 5. Прикладное программное обеспечение используется для того, чтобы разрешить специальные проблемы, связанные с обработкой различных данных.

LISTENING

Exercise 20. Listen to the text “Application of Computers”

Before listening: mind the words and phrases given to comprehend better the information you are going to listen to.

Prominent — выдающийся, заметный, известный;

widespread — широко распространенный;
it regards — это касается;
as for industries concerned — что касается промышленности;
to improve the quality — улучшать качество;
to be engaged in — быть вовлеченным;
refinery — нефтеперерабатывающий завод;
thanks to them — благодаря им;
disease — заболевание;
accountancy — бухгалтерский учет;
to enhance cognitive skills — развивать познавательные навыки;
illiterate — неграмотный, необразованный;
commonplace — типичный случай, обычное явление.

After listening: agree or disagree with the following statements and add some more information if needed.

1. The role of computers is ever increasing in our life. 2. Computers are widely used in banking, industry, and medicine. 3. Computers find application in education, providing computer-aided learning environment. 4. Computers can be hardly used in fire control. 5. They are widely used in automatic piloting and navigation. 6. The reach of the computer application is to be increased soon.

SPEAKING

Exercise 21. Share your vision of computers using the following phrases: to my mind, in my opinion, if I am not mistaken, as far as I remember, it seems to me, etc.

1. What is a computer?
2. What types of computers do you know?
3. What are the main functional units of the computer?
4. What is storage? What storage units are you familiar with?
5. Do you happen to know anything about the CPU? If yes, list its constituent parts.
6. How can you input and output information? What devices can be used?
7. What are the specific features of hardware and software?
8. What can you say about application of computers?
9. What manual predecessors of computers do you know?
10. Who built the first analog and electronics computers? When?

Exercise 22. Make up general and disjunctive questions, and answer them according to the models to enhance your speaking skills.

Model A: Computers have circuits to perform arithmetic operations.

Do computers have circuits to perform arithmetic operations? — Yes, they do.

Computers have circuits to perform arithmetic operations, don't they? — Yes, they do.

1. Computers have devices to accept information in the form of instructions. 2. They have programmes to provide information needed to solve the problem. 3. Computers have devices to feed information in and get results back. 4. Computers have circuits to make thousands of logical decisions without becoming tired. 5. Computers have devices to print the information.

Model B: *The device had means of coding.*

Did the device have means of coding? — Yes, it did.

The device had means of coding, didn't it? — Yes, it did.

1. It had a binary code storing data and instructions. 2. It had devices of printing information. 3. It had some transistors. 4. That device had a vacuum tube. 5. It had capacitors for storage.

Exercise 23. Make up special questions according to the models, and answer them to streamline your speaking skills.

Model A: *That garget was used as the base for the first computer.*

What was used as the base for the first computer?

1. The electronic device was invented in the 20th century. 2. The first vacuum-tube computer was built at that time. 3. The first vacuum-tube computer was referred to as the first-generation computer. 4. A transistor was used in the second-generation computer. 5. An integrated circuit was used in computers of the third generation.

Model B: *Computers can process information.*

What can computers process?

1. Computers can accept information in the form of instructions. 2. Computers can perform mathematical and logical operations. 3. The programme can tell the computers what to do. 4. The programme can also provide the information needed to solve the problem. 5. Computers can keep instructions in their memory.

Exercise 24. Ask questions and use the words in italics in your answers. The words in brackets will help you.

1. *Electronic computers* are comparatively *modern* invention (what, what kind of). 2. *J. Napier* devised a *mechanical* way to multiply and divide (who,

what kind of). 3. *Most computers* have *circuits* for performing arithmetic operations (what, what). 4. *Integrated circuit technology* was used in computers of the third generation (what kind of, what). 5. *Computers* can solve *a series of problems* and make thousands of *logical* decisions (what, how many, what kind of).

Exercise 25. Read the following dialogue, sum up the information and act out a similar dialogue.

COMPUTERS

- A.: They say you have bought a computer.
B.: Yes, now I have got my own computer.
A.: That's fine. And what type of a computer have you got?
B.: The most common type, a digital one.
A.: By the way, do you know what "a digital computer" means?
B.: It goes without saying. Digital computers deal with numbers. All data — pictures, sounds, symbols, and words — are translated into numbers inside the computer.
A.: Yes, you are right. Digital computers are so widespread that the word "computer" almost always refers to a digital computer. But there are 3 types of computers: digital, analog and hybrid.
B.: I do know about it. Analog computers work with a physical quantity, such as weight, speed, temperature. They solve problems by measuring a quantity in terms of another quantity. Do you understand what I mean?
A.: Yes, certainly, for example, they measure temperature in terms of the length of a thin line of liquid in a thermometer.
B.: Good for you. And when are you going to buy a computer? You know so much about the computers.
A.: You see, I haven't got such a large amount of money.
B.: Take it easy. You may use my computer.
A.: Thanks a lot.
B.: You are welcome.

Exercise 26. Role-play the following situation.

You are at the team-building session for the first time. You are listening to the song of the band "Ayreon" ("Ayreon" is a musical project by a Dutch composer and musician Arjen Anthony Lucassen. Ayreon's music is mostly heavy metal and progressive rock but combined genres with folk, classical, and electronic music). This song describes a distant future in which technology triumphs over passion. You are discussing with your new ex-parts whom you meet there the role of computers nowadays. Here is the song:

I see a future cold as ice
 where all the love has gone.
 I see a race that pays the price
 for everything it's done.

 I see shadows of giant machines
 cast upon the land.
 I see a world where kings nor queens
 but chips are in command.
 COMPUTER...COMPUTER...COMPUTER...
 COMPUTER REIGN
 Now the end has just begun,
 technology has won.
 And it cannot be undone.
 There will be nowhere to run...
 Now the damage has been done
 GAME OVER! GAME OVER!
 I see a game gone out of hand.
 And memories erased.
 I see a programmed master plan
 and man will be replaced.

 I see a planet die in space
 and slowly fade away
 I see the end of the human race
 there has to be a way.

WRITING

Exercise 27. Complete the following sentences in a logical way.

1. Computers perform functions of inputting, storing, processing,
2. The functional units of the computer are storage or memory, central processing unit,
3. Central processing unit coordinates all the actions performed by... .
4. The function of the storage, or memory, is to store information and make it available at
5. Memory consists of two main parts:
6. An arithmetic-logical unit performs
7. Control unit controls and coordinates data movements within
8. The visible units of a data processing system are called
9. Software programmes are of two types:

10. The functions of input-output devices are to insert data into a machine and

Exercise 28. Translate the following sentences from Russian into English. You will have a story on the topic as a pattern.

1. Для того чтобы компьютер мог обработать информацию, её необходимо ввести, затем её необходимо обработать и показать результаты этой обработки. 2. Значит, компьютер должен иметь в своем составе устройства ввода, обработки и вывода информации. 3. Самое главное — системный блок. В системном блоке находятся: материнская плата с установленным на ней процессором, ОЗУ, накопитель на жестких магнитных дисках, блок питания. 4. Процессор, его можно назвать «сердцем машины», устанавливается на «материнской плате» и выполняет все операции с информацией, всю работу с аппаратурой и программами. 5. ПЗУ, составляющая часть материнской платы, предназначена для постоянного хранения информации о составных частях и настройках компьютера. 6. ОЗУ, составляющая часть материнской платы, предназначена для кратковременного хранения информации. 7. Накопитель на жестких магнитных дисках, «жесткий диск», — устройство для долговременного хранения информации. 8. В компьютерной терминологии жёсткий диск, установленный в компьютере, именуется как «фиксированный диск», «жёсткий диск» или «винчестер». 9. Кроме этого, для хранения информации используется дополнительное оборудование — устройство чтения (записи) информации на лазерных дисках (CD ROM, DVD-ROM). 10. Центральный процессор состоит из арифметико-логического устройства и устройства управления. 11. К устройствам ввода информации относят клавиатуру, мышь, сканер, цифровую камеру и др. 12. К устройствам вывода информации относят монитор, принтер и др.

Exercise 29. Make up your own story about computers according to the following points of the plan. The words and phrases are supposed to make your story logical and interesting.

1. *What Is a Computer?*

A computer can be defined

Computers perform

2. *The First Computers*

The first calculating devices were developed

An analog computer was built

Electric computers were used

3. *The Main Functional Units of the Computer*

CPU is

Storage, or memory, is

Hardware and software are

Input-output devices perform

Exercise 30. Write an e-mail to your friend about the main components of your computer you need to change, providing a detailed description of the functions these units perform.

PROJECT WORK

Exercise 31. Compile information about computers. Present the project to your group. You may use the following websites: www.computer.ru, www.pc-world.ru, www.upweek.ru, www.hardnsoft.ru.

ADDITIONAL READING

Exercise 32. Make a summary of the text using the following phrases:

1. The title of the text is...
2. The text is about... The text deals with...
3. The text covers such points as ... first ... second ... third ...
4. It should be underlined that ...
5. In conclusion, I may say that ...
6. To my mind ... In my opinion ...

WHAT IS A COMPUTER?

Electronic computers are a comparatively modern invention, although their manual predecessors go back several centuries. Let us consider briefly the history of computers that nowadays we are familiar with. Long ago J. Napier, a Scotsman, devised a mechanical way to multiply and divide that is known as the slide rule. Later Henry Briggs applied Napier's ideas and developed logarithm tables commonly used today. The mathematicians Pascal and Leibnitz developed some of the first primitive calculating machines. As for the first real calculating machines concerned, they appeared in 18th century. In 1830, Charles Babbage suggested to create a problem-solving device that he called "analytical engine". It is a mechanical device incorporating a punched card input memory, calculating section, automatic output and a series of instructions that could control its operation. His ideas were the basis for building modern computers.

In 1930, the first analog computer was built by an American, Vannevar Bush. Many technical developments and progress in electronics made it possible to build the first electronic computer in the early 1940s. It was called ENIAC (the Electronic Numerical Integrator and Calculator). It was used for military and scientific purposes. By the end of the 1960s, commercial models of these computers were mainly used for both scientific computation and business data processing. Initially those devices got input data supplied by punched cards. At the turn of the 1970s punched cards were replaced by keyboard terminals. Since that time scientific advances have resulted in the proliferation of computers that spotted the entire landscape of the Universe!

It is considered that computers have many remarkable powers. However, most computers, whether large or small, have three basic capabilities. First, computers have circuits for performing arithmetic operations such as: addition, subtraction, division, multiplication, and exponentiation. Second, computers have means of communicating with the user. Third, computers have circuits which can make decisions. They can solve a series of problems and make thousands of logical decisions without becoming tired. A computer can replace people in dull, routine tasks, but it works according to the instructions given to it.

TEST 6

1. Choose the proper words and fill in the blanks.

- The system ... is usually stored in read-only memory.*
A. hardware B. software C. firmware D. variety
- Instructions and data are fed through the ... devices*
A. output B. input C. control D. memory
- A computer can perform very complex numerical...*
A. communication C. instructions
B. computations D. tasks
- Numbers and instructions forming the programme are ... in the memory.*
A. stored B. solved C. settled D. simulated
- The control unit serves for ... orders.*
A. reading B. inputting C. interpreting D. fulfilling
- Magnetic disks constitute the ... storage media.*
A. internal B. primary C. secondary D. main
- Magnetic ... were the main elements used in digital computers for many years.*
A. cores B. tapes C. disks D. drives

8. *Input-output devices allow the computer to ... with its external environment.*
 - A. compute
 - B. command
 - C. communicate
 - D. cooperate
9. *Electronic memories have ... capacities for data storage.*
 - A. more
 - B. larger
 - C. less
 - D. similar
10. *The control unit ... instructions from the programme.*
 - A. sends
 - B. changes
 - C. obtains
 - D. gains

1. *The basic function of a computer is*
A. process B. to process C. to be processed D. being processed
2. *... information into the computer is realized by means of flashcards.*
A. Input B. Inputs C. Inputting D. Is input
3. *Air traffic control depends on computer- ... data.*
A. generating B. generated C. generate D. is generated
4. *Computers were designed ... thousands of operations per second.*
A. to perform B. perform C. performing D. have performed
5. *Analytical engine ... to store data.*
A. were invented C. was invented
B. invented D. is being invented
6. *Early computers ... vacuum tubes could perform computations in milli-seconds.*
A. using B. used C. use D. were using
7. *Computers were developed ... calculations for military and scientific purposes.*
A. to perform B. perform C. performing D. is performing
8. *The amount of data on a magnetic disk ... constantly*
A. is stored B. is storing C. were storing D. are storing
9. *When ... the Internet, I normally find a lot to read.*
A. enter B. entering C. is entering D. entered
10. *While ... this programme we experienced great difficulties.*
A. install B. installing C. installed D. having installed

The most common keyboard device uses the QWERTY keyboard. It is called a “QWERTY” keyboard because there are the first six letters on the top left of the keyboard. The multimedia input devices are digital camera, webcam, video capture, scanner, and voice data entry.

4. Answer these multiple-choice questions about science and technology.

1. *What is a computer?*
 - A. a device to process information
 - B. a device to accept information
 - C. a device to accept and input information
2. *What units does the case (or chassis) house?*
 - A. a motherboard, a power supply unit, RAM, CPU, ROM
 - B. CU, a power supply unit, ALU, ROM
 - C. a motherboard, CU, CPU, ROM
3. *What kind of storage do you know?*
 - A. primary and direct
 - B. secondary and indirect
 - C. primary and secondary
4. *What basic types of computers can you name?*
 - A. digital and numerical
 - B. digital and analog
 - C. numerical and analog
5. *What are the main components of the CPU?*
 - A. CU and ALU
 - B. CU and a power supply unit
 - C. ALU and RAM

Module 7

ENGINEERING MATERIALS

Vocabulary: exercises 1—7, 12—16.

Grammar (the Complex Object): exercises 8—9, 17—19.

Reading: exercises 10, 11, 32.

Listening: exercise 20.

Speaking: exercises 21—26.

Writing: exercises 27—30.

Project Work: exercise 31.

Test 7.

KEY VOCABULARY

Exercise 1. Read and guess the meanings of the new words. If you have some difficulties, use the dictionary at the end of this book. It will help you to read and discuss the texts and dialogues, arrange the role-plays and present the projects.

- 1) *access*. The earliest humans had an access to only a very limited number of materials.
- 2) *property*. A lot of materials with specialized properties were produced.
- 3) *to encompass*. Material science encompasses various classes of materials.
- 4) *alloy*. Metallic materials include metals and alloys.
- 5) *ferrous metals*. Metallic materials which contain iron are called ferrous metals.
- 6) *non-ferrous metals*. Metallic materials which do not contain iron are called non-ferrous metals.
- 7) *cast iron*. The most common ferrous metals are cast iron and steel.
- 8) *to influence*. Different elements in alloys influence properties of materials.
- 9) *brittleness*. Large amount of carbon in cast iron increases its brittleness.
- 10) *to rust*. Steel containing nickel or chromium does not rust.
- 11) *tungsten*. Steels which contain tungsten or cobalt are extremely hard.
- 12) *copper*. Aluminium and copper are widely used.

- 13) *ductile, malleable*. Copper is a ductile and malleable metal.
- 14) *frequent*. Copper is a frequent element of various metal alloys.
- 15) *brass, tin, lead*. Brass contains copper and zinc, bronze contains copper and tin/lead.
- 16) *representative*. Polymers are representatives of non-metallic materials.
- 17) *rubber*. One of the best-known natural polymers is rubber.
- 18) *thermoplastics, thermosets*. Plastics can be divided into thermoplastics and thermosets.
- 19) *to mould*. Thermoplastics can be heated and moulded numerous times.
- 20) *indispensable*. The properties of plastics are indispensable.
- 21) *flexible*. Plastics are flexible.
- 22) *relevantly*. Plastics are relevantly cheap.
- 23) *subsequent cooling*. Ceramic materials are formed by the action of heat and subsequent cooling.
- 24) *clay*. Clay was one of the earliest materials used to produce ceramics.
- 25) *stiff*. Ceramics tend to be strong, stiff, brittle, and chemically inert.
- 26) *to vary*. Ceramics properties vary widely.
- 27) *insulator*. Porcelain is widely used to make electrical insulators.
- 28) *available*. A lot of engineering materials are available to engineer.
- 29) *to choose*. Engineers have to choose the engineering materials.
- 30) *purpose*. Engineers have to choose the engineering materials best suited the given purpose.
- 31) *to memorize*. Have you memorized the groups of engineering materials?
- 32) *to exist*. A wide variety of materials exists nowadays.
- 33) *to decline*. Some materials tend to have a declining usage.
- 34) *to save*. The manufacturers are switching from steel to aluminium to save weight of a car.
- 35) *to change*. The materials technology is constantly changing.
- 36) *to substitute*. Aluminium can substitute steel.
- 37) *to increase*. The popularity of aluminium is increasing.

Exercise 2. Read the words following the rules of reading. Pronounce correctly. Practise aloud.

Age, major, insulator, civilization, shape, save;
access, action, malleable, metallic, plastics;
role, stone, both, component, corrosion;
copper, bronze, common;
time, while, describe, widely, divide, decline;

different, industry, still, influence, brittle, nickel, tin, resistance, stiff, exist;

during, humans, produce;

number, rust, rubber, ductile, tungsten, subsequent, structure, substitute; indispensable, representative, tend, domestic;

term, inert, purpose, thermal;

thermoplastics, thermosets, both, synthetic;

cheap, choose, change.

Exercise 3. Look at the following pairs of words and think if the underlined letters are pronounced in the same way, or if they are pronounced differently. Read aloud.

Age — access; major — age; access — various; age — ceramics; human — number; widely — while; corrosion — copper; engineer — steel; ceramics — clay; ferrous — term; tungsten — rust; ductile — rubber; cast — brass; cheap — choose; thermoplastics — thermosets; chemically — choose; society — science.

Exercise 4. Read the international words, mind the stress.

Material, role, civilization, natural, technology, class, traditional, group, metal, polymer, ceramics, nickel, cobalt, aluminium, structure, component, corrosion, thermal, electrical, element, zinc, bronze, polymer, synthetic, plastic, category, industry, product, form, element, reaction, classification.

Exercise 5. Try to enrich your vocabulary:

a) analyse the following words with different suffixes and divide them into two groups — nouns and adjectives:

development, civilization, natural, possible, various, traditional, ferrous, different, brittleness, stainless, structure, corrosion, resistance, thermal, electrical, frequent, indispensable, action, industrial, insulator, superconductor:

b) make up as many words as you can by combining different parts of the words:

super-	develop	-ment
in-	tradition	-al
re-	resist	-ance
	differ	-ent
	stain	-less
	brittle	-ness
	conduct	-or
	mould	

Exercise 6. Divide the following words into two groups, those which describe or belong to a) metallic materials; b) non-metallic materials.

Ferrous, iron, polymers, alloys, thermoplastics, steel, chromium, polycarbonate, copper, rust, tungsten, cobalt, ductile, brass, electrical insulators, thermosets, non-ferrous, cobalt, nickel, zinc, aluminium, ductile, bronze, rubber, thermoset, plastics, polyvinylchloride, ceramics, clay, porcelain, malleable, cast iron.

Exercise 7. Think over the definitions of the words which appear in the texts and dialogues and then:

a) agree or disagree with the following definitions

1. *Common* means happening frequently or existing in large amounts or numbers.
2. *Rubber* is a strong substance that can bend easily and is used for making things such as tyres or boots.
3. *Non-ferrous metals* are metals that do not contain iron.
4. *Ferrous metals* are metals that contain iron.
5. *Amount* is a quantity of something.

b) match each word with its correct definition

cast iron, property, conductor, insulator, copper

1. Quality or a feature of something.
 2. Ferrous metal.
 3. Non-ferrous metal.
 4. Substance that allows heat or electricity to pass through it.
 5. Substance that reduces the amount of heat or electricity that can pass through something.
- c) find the definitions for some other words which you consider to be important for the topic “Engineering Materials”. Use the website www.macmillandictionaries.com**

EXPLORING GRAMMAR

Exercise 8. Read the sentences, point out the Complex Object. Give the Russian equivalents. If you have some difficulties, use the grammar reference at the end of the book.

1. The engineers consider this material to be rather brittle.
2. I wish them to make this experiment.
3. I heard the engineers change the technological process of producing this material.
4. They let him research this problem.
5. They allowed this alloy to be used in the production of these tools.

Exercise 9. Make up your own sentences with the Complex Object according to the models.

Model A: *They believe that this element influences the property of this material.*
They believe this element to influence the property of this material.

1. They consider that this material contains iron. 2. They suppose that this steel is stainless. 3. We expect that they form ceramics by the action of heat and subsequent cooling. 4. We know that ceramics is strong, stiff, brittle and chemically inert. 5. We believe that they use this material in this structure. 6. They think that this alloy contains nickel.

Model B: *We know that he investigated this problem.*
We know him to have investigated this problem.

1. He believes that they made an experiment. 2. He thinks that they used these data for their experiment. 3. We know that they described the experiment in the scientific article. 4. We expect that manufacturers increased the aluminium application in the production. 5. We consider that materials technology changed.

READING

Exercise 10. Read the text, try to focus on its essential facts and choose the most suitable heading given below for each paragraph.

- 1) Metallic Materials
- 2) Ceramics
- 3) Various Classes of Materials
- 4) Polymers
- 5) Choosing Materials

DIFFERENT KINDS OF ENGINEERING MATERIALS

Materials played a major role in the development of societies. Civilizations were named by the level of their materials development, e.g. the Stone Age, the Bronze Age, and the Iron Age. The earliest humans had an access to only a very limited number of natural materials. Modern technologies have made it possible to produce new materials. We believe more than 50,000 materials with specialized properties to have been developed by now. Materials science encompasses various classes of materials, but the traditional groups of engineering materials are metallic materials (metals and alloys) and non-metallic materials (polymers, ceramics, etc.).

Metallic materials include ferrous (those that contain iron) and non-ferrous (those that do not contain iron) metals. It should be noted that while

describing alloys which are metallic materials it is possible to use the term “metals”. The most common ferrous metals are cast iron and steel, which are both alloys. Different elements in alloys influence properties of materials: large amount of carbon in cast iron increases its brittleness; stainless steels containing nickel or chromium do not rust; steels, which contain tungsten or cobalt, are extremely hard, etc. We consider the most widely used non-ferrous metals to be aluminium and copper. Aluminium alloys are widely used in engineering structures and components where light weight or corrosion resistance is required. Copper is a ductile, malleable metal with a very high thermal and electrical conductivity. It is a frequent element of various metal alloys: brass (copper and zinc), bronze (copper and tin/lead).

Polymers are representatives of non-metallic materials. One of the best known natural polymers is rubber. However, most of the polymers used in industry are not natural but synthetic; they are generally called ‘plastics’. Plastics can be divided in two categories: thermoplastics and thermosets. Thermoplastics can be heated and moulded numerous times. Common engineering thermoplastics are ABS (acrylonitrile butadiene styrene); polycarbonate; PVC (polyvinylchloride). Thermosets can be heated and moulded only once, they cannot be remoulded. The most common engineering thermosets are epoxy resins and polyamides. The properties of plastics are indispensable: they are lightweight, hard, easy to shape and colour, flexible, non-rusting, relevantly cheap, etc.

Ceramic materials are inorganic, non-metallic materials which are formed by the action of heat and subsequent cooling. Clay was one of the earliest materials used to produce ceramics, but many different ceramic materials are now being used in domestic and industrial products. Ceramics tend to be strong, stiff, brittle, chemically inert. They are non-conductors of heat and electricity, but still their properties vary widely. For example, porcelain is widely used to make electrical insulators, but some ceramic compounds made from a metal and a non-metal are superconductors.

Thus, at present a lot of engineering materials are available to engineer, who has to choose the one best suited to serve the given purpose.

Exercise 11. Agree or disagree with the following statements.

1. A lot of materials were available to early humans. 2. The traditional groups of engineering materials are metals and alloys. 3. It is possible to use the term ‘metals’ instead of ‘metallic materials’. 4. Representatives of non-metallic materials are ceramics. 5. Copper is a frequent element of various metal alloys.

KEY VOCABULARY DEVELOPMENT

Exercise 12. Match the adjectives in column A with the nouns in column B to form meaningful phrases and then identify them at the sentence level in the text. It will help you understand the text in detail.

A	B
1) stiff	a) amount
2) electrical	b) steel
3) various	c) element
4) ferrous	d) conductivity
5) ductile	e) insulators
6) brittle	f) materials
7) indispensable	g) ceramics
8) stainless	h) cast iron
9) frequent	i) properties
10) large	j) metals

Exercise 13. Decide which of the verbs on the left collocate with the nouns on the right and then identify the word combinations at the sentence level in the text. It will help you understand the text precisely.

1) to encompass	a) classes
2) to influence	b) thermoplastics
3) to contain	c) material
4) to change	d) properties
5) to choose	e) nickel
6) to mould	f) technology
7) to substitute	g) popularity
8) to increase	h) steel
9) to save	i) groups
10) to memorize	j) weight

Exercise 14. Try to enrich your vocabulary:

a) find words in the text which have the same meanings as the following words:

for example, people, to embrace, big, an element, different, to manufacture, aim;

b) find words in the text whose meanings are opposite to the meanings of the following words:

the latest, unlimited, synthetic, small, decrease, soft, heavy, low, rare, the worst, stiff, expensive, organic, conductors;

c) replace the words in italics with the words with similar meanings:

1. Materials science includes *different* classes of materials. 2. Materials science *embraces* the traditional classes of engineering materials: metallic and non-metallic materials. 3. Clay was used *to manufacture* ceramics. 4. There are a lot of alloys containing copper, *for example*, brass, bronze, etc. 5. Ancient *people* had an access to a very limited number of natural materials.

Exercise 15. Complete the sentences: change the word in capitals at the end of each sentence to form a word that fits suitably in the blank space.

1. ... steels which contain nickel do not rust STAIN.
2. Materials were very important in the ... of societies DEVELOP.
3. Carbon increases ... in cast iron BRITTLE.
4. There are ... kinds of engineering materials DIFFER.
5. Corrosion ... is one of the aluminium properties RESIST.

Exercise 16. Insert the words at the sentence level: fill in the blanks with the missing words (the first letter of each word is given).

1. A lot of materials with specialized p... have been developed. 2. Metallic materials which contain iron are called f... metals. 3. Steels which contain t... are extremely hard. 4. Copper is a m... metal. 5. Copper is a f... element of various alloys. 6. R... is a natural polymer. 7. T... can be moulded numerous times. 8. The plastics properties are i... . 8. Ceramics are strong and s... . 9. Materials science e... different groups of materials. 10. Metallic materials include metals and a... .

GRAMMAR DEVELOPMENT

Exercise 17. Point out the sentences with the Complex Object in the text and provide the Russian equivalents. It will help you understand the text in detail.

Exercise 18. Fill in the blanks to streamline the use of the Complex Object. The words in brackets are given to help you.

1. He supposes ... to study here (she). 2. We think the early humans ... a very limited number of materials (to use). 3. We believe ... to make an experiment (they). 4. I believe him ... an experiment long ago (to make). 5. She knows him ... this problem last year (to investigate).

Exercise 19. Make up sentences according to the models to practise the use of the Complex Object.

Model A: *Мы знаем, что они провели эксперимент.*
We know them to have made an experiment.

1. Мы знаем, что он исследовал эту проблему. 2. Мы полагаем, что он учился здесь. 3. Мы думаем, что они изменили технологический процесс. 4. Мы считаем, что они решили эту проблему. 5. Мы знаем, что она выбрала самый лучший доклад.

Model B: *Она разрешила ему участвовать в конференции.*

She let him take part in the conference.

1. Он позволил им изменить технологический процесс. 2. Она заставила их решить эту проблему. 3. Мы позволили ей выбрать лучший вариант. 4. Он заставил их исследовать эту проблему. 5. Они заставили инженеров выбрать конструкционные материалы с определенными механическими свойствами.

LISTENING

Exercise 20. Listen to the text “Elements, Compounds, Mixtures and Compounds”.

Before listening: mind the words and phrases given to comprehend better the information you are going to listen to.

To take into consideration — принимать во внимание;

to distinguish — выделять, различать;

pure — чистый, без примесей;

constituent — составная часть;

reinforced — усиленный, укрепленный.

After listening: agree or disagree with the following statements and add some more information if needed.

1. Elements are pure materials in their basic form. 2. Elements can be broken into separate constituents. 3. Compounds consist of one or two elements. 4. Alloys are the most common mixtures. 5. Composite materials are hi-tech materials.

SPEAKING

Exercise 21. Share your vision about engineering materials using the following phrases: to my mind, in my opinion, if I am not mistaken, as far as I remember, it seems to me, etc.

1. What technologies made it possible to produce new materials?
2. What groups can engineering materials be divided into?
3. What ferrous metals do you know?
4. What non-ferrous metals do you know?

5. What properties of ferrous metals can you name?
6. What are the most important properties of aluminium?
7. Where are aluminium alloys used?
8. What copper alloys do you know?
9. What are the most common representatives of non-metallic materials?
10. What is the difference between thermoplastics and thermosets?
11. Can you name common engineering thermoplastics?
12. Why are the plastics properties indispensable?
13. How are ceramics formed?
14. Are ceramics good conductors of heat and electricity?
15. What should an engineer take into consideration while choosing a material for the given purpose?

Exercise 22. Make up general and disjunctive questions, and answer them according to the models to enhance your speaking skills.

Model A: *It is possible to use the term 'metals' instead of 'alloys'.*

Is it possible to use the term 'metals' instead of 'alloys'? — Yes, it is.

It is possible to use the term 'metals' instead of 'alloys', isn't it? — Yes, it is.

1. It is necessary to divide engineering materials into various classes.
2. It is a ductile metal.
3. It is a frequent element of various metal alloys.
4. It is a representative of non-metallic materials.
5. It is used in industry.

Model B: *Metallic materials include ferrous and non-ferrous metals.*

Do metallic materials include ferrous and non-ferrous metals? — Yes, they do.

Metallic materials include ferrous and non-ferrous metals, don't they? — Yes, they do.

1. Different elements in alloys influence properties of materials.
2. Ceramics tend to be strong and stiff.
3. Ceramics properties vary widely.
4. Compounds consist of two or more elements.
5. Mixtures include two or more elements or compounds.

Exercise 23. Make up special questions according to the models, and answer them to streamline your speaking skills.

Model A: *The most common ferrous metals are cast iron and steel.*

What are the most common ferrous metals?

1. The traditional groups of engineering materials are metallic and non-metallic materials.
2. The metallic materials are ferrous and non-ferrous met-

als. 3. The most widely used non-ferrous metals are aluminium and copper. 4. The most common engineering thermoplastics are ABS and PVC. 5. The most common engineering thermosets are epoxy resins and polyamides.

Model B: *Materials science encompasses various classes of materials.*
What does materials science encompass?

1. This alloy contains copper. 2. Large amount of carbon in cast iron increases its brittleness. 3. Stainless steel contains nickel or chromium. 4. A compound consists of two or more elements. 5. A mixture includes two or more elements or compounds.

Exercise 24. Ask questions and use the words in italics in your answers. The words in brackets will help you.

1. Fiberglass is correctly called *glass-reinforced plastic* (how). 2. Cast iron has a wide range of applications *in machines and automotive industry parts* (where). 3. At present some car manufacturers are switching from steel to aluminium *to save weight of a car* (why). 4. Car makers try *to make vehicles lighter* (what). 5. Thermosets can be moulded *only once* (how many times).

Exercise 25. Read the following dialogue, sum up the information and act out a similar dialogue.

APPLICATION OF ENGINEERING MATERIALS

A.: We have been discussing the classification of engineering materials during the English classes. Have you memorized the groups of engineering materials?

B.: Sure. They are metallic and non-metallic materials.

A.: Yes, you are right! There is such a wide variety of materials. And I'd like to know where they are all used in mechanical engineering. It seems to me that cast irons tend to have a declining usage.

B.: Nothing of the kind. Cast iron has a wide range of applications in machines and automotive industry parts.

A.: Is that really so? But as for the cars, steel but not cast iron makes up by far the single largest percentage of materials.

B.: I agree with you on this point. If I am not mistaken, an average car has about 55 per cent of steel.

A.: But materials technology is constantly changing and at present some car manufacturers are switching from steel to aluminium to save weight of a car. I wonder if aluminium can fully substitute steel.

B.: New alloys mean that aluminium is now as rigid as steel. Moreover, it is corrosion-resistant.

- A.: It's going to be interesting to see if the popularity of aluminium continues to increase in the future.
- B.: Not only of aluminium but plastics too. As car makers try to make vehicles lighter the plastics percentage is increasing all the time.
- A.: I see. Thanks a lot for your comments.
- B.: You are welcome.

Exercise 26. Role-play the following situations.

1. You are discussing the application of engineering materials with a representative from Japan at the international scientific conference devoted to the automotive industry. 2. You are discussing the application of engineering materials to machines and automotive industry parts at the motor-car plant in the UK.

WRITING

Exercise 27. Complete the following sentences in a logical way.

1. Materials played a major role in ...
2. Civilizations were named by the level of...
3. The earliest humans had an access to...
4. Modern technologies have made it possible to...
5. Materials science encompasses various classes of...
6. The traditional groups of engineering materials are metallic materials and...
7. Metallic materials include ferrous and...
8. Polymers are representatives of...
9. Plastics can be divided into two categories...
10. Ceramics are non-metallic materials which...

Exercise 28. Translate the following sentences from Russian into English. You will have a story on the topic as a pattern.

1. Современные технологии сделали возможным производство новых материалов. 2. К настоящему времени созданы более 50 000 материалов с определенными свойствами. 3. Металлические и неметаллические материалы — традиционные группы конструкционных материалов. 4. Металлические материалы включают черные и цветные материалы. 5. Самые распространенные черные металлы — чугун и сталь. 6. Самые широко используемые цветные металлы — алюминий и медь. 7. Полимеры — представители неметаллических материалов. 8. Синтетические полимеры могут быть разделены на две категории: термопластические и термореактивные пластмассы. 9. Свойства пластмасс незаменимы:

они легкие, твердые, нержавеющие, хорошо формуются и красятся.
10. Керамические материалы также являются представителями неметаллических материалов, и их свойства имеют большой диапазон.

Exercise 29. Make up your own story about engineering materials according to the following points of the plan. The words and phrases are supposed to make your story logical and interesting.

1. *Various Classes of Materials*

Materials have played
Civilizations were named
Early humans had
Modern technologies made
Materials science encompasses
The traditional groups of engineering materials are

2. *Metallic Materials*

Metallic materials include
The most common ferrous metals are
Different elements in alloys influence
The most common non-ferrous metals are

3. *Polymers*

One of the best-known polymers is
Synthetic polymers are called
Plastics can be divided

4. *Ceramics*

Ceramics are formed
Ceramics tend to be

5. *Choosing Materials*

A lot of engineering materials are
Engineers have to choose

Exercise 30. Write an e-mail to your friend about your attending the exhibition devoted to engineering materials.

PROJECT WORK

Exercise 31. Compile information about engineering materials and participate in a project. Give reasons why this or that material is widely used in machine building industry. Present the project to your group. You may use the following website: www.materialmoments.org/top100.html

ADDITIONAL READING

Exercise 32. Make a summary of the text using the following phrases:

1. The title of the text is...
2. The text is about... The text deals with...
3. The text covers such points as... first... second... third...
4. It should be underlined that...
5. In conclusion, I may say that...
6. To my mind... In my opinion...

IMPORTANT METAL PROPERTIES FOR MANUFACTURING

One of the most important aspects in manufacturing is to choose the right material for a particular application. There are some important properties of metals: ductility, malleability, elasticity, hardness, durability, etc.

Ductility is a solid material ability to be stretched into a wire. Malleability, a similar property, is a material ability to form a thin sheet by hammering or rolling. Both of these mechanical properties are aspects of plasticity, the extent to which a solid material can be plastically deformed without fracture. Ductility and malleability are not always coextensive, for example, while gold is both ductile and malleable, lead is only malleable.

Elasticity is an ability of a material to stretch easily and then return to its original shape quickly. Springs are usually made out of elastic materials such as spring steel, titanium, and bronze.

Hardness is an ability of a material to resist to various kinds of shape change when a force is applied. Common examples of hard materials are not only certain metals but also ceramics. Hardness of a material affects its durability. Generally, hard metals are more durable than soft ones.

The properties of a metal can be changed by heat treating. The main types of heat treating are quenching, annealing, tempering. Quenching is a heat treating process when metal is heated, and then dipped in water or oil to cool it rapidly. It makes metal to be harder but more brittle. While annealing, metal is also heated, but then is allowed to cool slowly. Annealed metal is softer and more elastic. While tempering, metal is heated and kept at high temperature for a period of time. As a result, tempered metal has a balance between hardness and elasticity.

TEST 7

1. Choose the proper words and fill in the blanks.

1. *Materials which consist of two or more elements combined by chemical reaction present a category of*

- A. elements
B. compounds
C. mixtures
D. composite materials
2. ... *is a matrix with a reinforced material inside it.*
A. An element
B. A compound
C. A mixture
D. A composite material
3. ... *includes two or more elements which are not chemically bound.*
A. An element
B. A compound
C. A mixture
D. A composite material
4. ... *cannot be broken into separate constituents.*
A. An element
B. A compound
C. A mixture
D. A composite material
5. *Cast iron and steel are*
A. elements
B. compounds
C. mixtures
D. composite materials
6. *Copper is*
A. an element
B. a compound
C. a mixture
D. a composite material
7. *Polymers are representatives of*
A. ceramics
B. plastics
C. non-metallic materials
D. thermosets
8. ... *polymers are usually called "plastics".*
A. Natural
B. Synthetic
C. Cheap
D. Non-rusting
9. *Ceramics are*
A. ductile
B. stiff
C. malleable
D. lightweight
10. *A lot of engineering materials are ... to engineer.*
A. flexible
B. brittle
C. available
D. subsequent

2. Fill in the blanks with the proper forms of the infinitive.

1. *We didn't believe you ... it.*
A. to do
B. to be done
C. do
D. to have been done
2. *The teacher wishes them ... part in the conference.*
A. to have been taken
B. to take
C. to be taken
D. take
3. *He allowed these data ... in the article.*
A. to use
B. use
C. to be used
D. be used

4. He didn't expect them ... here.

A. to study	C. to have been studied
B. to be studied	D. study
5. The teacher made the students ... the metal properties.

A. to study	C. to have been studied
B. to be studied	D. study
6. The teacher let the students ... the experiment.

A. to change	C. to be changed
B. change	D. to have been changed
7. The teacher supposed the students... the text about engineering materials.

A. to be read	C. to have been read
B. read	D. to have read
8. He ordered the experiment ... by them.

A. to be made	C. to have made
B. make	D. to make
9. We expect them ... this problem long ago.

A. to have investigated	C. to be investigated
B. investigate	D. to investigate
10. He believes the manufacturers ... the technological process.

A. to have been changed	C. change
B. to change	D. to be changed

3. The text contains different mistakes: 2 — in spelling, 5 — in grammar. Correct the mistakes and rewrite the text.

There are various classes of materials. They can be divided into two groups: metals and non-metals. Metals include ferrous and non-ferrous metals. Cast iron and steel are common ferrous metals. Copper and aluminium are non-ferrous metals. Non-metals embrace polymers, ceramics, etc.

4. Answer these multiple-choice questions about engineering materials.

1. *What do metals include?*
 - A. traditional groups
 - B. ferrous and non-ferrous metals
 - C. metallic and non-metallic materials
2. *How does large amount of carbon in cast iron influence its properties?*
 - A. it increases its properties
 - B. it increases its conductivity
 - C. it increases its brittleness

3. *Why don't stainless steels rust?*
 - A. because they contain carbon
 - B. because they contain nickel or chromium
 - C. because they are extremely hard
4. *What are the most common non-ferrous metals?*
 - A. zinc and tin
 - B. zinc and lead
 - C. copper and aluminium
5. *What is a frequent element of metal alloys?*
 - A. hydrogen
 - B. oxygen
 - C. copper
6. *What is the best-known natural polymer?*
 - A. rubber
 - B. thermoplastics
 - C. thermosets
7. *What plastics can be heated and moulded only once?*
 - A. thermosets
 - B. thermoplastics
 - C. polycarbonate

Module 8

ENGINEERING MATERIALS TECHNOLOGY (1)

Vocabulary: exercises 1—7, 12—16.

Grammar (the Complex Subject): exercises 8—9, 17—19.

Reading: exercises 10, 11, 32.

Listening: exercise 20.

Speaking: exercises 21—26.

Writing: exercises 27—30.

Project Work: exercise 31.

Test 8.

KEY VOCABULARY

Exercise 1. Read and guess the meanings of the new words. If you have some difficulties, use the dictionary at the end of this book. It will help you to read and discuss the texts and dialogues, arrange the role-plays and present the projects.

- 1) *forming, cutting, joining.* Metalworking processes can be categorized as forming, cutting, and joining processes.
- 2) *to embrace.* Metalworking embraces forming, cutting, and joining.
- 3) *casting, castings.* Casting is a forming process during which metal castings are produced.
- 4) *to pour into a mold.* Heated liquid material is usually poured into a mold.
- 5) *hollow cavity.* A mold contains a hollow cavity of the desired shape.
- 6) *to solidify.* Heated liquid metal cools and solidifies in a mold.
- 7) *to eject.* A casting is ejected from the mold.
- 8) *to complete.* A casting is ejected or broken out of the mold to complete the process.
- 9) *foundry.* All metal castings are produced in foundries.
- 10) *rolling, extrusion, drawing.* All technological processes of metalworking with the application of force or pressure embrace final metallurgy

(which includes rolling, extrusion, and drawing) and workpieces and machine parts manufacturing.

- 11) *forging, forgings*. Forging is one of the oldest metalworking processes during which forgings are produced.
- 12) *open die forging, impression die forging, closed die forging*. Workpieces and machine parts manufacturing embraces open die forging, impression die forging, closed die forging, etc.
- 13) *to improve*. Forging improves the mechanical properties of metals.
- 14) *grain*. Forging minimizes the internal grain size in metal.
- 15) *drawing out, upsetting, squeezing*. There are different kinds of forging operations: drawing out, upsetting, squeezing in compression dies.
- 16) *cross section*. While drawing out the workpiece length increases and its cross section decreases.
- 17) *die*. Most forging operations use metal-forming dies.
- 18) *to withstand*. Metal-forming dies must be precisely designed and carefully heat-treated to withstand the tremendous forces and pressure.
- 19) *flat, shaped*. Open die forging uses flat and shaped dies.
- 20) *to achieve*. On completing open die forging, forgings require their considerable machining to achieve the final shape.
- 21) *to attach to the anvil*. In impression die forging, the metal workpiece is placed in a die which is attached to the anvil.
- 22) *to drop*. The hammer is dropped on the workpiece to make the metal flow and fill the die cavities.
- 23) *excess metal, flash*. Excess metal flows out of the die and forms flash.
- 24) *to prevent from*. The flash cools more rapidly than the rest of material so it helps prevent from forming more flash.
- 25) *lubrication*. The disadvantage of closed die forging is the need for better lubrication and workpiece placement.
- 26) *sheet metal forming*. Sheet metal forming is one of the manufacturing processes.
- 27) *stamping, punching, bending*. Sheet metal forming includes stamping, punching, bending, etc.
- 28) *to involve*. Recent developments involve the heating of dies or workpieces.
- 29) *powder metallurgy*. Forming processes embrace casting, metalworking with the application of force or pressure, and powder metallurgy.
- 30) *molten metal*. Heated liquid metal is called molten metal.
- 31) *billet, bar, ingot*. Metal components can be formed by using metal powder instead of molten metal, billets, bars or ingots.

- 32) *sintering*. Sintering is the process when the powder is placed into a die, compressed and then heated until the powder particles join together structurally.

Exercise 2. Read the words following the rules of reading. Pronounce correctly. Practise aloud.

Embrace, shape, recrystallization, operation, escape, lubrication, placement;

manufacturing, sand, classify, flat, attach, anvil, hammer, flash;
these, sheet, need;

assembling, pressure, ejected, impression, length, tremendous;

divide, final, die, while, size, precisely, besides;

which, fixed, different, fill, little, billet, ingot, sintering;

broken, open, close, component;

drop, complex, stock, cross, cost;

numerous, produce, use, due;

bulk, cutting, punching, structurally.

Exercise 3. Look at the following pairs of words and think if the underlined letters are pronounced in the same way, or if they are pronounced differently. Read aloud.

Shape — sand; escape — flat; while — which, fixed — final, close — cost,
use — due, pressure — impression, drop — cost, lubrication — operation,
cross — drop, fill — billet, sintering — different, sheet — need, attach — flash,
hammer — embrace.

Exercise 4. Read the international words, mind the stress.

Metal, category, process, material, technique, final, equivalent, mechanical, plastic, deformation, temperature, operation, design, limit, kilogram, variation, type, complex, fact, component, mass, method, industry.

Exercise 5. Try to enrich your vocabulary:

- a) analyse the following words with different suffixes and divide them into two groups — nouns and adjectives:

various, pressure, cavity, numerous, section, extrusion, final, mechanical, internal, plastic, deformation, temperature, different, operation, compression, tremendous, considerable, impression, variation, advantage, additional, lubrication, placement, thickness, dimensional, productivity, requirement, centrifugal, central, electricity, facility, production, equipment, desirable, economical, controllable;

b) make up as many words as you can by combining different parts of the words:

multi-	dimension	-al
	impress	-ion
	differ	-ent
	compress	-ion
	product	-able
	place	-ment
	equip	-ure
	press	
	consider	
	require	
	direction	

Exercise 6. Divide the following words or phrases into three groups, those which describe or belong to a) casting; b) metalworking with the application of force or pressure; c) powder metallurgy.

Rolling, extrusion, foundry, flash, cross-section, drawing, forging, sheet metal forming, hollow cavity, pour, grain, drawing out, upsetting, flat die, shaped die, excess metal, lubrication, solidify, workpiece, recrystallization, punching, bending, billet, bar, ingot, molten metal, squeezing in compression dies.

Exercise 7. Think over the definitions of the words which appear in the texts and dialogues and then:

a) agree or disagree with the following definitions

1. *Cavity* is a hole or space inside a solid object.
2. *Foundry* is a factory where metal or glass is heated and made into different objects.
3. *Cross section* is the inside of the object that you can see by cutting through the middle of it from top to bottom.
4. *Die* is a block of metal used for pressing or cutting something into shape or pattern.
5. *Hammer* is a tool used for hitting things.

b) match each word with its correct definition

to embrace, to pour, to attach, to withstand, to divide

1. To make liquid or substance to flow in a continuous stream.
2. To accept and include something.
3. To separate people or things into smaller groups or parts.
4. To fasten or join one thing to another.
5. To be strong enough not to be harmed or destroyed by something.

- c) find the definitions for some other words which you consider to be important for the topic “Engineering Materials Technology”. Use the website www.macmillandictionaries.com

EXPLORING GRAMMAR

Exercise 8. Read the sentences, point out the Complex Subject. Give the Russian equivalents. If you have some difficulties, use the grammar reference at the end of the book.

1. Metalworking is known to be categorized as forming, cutting and joining processes. 2. Forging processes are expected to be performed at various temperatures. 3. True closed die forging proves to keep the workpiece from forming flash. 4. Over 70% of all metal castings appear to be produced in foundries via a sand casting process. 5. Sheet metal forming is certain to include such operations as stamping, punching, bending, etc.

Exercise 9. Make up your own sentences according to the models.

Model A: *It is expected that he will be a good engineer.*
He is expected to be a good engineer.

1. It is expected that he will test it experimentally. 2. It is known that a forging is stronger than an equivalent casting. 3. It is believed that this forging process will be performed below the recrystallization temperature. 4. It is said that sand casting is relatively cheap. 5. It is known that forging is one of the oldest metalworking processes.

Model B: *Will he take part in this manufacturing process? — Yes, he is certain to take part in this manufacturing process.*

1. Will he work in this foundry? 2. Will this forging require further processing? 3. Will this metal be forged cold? 4. Will this metal stock be passed through a pair of rolls? 5. Will this excess metal flow out of the die?

READING

Exercise 10. Read the text, try to focus on its essential facts and choose the most suitable heading given below for each paragraph.

- 1) Casting
- 2) Open Die Forging
- 3) Different Kinds of Forging Operations
- 4) Impression Die Forging
- 5) Powder Metallurgy
- 6) Sheet Metal Forming
- 7) Forming Processes Classification

8) Closed Die Forging

9) Metalworking with the Application of Force or Pressure

METALWORKING FORMING PROCESSES

Modern metalworking processes, though diverse and specialized, can be categorized as forming, cutting, and joining processes. Forming processes are supposed to be classified in different ways. One way of classification includes casting, bulk forming processes, and sheet forming processes. Another way embraces casting, metalworking with the application of force or pressure, powder metallurgy. The latter is considered more common.

Casting is known to involve pouring heated liquid material into a mold which contains a hollow cavity of the desired shape, and then allowing it to cool and to solidify. The solidified part, a casting, is ejected or broken out of the mold to complete the process. There are numerous metal casting techniques but over 70% of all metal castings are produced in foundries via a sand casting process, which is characterized by using sand as the mold material.

All technological processes of metalworking with the application of force or pressure are known to be divided into final metallurgy processes (rolling, extrusion, drawing); workpieces and machine parts manufacturing processes (open die forging, impression die forging, closed die forging, sheet metal forming, etc.).

Forging is considered to produce a piece, a forging, that is stronger than an equivalent casting as it improves the mechanical properties of metals by minimizing the internal grain size in metal under controlled plastic deformation. Forging processes can be performed at various temperatures; they are generally classified by whether the metal temperature is above or below the recrystallization temperature. There are different kinds of forging operations available: drawing out (the workpiece length increases and its cross section decreases), upsetting (the workpiece length decreases and its cross section increases), squeezing in closed compression dies (it produces multidirectional flow), etc. Most forging operations use metal-forming dies. Dies must be precisely designed and carefully heat-treated to shape correctly the workpiece and withstand the tremendous forces and pressure.

Open die forging uses flat and shaped dies with almost no limit in size of forgings ranging from a few up to several hundred thousand kilograms but requiring their considerable machining to achieve the final shape.

In impression die forging, a metal workpiece is placed in a die resembling a mold which is attached to the anvil. The hammer die is usually shaped as well. The hammer is dropped on the workpiece to make the metal flow and fill the die cavities. Excess metal flows out of the die and forms flash. The flash cools more rapidly than the rest of the material so it helps prevent from forming

more flash and also forces the metal to fill completely the die cavity. In the end of this operation the flash is removed.

A variation of impression die forging is believed to be flashless forging, or true closed die forging. In this type of forging the die cavities are completely closed to keep the workpiece from forming flash. The major advantage of this process is that there is little or no escape of excess metal. The disadvantages include additional cost due to a more complex die design and the need for better lubrication and workpiece placement.

There is a variety of sheet metal forming manufacturing processes, such as stamping, punching, bending, etc. These types of forming processes are performed at room temperature. However, some recent developments involve the heating of dies or workpieces. Sheet metal forming is characterized by the fact that the thickness of the sheet metal changes little while processing.

Metal components can also be formed by using metal powder instead of molten metal, billets, bars or ingots. The powder is placed into a die and compressed into a solid mass, and then it is heated until the powder particles join together structurally. This process is often called sintering. Besides, metal powder can be shaped by rolling, extruding, etc.

Exercise 11. Agree or disagree with the following statements.

1. Casting is a process performed on the liquid materials. 2. Final metal-lurgy includes rolling, extrusion, and drawing. 3. A casting is stronger than an equivalent forging. 4. Forging processes can be performed only below the recrystallization temperature. 5. Sintering is a process of powder metallurgy.

KEY VOCABULARY DEVELOPMENT

Exercise 12. Match the adjectives in column A with the nouns in column B to form meaningful phrases and then identify them at the sentence level in the text. It will help you understand the text in detail.

A	B
1) various	a) material
2) mechanical	b) processes
3) flashless	c) deformation
4) hollow	d) techniques
5) liquid	e) cavity
6) numerous	f) property
7) major	g) forces
8) plastic	h) cost
9) tremendous	i) forging
10) additional	j) advantage

Exercise 13. Decide which of the verbs on the left collocate with the words on the right and then identify the word combinations at the sentence level in the text. It will help you understand the text precisely.

- | | |
|-----------------|----------------------|
| 1) to embrace | a) liquid material |
| 2) to pour | b) heating |
| 3) to compress | c) properties |
| 4) to eject | d) dies |
| 5) to remove | e) flash |
| 6) to attach | f) tremendous forces |
| 7) to improve | g) die cavities |
| 8) to fill | h) categories |
| 9) to withstand | i) powder |
| 10) to involve | j) castings |

Exercise 14. Try to enrich your vocabulary:

a) find words in the text which have the same meanings as the following words:

usually, to include, to reduce, to finish, to manufacture, to name, different, types, to form, some, too, quickly, main, billet;

b) find words in the text whose meanings are opposite to the meanings of the following words:

solid, bulk, full, to begin, open, above, to increase, to heat, advantage, worse;

c) replace the words in *italics* with the words with similar meanings:

1. While upsetting, the workpiece length *decreases* and its cross section increases. 2. Castings are ejected from the molds *to complete* the process. 3. Modern metalworking processes are *diverse* and specialized. 4. Metal-forming dies must be designed carefully *to shape* correctly the workpiece. 5. The flash cools more *rapidly* than the rest of the material.

Exercise 15. Complete the sentences: change the word in capitals at the end of each sentence to form a word that fits suitably in the blank space.

1. In ... die forging excess metal flows out of the die and forms flash IM-PRESS.

2. In closed die forging the workpiece needs a better ... PLACE.

3. Forgings require their ... machining to achieve the final shape in open die forging CONSIDER.

4. There are ... sheet metal forming processes DIFFER.

5. One of the forging operations is squeezing the workpiece in the ... dies COMPRESS.

Exercise 16. Insert the words at the sentence level: fill in the blanks with the missing words (the first letter of each word is given).

1. Casting involves pouring m... metal into a mold where it cools and solidifies into the shape of the mold. 2. A mold contains a h... cavity. 3. A casting is e... from the mold. 4. Metal castings are produced in f... . 5. Forging i... the mechanical properties of metals. 6. Most forging operations use d... . 7. In impression die forging a die is attached to the a... . 8. Excess metal flow out of the die and forms f... . 9. True closed die forging needs better l... . 10. There is a variety of s... metal forming processes.

GRAMMAR DEVELOPMENT

Exercise 17. Point out the sentences with the Complex Subject in the text and provide the Russian equivalents. It will help you understand the text in detail.

Exercise 18. Fill in the blanks to streamline the use of the Complex Subject. The words in brackets are given to help you.

1. He ... to have done this experiment (известно). 2. Castings ... to be produced in foundries (несомненно). 3. Forgings ... to be produced at various temperatures (определенно). 4. Do you ... to watch one of the metalworking forming processes (случайно)? 5. He ... to be a good engineer (говорят).

Exercise 19. Make up sentences according to the models to practise the use of the Complex Subject.

Model A: *Несомненно, они исследуют эту проблему (to be certain).
They are certain to investigate this problem.*

1. Маловероятно, что они будут проводить этот эксперимент сегодня (to be unlikely). 2. Вероятно, существуют различные типы ковочных операций (to be likely). 3. Затвердевшая заготовка обязательно выбивается из литейной формы (to be sure). 4. Большинство операцийковки определенно используют бойки или штампы для формоизменяющих операций (to be certain). 5. Вряд ли он примет участие в конференции (to be unlikely).

Model B: *Кажется, эта проблема будет исследована (to seem).
This problem seems to be researched.*

1. Кажется, этот процесс улучшит механические свойства металла (to seem). 2. Кажется, он переведет этот текст (to seem). 3. Оказывается, существуют многочисленные способы литья (to prove). 4. Кажется, он достигнет цели (to seem). 5. Оказывается, бойки должны пройти термообработку (to prove).

LISTENING

Exercise 20. Listen to the text “Different Kinds of Casting”.

Before listening: mind the words and phrases given to comprehend better the information you are going to listen to.

Sand casting — литье в песчаные формы;
sufficiently refractory — достаточно огнеупорный;
shell-mold casting — литье в оболочковые формы;
resin covered sand — песок, пропитанный клеем;
dimensional accuracy — точные габаритные размеры;
die casting — литье в постоянные формы;
spin casting — центробежное литье;
to spin — вращаться.

After listening: agree or disagree with the following statements and add some more information if needed.

1. There are some pouring methods such as gravity, vacuum or pressure methods. 2. Molds can be made from sand or metal. 3. Sand casting has better dimensional accuracy as compared to shell-mold casting. 4. The mold for shell-mold casting is created using two hardened tool steel dies. 5. The casting material for spin casting is molten metal or liquid thermoset plastic.

SPEAKING

Exercise 21. Share your vision of engineering materials technology using the following phrases: to my mind, in my opinion, if I am not mistaken, as far as I remember, it seems to me, etc.

1. Forming, cutting, joining processes are categorized as modern metal-working processes, aren't they?
2. What are the main metalworking forming processes?
3. Casting is the main manufacturing process, isn't it?
4. Is casting more often used in metalworking than forging?
5. What kinds of casting do you know?
6. What is the most common kind of casting? Why?
7. Why is a forging stronger than an equivalent casting?
8. Can forging processes be performed at various temperatures?
9. What kinds of forging operations are available?
10. Most forging operations use metal-forming dies, don't they?
11. What kinds of dies does open die forging use?
12. How is flash formed during impression die forging?

13. What are the advantages and disadvantages of true closed die forging?
14. What sheet metal forming processes can you name?
15. What is sintering? Can you describe it?

Exercise 22. Make up general and disjunctive questions and answer them according to the models to enhance your speaking skills.

Model A: *Each of metalworking categories contains various processes.*

Does each of metalworking categories contain various processes? — Yes, it does.

Each of metalworking categories contains various processes, doesn't it? — Yes, it does.

1. A mold contains a hollow cavity.
2. A sand casting process uses sand as the mold material.
3. Forging improves the mechanical properties of metals.
4. Forging minimizes the internal grain size.
5. The metal fills the die cavity.

Model B: *Most forging operations use metal dies.*

Do most forging operations use metal dies? — Yes, they do.

Most forging operations use metal dies, don't they? — Yes, they do.

1. Dies withstand the tremendous forces and pressure.
2. Forgings require their considerable machining on completing open die forging process.
3. The disadvantages of closed die forging include additional cost and the need for lubrication and workpiece placement.
4. These forming processes involve the application of mechanical force at room temperature.
5. Some recent developments involve the heating of dies.

Exercise 23. Make up special questions according to the models and answer them to streamline your speaking skills.

Model A: *Modern metalworking processes are forming, cutting and joining.*

What are modern metalworking processes?

1. The main forging operations are drawing out, upsetting, squeezing in compression dies.
2. The main workpieces and machine parts manufacturing processes are open die forging, impression die forging, closed die forging, sheet metal forming.
3. Final metallurgy processes are rolling, extrusion and drawing.
4. The main sheet metal forming processes are stamping, punching and bending.
5. The main kinds of casting are sand casting, shell-mold casting, die casting, and spin casting.

Model B: *Heated liquid material is usually poured into a mold.*

What is usually poured into a mold?

1. A casting is ejected or broken out of the mold.
2. A sand casting is characterized by using sand as the mold material.
3. A metal workpiece

is placed in a die. 4. A die is attached to the anvil. 5. A hammer is dropped on the workpiece.

Exercise 24. Ask questions and use the words in italics in your answers. The words in brackets will help you.

1. A metal workpiece is placed *in a die* (where). 2. Heated liquid material is usually poured *into a mold* (where). 3. Dies must be *precisely* designed (how). 4. Dies should withstand *tremendous forces and pressure* (what). 5. *In the end of the operation* the flash is removed (when).

Exercise 25. Read the following dialogue, sum up the information and act out a similar dialogue.

FORGING

A.: Do you know what forging is?

B.: Sure. Forging is one of the oldest known metalworking processes. Traditionally, many metal tools were made by heating iron bars in a fire called a forge, and then they were worked or shaped by hammering it.

A.: Absolutely. Forging was performed by a smith using hammer and anvil. It is still in use though nowadays it is done either with modern presses or with hammers powered by compressed air, electricity, hydraulics or steam.

B.: I agree with you. Forging has lived over centuries to become a facility with engineered processes, production equipment, raw materials and products to meet the demands of modern industry.

A.: I wonder if there really exist 'cold', 'warm' or 'hot' forging.

B.: You see, some metals may be forged cold, but iron and steel are almost always hot forged.

A.: Are there any advantages of 'hot' forging?

B.: Hot forging prevents the work hardening that would result from cold forging, which would increase the difficulty of performing secondary machining operations on the piece. Are you aware of the fact that forged parts usually require further processing to achieve a finished part?

A.: Yes, I am. But I know that work hardening may be desirable in some circumstances.

B.: Then other method of hardening the piece is used, such as heat treating, which is generally more economical and more controllable.

A.: So, I see, engineers have to choose the type of forging to serve the given purpose.

Exercise 26. Role-play the following situations.

1. You are watching the casting process in the foundry in one of the English-speaking countries. You are talking with a foundry worker. 2. You are at

the international scientific conference “Materials Technology of the 21st Century”. During the break you are talking with one of the scientists. You are discussing advantages and disadvantages of different kinds of forging operations. The language of communication is English.

WRITING

Exercise 27. Complete the following sentences in a logical way.

1. There are different kinds of casting: sand casting, shell-mold casting,
2. All metal castings are produced in
3. There are different kinds of forging operations: drawing out, upsetting,
4. Forging produces a piece, a forging, that is stronger than an equivalent
5. Forging minimizes the internal grain size in metal under
6. Most forging operations use metal-forming
7. Open die forging uses flat and shaped dies with almost no limit in
8. In impression die forging, a metal workpiece is placed in a die which
9. In closed die forging the die cavities are completely closed to keep the workpiece from
10. The disadvantages of closed die forging include additional cost due to a more complex die design and

Exercise 28. Translate the following sentences from Russian into English. You will have a story on the topic as a pattern.

1. Современные процессы металлообработки включают формование, обработку металла резанием, соединение деталей. 2. Процессы формования включают литье, обработку металлов давлением, порошковую металлургию. 3. Существуют многочисленные способы литья, такие как литье в песчаные формы, литье в оболочковые формы, литье в постоянные формы, центробежное литье и др. 4. Свыше 70% всех металлических отливок производятся в литейных цехах в процессе литья в песчаные формы. 5. Процессы обработки металлов давлением делятся на процессы, завершающие металлургический цикл (прокатка, экструзия, волочение); процессы производства заготовок и готовых деталей для машиностроения (ковка в открытых или подкладных штампах, объемная штамповка, штамповка в закрытых штампах, листовая штамповка и др.). 6. Ковка производит заготовку, поковку, которая прочнее, чем эквивалентная отливка. 7. Ковка уменьшает размер зерна в металле при контролируемой пластической деформации. 8. Существуют различные

типы ковочных операций: вытяжка, осадка, сжатие в компрессионных штампах. 9. Большинство операцийковки используют бойки или штампы для формоизменяющих операций. 10. Ковка в открытых или подкладных штампах использует плоские или вырезные (фигурные) бойки. 11. При объемной штамповке металлическая заготовка помещается в штамп, похожий на литейную форму. 12. При объемной штамповке излишки металла образуют облой. 13. При штамповке в закрытых штампах полости штампа полностью закрыты, чтобы предохранить заготовку от образования облоя. 14. Разнообразные процессы формования из листового металла включают штамповку, пробивку, гибку и др. 15. Изделия из металла могут также формоваться из металлического порошка вместо расплавленного металла, заготовок, прутков или слитков.

Exercise 29. Make up your own story about engineering materials technology according to the following points of the plan. The words and phrases are supposed to make your story logical and interesting.

1. *Metal Casting*

Casting is

Heated liquid material is poured into

A mold contains

Molten metal cools

Molten metal solidifies

The solidified part is ejected from

All metal castings are produced

There are

2. *Different Kinds of Forging Operations*

Forging produces

Forging improves

Forging minimizes

Forging processes can be performed at

There are

Most forging operations use

3. *Open Die Forging*

Open die forging uses

Forgings require

4. *Impression Die Forging*

The metal workpiece is placed in

The die is attached to

The hammer die is shaped

The hammer is dropped on

Excess metal forms
The flash cools
The flash is removed

5. *Closed Die Forging*

A variation of impression die forging is
The die cavities are closed
The major advantage of this process is
The disadvantages include

6. *Sheet Metal Forming*

There are
Sheet metal forming processes are performed
Some recent developments involve
Sheet metal forming is characterized by

7. *Powder Metallurgy*

Metal components can be formed by
The powder is placed into
The powder is compressed into
The powder is heated
This process is called
Metal powder can be shaped by

Exercise 30. Write an e-mail to your friend about your visiting a foundry in the English-speaking country. Describe the whole metal casting process in detail.

PROJECT WORK

Exercise 31. Compile information about metal forming processes and participate in a project. Present the project to your group. You may use the following website: www.qcforge.info/Page.aspx/89/Forging_Questions.html

ADDITIONAL READING

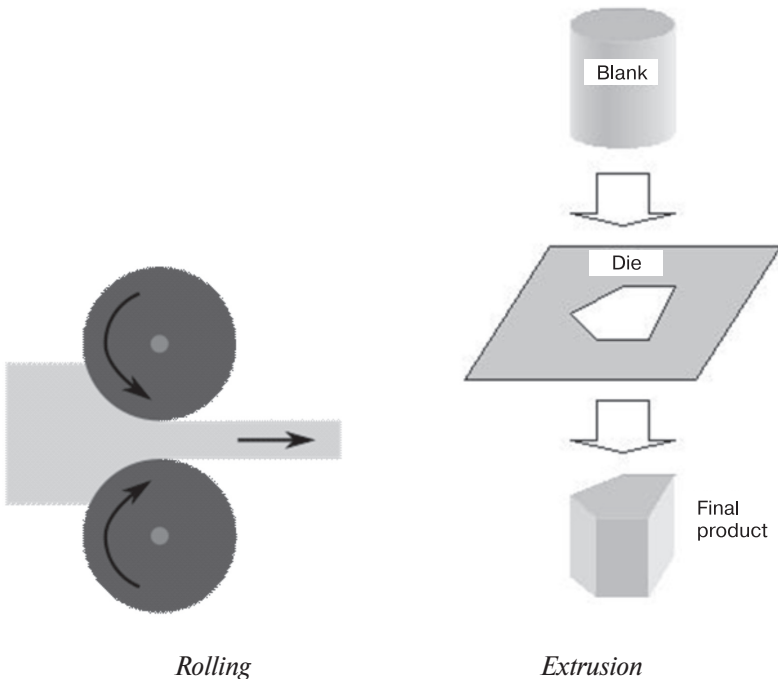
Exercise 32. Make a summary of the text using the following phrases:

1. The title of the text is...
2. The text is about... The text deals with...
3. The text covers such points as... first... second... third...
4. It should be underlined that...
5. In conclusion, I may say that...
6. To my mind... In my opinion...

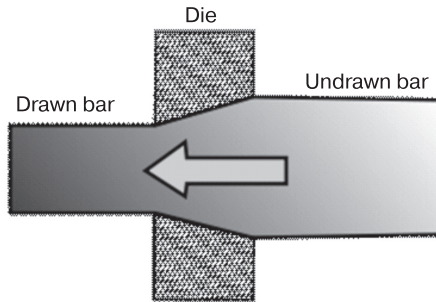
ROLLING, EXTRUSION, DRAWING

Rolling is a metal forming process in which metal stock is passed through a pair of rolls to achieve the fixed shapes and properties. Rolls are revolving at the same speed but in opposite directions; they are spaced so that the distance between them is slightly less than the thickness of the metal. Rolling is classified according to the temperature of the metal rolled. If the temperature of the metal is above its recrystallization temperature, then the process is termed as hot rolling. If the temperature of the metal is below its recrystallization temperature, the process is termed as cold rolling. Rolling is particularly important in the manufacture of steel.

Extrusion is a process used to create objects of a fixed cross-sectional profile: a material is pushed or drawn through a die of the desired cross section. The two main advantages of this process over other manufacturing processes are its ability to create very complex cross sections from materials that are brittle and to form finished parts with an excellent surface finish. The extrusion process can be done with the material hot or cold. Commonly extruded materials embrace metals, polymers, ceramics, etc. Plastics extrusion is a high volume manufacturing process in which raw plastic material is melted and formed into a continuous profile.



Drawing is a metalworking process which uses tensile forces to stretch metal. For wire, bar, and tube drawing, the starting stock is drawn through a die to reduce its diameter and increase its length. Drawing is usually done at room temperature, thus classified as a cold working process; however, it may be performed at elevated temperatures in order to reduce forces.



Drawing

TEST 8

1. Choose the proper words and fill in the blanks.

- Forming processes ... casting, metalworking by the application of force or pressure, powder metallurgy.*
A. achieve B. embrace C. improve D. complete
- A mold ... a hollow cavity.*
A. improves B. achieves C. completes D. contains
- Molten metal is allowed*
A. to achieve B. to improve C. to solidify D. to complete
- Final metallurgy processes include ..., extrusion, drawing.*
A. rolling B. casting C. forging D. stamping
- Forging operations embrace drawing out, ..., squeezing in compression dies.*
A. rolling B. upsetting C. forging D. stamping
- In impression die forging a die is attached to the*
A. hammer B. flash C. anvil D. mold
- The ... cools more rapidly than the rest of the material.*
A. anvil B. flash C. mold D. hammer

8. *There is little or no escape of ... metal in closed die forging.*
A. flashless B. major C. excess D. available
9. *Closed die forging needs more complex ... design.*
A. flash B. die C. anvil D. mold
10. *... is a metalworking process which uses tensile forces to stretch metal.*
A. Rolling B. Drawing C. Extrusion D. Casting

2. Fill in the blanks. The words in brackets will help you.

1. This process ... to improve the mechanical properties of this metal (вероятно).
A. are likely B. is like C. were likely D. is likely
2. The dies ... to be precisely shaped (оказывается).
A. proved B. prove C. are proved D. proves
3. Forgings ... to be stronger than equivalent castings (известно).
A. is known B. are known C. is know D. was known
4. Casting ... to be one of the main manufacturing processes (несомненно).
A. are certain B. is certain C. were certain D. to be certain
5. He ... to achieve the aim (кажется).
A. seemed B. is seemed C. seems D. seem
6. They ... to have made the experiment (говорят).
A. is said B. were said C. are said D. to be said
7. Most forging operations ... to use metal-forming dies (несомненно).
A. are certain B. is certain C. were certain D. to be certain
8. *The dies ... to be carefully heat-treated (известно).*
A. are known B. is know C. was know D. is known
9. He ... to do it (определенно).
A. is certain B. are certain C. were certain D. to be certain
10. These manufacturing processes ... to be successful (полагают).
A. is supposed C. are suppose
B. are supposed D. were supposed

3. The text contains different mistakes: 4 — in spelling, 3 — in grammar. Correct the mistakes and rewrite the text.

Casting is one of the main manufacturing proceses. Casting is a process of poring molten metall into a mold where it solidify into the shape of a mold.

Casting was well establish in the Bronze Age when it was use to form bronze pieces now found in muzeums.

4. Answer these multiple-choice questions about engineering materials technology.

1. *What operations does forging include?*
 - A. casting, forging, pressing
 - B. drawing out, upsetting, squeezing in compression dies
 - C. forming, cutting, joining
2. *What processes does final metallurgy embrace?*
 - A. rolling, forging, drawing
 - B. rolling, extrusion, drawing
 - C. forging, casting, drawing
3. *What kinds of casting do you know?*
 - A. sand casting, spin casting, shell casting, die casting
 - B. mold casting, sand casting, die casting, spin casting
 - C. sand casting, shell-mold casting, die casting, spin casting
4. *What temperatures can forging operations be performed at?*
 - A. at various temperatures
 - B. above the recrystallization temperature
 - C. below the recrystallization temperature
5. *What processes does metalworking include?*
 - A. forming, cutting
 - B. forming, joining
 - C. forming, cutting, joining
6. *What is extrusion?*
 - A. is a process when material is pushed through a die of the desired cross section
 - B. is a process in which metal stock is passed through a pair of rolls
 - C. is a process which uses tensile forces to stretch metal
7. *What is drawing?*
 - A. is a process when material is pushed through a die of the desired cross section
 - B. is a process in which metal stock is passed through a pair of rolls
 - C. is a process which uses tensile forces to stretch metal

Module 9

ENGINEERING MATERIALS TECHNOLOGY (2)

Vocabulary: exercises 1—7, 12—16.

Grammar Revision: exercises 8—9, 17—19.

Reading: exercises 10, 11, 32.

Listening: exercise 20.

Speaking: exercises 21—26.

Writing: exercises 27—30.

Project Work: exercise 31.

Test 9.

KEY VOCABULARY

Exercise 1. Read and guess the meanings of the new words. If you have some difficulties, use the dictionary at the end of this book. It will help you to read and discuss the texts and dialogues, arrange the role-plays and present the projects.

- 1) *specified geometry*. Material is brought to specified geometry by removing excess material.
- 2) *chips or swarf*. In cutting metals the excess metal is chips or swarf.
- 3) *machining, burning*. Cutting is nearly fully represented by machining, burning, and some special processes.
- 4) *oxy-fuel cutting torch*. Using an oxy-fuel cutting torch to separate a plate of steel into smaller pieces is an example of burning.
- 5) *chemical milling*. Chemical milling is an example of a special process.
- 6) *etching and masking chemicals*. Chemical milling removes excess material by the use of etching and masking chemicals.
- 7) *turning*. Turning is a cutting process for producing a cylindrical surface.
- 8) *lathe*. Turning can be done on a lathe.
- 9) *continuous supervision*. Turning frequently requires continuous supervision.
- 10) *cutting tool*. Turning uses cutting tools.

- 11) *single-point*. Turning usually uses single-point cutting tools.
- 12) *to traverse along axes*. A cutting tool is traversed along two axes of motion.
- 13) *either ... or ...*. Turning can be either on the outside of the cylinder or on the inside.
- 14) *boring*. Turning on the inside of the cylinder is known as boring.
- 15) *milling*. Milling is a process of removing material to form the final part.
- 16) *comparatively*. Milling is a comparatively complex process.
- 17) *milling cutter*. A milling machine includes a milling cutter, a worktable, etc.
- 18) *multipoint*. A milling cutter is usually multipoint.
- 19) *axis — axes*. A milling cutter rotates about its axis.
- 20) *slot cutting, planing, drilling, threading, rabbeting*. Milling machines can perform a vast number of complex operations, such as slot cutting, planing, drilling, threading, rabbeting, etc.
- 21) *grinding*. A grinding machine is a machine used for producing very fine finishes.
- 22) *abrasive wheel*. A grinding machine uses an abrasive wheel as a cutting device.
- 23) *to meet specifications*. Finished parts should meet specifications.
- 24) *temporary and permanent joining*. One can distinguish between temporary and permanent joining techniques.
- 25) *fastening*. Sometimes mechanical fastening is called temporary mechanical joining.
- 26) *bolts, screws, studs*. Mechanical fastening includes joining processes which use bolts, screws, studs, etc.
- 27) *welding, brazing, soldering, riveting*. Permanent joining processes embrace welding, brazing, soldering, and riveting.

Exercise 2. Read the words following the rules of reading. Pronounce correctly. Practise aloud.

Embrace, plate, operator, operation, rotate, planing, abrasive, specification;

plastic, rabbeting;

steel, wheel, meet;

collection, excess, represent, separate, length, direction, assemble, temporary;

besides, precise, size, final, device, riveting, grinding, kind;

chips, which, milling, drilling, single, different, exist;

hole, process, stone, motion, component;
 common, lot, slot, complex, horizontal
 include, produce, during, use, computer
 cutting, cutter, number, such, stud;
 burning, turning, surface, purpose, permanent, traverse, vertical;
 cutting, joining, forming, metalworking, turning, milling, boring, grinding;
 collection, motion, direction, operation, specification.

Exercise 3. Look at the following pairs of words and think if the underlined letters are pronounced in the same way, or if they are pronounced differently. Read aloud.

Rotate — operation; embrace — plastic, steel — wheel, excess — separate;
 abrasive — plate; specification — rabbeting; length — assemble; milling —
 drilling; temporary — direction; size — final; device — chips; cylindrical —
 grinding; hole — stone; single — riveting; produce — computer; motion —
 complex; process — common; lot — slot; cutter — such; stud — include;
 purpose — surface; use — number; cutting — joining; direction — operation.

Exercise 4. Read the international words, mind the stress.

Metal, process, collection, material, geometry, chemical, operator, com-
 puter, control, plastic, diameter, cylinder, component, complex, final, ma-
 chine, direction, operation, type, horizontal, vertical, specification, mechan-
 ical, bolt.

Exercise 5. Try to enrich your vocabulary:

a) analyse the following words with different suffixes and divide them into two groups — nouns and adjectives:

collection, special, technological, available, cylindrical, continuous, su-
 pervision, operator, computer, numerical, motion, various, final, cutter, op-
 eration, horizontal, vertical, abrasive, inorganic, specification, different, per-
 manent, mechanical;

b) make up as many words as you can by combining different parts of the words:

in-	differ	-ic
re-	compute	-ion
	collect	-ent
	organ	-er
	move	

Exercise 6. Divide the following words or phrases into four groups, those which describe or belong to a) turning; b) milling; c) grinding; d) joining:

lathe, bolts, single-point, multipoint, screws, threading, worktable, tubular, planing, rabbeting, welding, slot cutting, riveting, studs, milling cutter, brazing, drilling, soldering.

Exercise 7. Think over the definitions of the words which appear in the texts and dialogues and then:

a) agree or disagree with the following definitions

1. *A hole* is space in the surface of something that goes partly or completely through it.

2. *To remove* is to take something away.

3. *Chemical* is a substance produced by a process involving chemistry.

4. *A lathe* is a machine that holds a piece of wood or metal and makes it move around so that you can cut and shape evenly.

5. *To traverse* is to move over or across an area.

b) match each word with its correct definition

drilling, turning, grinding, boring, welding

1. Joining process.

2. Producing cylindrical surfaces.

3. Making holes.

4. Turning inside of the cylinder.

5. Producing very fine finishes.

c) find the definitions for some other words which you consider to be important for the topic “Engineering Materials Technology”. Use the website www.macmillandictionaries.com

GRAMMAR REVISION

Exercise 8. Read the sentences, point out the verbals. Give the Russian equivalents. If you have some difficulties, use the grammar reference at the end of the book.

1. This is the material to be removed. 2. To produce fine finishes a grinding machine uses an abrasive wheel. 3. Finished parts should meet specifications. 4. Turning is a cutting process. 5. I can't explain it without watching the process. 6. They began grinding the workpiece. 7. He made the workpiece rotate. 8. We consider this material to be rather hard. 9. Milling is known to be a very complex process. 10. A milling cutter proves to be a multipoint tool.

Exercise 9. Make up your own sentences according to the models.

Model A: *Turning is a cutting process. It produces a cylindrical surface.*

Being a cutting process, turning produces a cylindrical surface.

1. Milling is a comparatively complex process. It forms the final part.
2. An oxy-fuel cutting torch is a tool for the burning process. It cuts a plate of steel into smaller pieces. 3. A grinding machine is a cutting machine. It produces very fine finishes. 4. A milling machine is a cutting machine. It performs a vast number of complex operations. 5. Chemical milling is an example of a special process. It removes excess material by the use of etching and masking chemicals.

Model B: *The workpiece which should be turned is rather hard.*

The workpiece to be turned is rather hard.

1. The metal parts which should be cut are in the foundry. 2. The complex operations which should be done embrace slot cutting and threading. 3. A piece of material which should be turned is made of wood or metal. 4. The milling cutter which should be used is rather hard. 5. The cutting tool which should be traversed along two axes of motion produces precise diameters and lengths.

READING

Exercise 10. Read the text, try to focus on its essential facts and choose the most suitable heading given below for each paragraph.

- 1) Different Kinds of Joining Processes
- 2) Turning Process
- 3) Different Kinds of Cutting Processes
- 4) Milling Process
- 5) Grinding Machine
- 6) Different Kinds of Chip Producing Processes

CUTTING AND JOINING PROCESSES

Besides forming processes, metalworking includes cutting and joining processes. Cutting is considered to be a collection of processes wherein material is brought to a specified geometry by removing excess material. In cutting metals the excess metal is chips or swarf. Cutting is nearly fully represented by machining, burning, and some special processes. Machining is most commonly known to be a chip producing process. Drilling a hole in a metal part is the most common example of a chip producing process. Burning is a process during which metal parts are cut into pieces. Using an oxy-fuel cutting torch to separate a plate of steel into smaller pieces is an example of burning. Chemical

milling is an example of a special process that removes excess material by the use of etching and masking chemicals.

In metalworking a lot of chip producing technological processes are available, such as turning, boring, milling, drilling, grinding, etc.

Turning is a cutting process for producing a cylindrical surface. It can be done on a lathe, which frequently requires continuous supervision by the operator, or by using modern computer numerical control (CNC) lathes. When turning, a piece of material (wood, metal, plastics, or stone) rotates and a cutting tool (usually single-point) is traversed along two axes of motion to produce precise diameters and lengths. Turning can be either on the outside of the cylinder or on the inside (also known as boring) to produce tubular components of various sizes.

Milling is a comparatively complex process of removing material to form the final part. It is generally done on a milling machine, which includes a milling cutter (usually multipoint) that rotates about its axis, and a worktable that can move in multiple directions. Milling machines can perform a vast number of complex operations, such as slot cutting, planing, drilling, threading, rabbeting, etc. There are two common types of milling machines: the horizontal and vertical mills.

A grinding machine is a machine used for producing very fine finishes. As a rule, a grinding machine uses an abrasive wheel as a cutting device to remove material from the workpiece. It can be made of various sizes and types of stones or inorganic materials.

Finished parts that meet specifications are assembled into different kinds of machines. For this purpose, temporary and permanent joining techniques exist. Mechanical fastening, sometimes called temporary mechanical joining, includes joining processes which use bolts, screws, studs, etc. Permanent joining processes embrace welding, brazing, soldering, and riveting.

Exercise 11. Agree or disagree with the following statements.

1. Cutting is represented by machining and burning. 2. Chip producing processes include turning, milling, brazing, etc. 3. Joining processes embrace welding, brazing, soldering, and riveting. 4. A milling machine contains a multipoint milling cutter, a worktable, etc. 5. An abrasive wheel can be made of inorganic materials.

KEY VOCABULARY DEVELOPMENT

Exercise 12. Match the adjectives in column A with the nouns in column B to form meaningful phrases and then identify them at the sentence level in the text. It will help you understand the text in detail.

A	B
1) abrasive	a) surface
2) common	b) joining
3) horizontal	c) control
4) modern	d) supervision
5) tubular	e) wheel
6) various	f) examples
7) permanent	g) mills
8) numerical	h) computers
9) cylindrical	i) sizes
10) continuous	j) components

Exercise 13. Decide which of the verbs on the left collocate with the words or phrases on the right and then identify the word combinations at the sentence level in the text. It will help you understand the text precisely.

1) to remove	a) supervision
2) to meet	b) a specified geometry
3) to bring to	c) a hole
4) to produce	d) a lathe
5) to drill	e) specifications
6) to cut into	f) excess material
7) to traverse	g) a cutting tool
8) to require	h) chips
9) to do on	i) in multiple directions
10) to move	j) pieces

Exercise 14. Try to enrich your vocabulary:

a) find words in the text which have the same meanings as the following words:

embrace, to cut, application, often, to revolve, great, kinds, tool, various;

b) find words in the text whose meanings are opposite to the meanings of the following words:

single-point, limited, inside, simple, common, horizontal, organic, temporary;

c) replace the words in *italics* with the words with similar meanings:

1. A plate of steel is *separated* into smaller pieces by using an oxy-fuel cutting torch. 2. A milling cutter *rotates* about its axis. 3. A grinding machine uses an abrasive wheel as the cutting *device*. 4. Finished parts are assembled into *different* kinds of machines. 5. Metalworking *includes* forming, cutting and joining processes.

Exercise 15. Complete the sentences: change the word in capitals at the end of each sentence to form a word that fits suitably in the blank space.

1. An abrasive wheel is made of ... materials ORGAN.
2. Modern ... numerical control lathes are used in manufacturing COM-
PUTE.
3. Cutting embraces a ... of processes COLLECT.
4. There are ... chip producing processes DIFFER.
5. Chemical milling ... excess material by the use of etching chemicals
MOVE.

Exercise 16. Insert the words at the sentence level: fill in the blanks with the missing words (the first letter of each word is given).

1. In cutting metals the excess material is c... . 2. M... is most commonly known to be a chip producing process. 3. Cutting embraces machining, b... , and some special processes. 4. T... is a cutting process for producing a cylindrical surface. 5. A lathe requires c... supervision by the operator. 6. A cutting tool is traversed along two a... of motion. 7. B... is turning on the inside of the cylinder. 8. M... is a complex process of removing material to form the final part. 9. A milling machine usually uses a m... milling cutter. 10. Milling machines can perform t... .

GRAMMAR REVISION

Exercise 17. Point out the sentences in the text with the Verbals and provide the Russian equivalents. It will help you understand the text in detail.

Exercise 18. Fill in the blanks to streamline the use of the infinitive constructions. The words in brackets are given to help you.

1. He is known ... this experiment (провел). 2. He is believed ... this experiment (проведет). 3. We suppose this experiment ... (будет проведен). 4. We thought that experiment ... (проведен). 5. This experiment is known to ... (был проведен).

Exercise 19. Make up sentences according to the models to practise the use of the infinitive constructions.

Model A: *Мы не ожидали, что этот процесс может быть осуществлен.
We didn't expect this process to be realized.*

1. Мы не предполагали, что эта операция может быть выполнена на токарном станке. 2. Мы не ожидали, что сверление может быть осуществлено на фрезерном станке. 3. Мы не верили, что он выпол-

нит эту операцию. 4. Мы не думали, что этот процесс такой сложный. 5. Мы не предполагали, что обточка может производиться на внутренней стороне цилиндра.

Model B: *Кажется, этот процесс может быть осуществлен (to seem).
This process seems to be realized.*

1. Кажется, этот процесс улучшит свойства металла (to seem). 2. Безусловно, обточка будет выполнена на токарном станке (to be certain). 3. Оказывается, фрезерование — сложный процесс (to prove). 4. Известно, что обточка — это процесс обработки резанием для изготовления цилиндрических поверхностей (to know). 5. Предполагается, что сверление будет происходить на фрезерном станке (to suppose).

LISTENING

Exercise 20. Listen to the text “A Lathe”.

Before listening: mind the words and phrases given to comprehend better the information you are going to listen to.

Chamfering — снятие фаски;

knurling — насечка, накатка;

straight turning lathe — токарный станок прямой обточки;

taper turning lathe — токарный станок конусной обточки;

profiling lathe — токарный станок фасонной обточки;

external grooving lathe — токарный станок внешней проточки каналов;

curved — изогнутый;

grooved — проточный.

After listening: agree or disagree with the following statements and add some more information if needed.

1. A lathe is the oldest machine tool. 2. Turning usually uses multipoint cutting tools. 3. Only chamfering and knurling can be performed on a lathe. 3. There are different types of lathes, such as straight turning and profiling. 4. Lathes can produce curved and grooved shapes of workpieces. 5. Modern CNC lathes can produce milling.

SPEAKING

Exercise 21. Share your vision of engineering materials technology using the following phrases: to my mind, in my opinion, if I am not mistaken, as far as I remember, it seems to me, etc.

1. What processes does metalworking include?
2. What is cutting?
3. What is considered to be the excess metal in cutting metals?
4. What is the most common example of a chip producing process?
5. How can you describe a cutting process which is called 'burning'?
6. Chemical milling is an example of special cutting processes, isn't it?
7. Is boring a cutting process?
8. Where can boring be performed?
9. What kinds of lathes do you know?
10. Is turning performed on the outside or the inside of the cylinder?
11. Which process can produce tubular components?
12. Which operations can milling machines perform?
13. Can lathes do milling?
14. What temporary joining techniques can you name?
15. What processes does permanent joining embrace?

Exercise 22. Make up general and disjunctive questions and answer them according to the models to enhance your speaking skills.

Model A: *Lathes can do milling.*

Can lathes do milling? — Yes, they can.

Lathes can do milling, can't they? — Yes, they can.

1. Lathes can do turning. 2. Lathes can do chamfering. 3. Lathes can be of four different types. 4. Lathes can produce various shapes of workpieces. 5. Lathes can produce curved workpieces.

Model B: *Turning is a cutting process.*

Is turning a cutting process? — Yes, it is.

Turning is a cutting process, isn't it? — Yes, it is.

1. Cutting is a collection of processes. 2. Drilling is the most common example of a chip producing process. 3. This operation is done on the milling machine. 4. A cutting tool is traversed along two axes of motion. 5. The turning process is typically carried out on a lathe.

Exercise 23. Make up special questions according to the models and answer them to streamline your speaking skills.

Model A: *Metalworking includes forming, cutting, and joining processes.*

What processes does metalworking include?

1. Cutting embraces machining, burning, and special processes. 2. Machining contains turning, boring, milling, drilling, and grinding processes. 3. A milling machine performs complex operations. 4. A lathe often requires continuous supervision. 5. Turning produces tubular components.

Model B: *Turning is performed on a lathe.*

Where is turning performed?

1. Boring is performed on a lathe. 2. Milling is performed on modern CNC lathes. 3. Milling is performed on a milling machine. 4. Drilling is performed on a milling machine. 5. Knurling is performed on a lathe.

Exercise 24. Ask questions and use the words in italics in your answers. The words in brackets will help you.

1. *A modern CNC lathe* can do milling (what cutting machine). 2. Lathes can produce *different shapes of workpieces* (what). 3. The turning operations have been developed *through the years* (when). 4. Turning usually uses *simple single-point cutting tools* (what kinds of cutting tools). 5. *A lot of* chip producing technological processes are available (how many).

Exercise 25. Read the following dialogue, sum up the information and act out a similar dialogue.

CUTTING MACHINE TOOLS

A.: Do you know what a cutting machine tool is?

B.: Yes, I do. A cutting tool is any tool that is used to remove material from the workpiece.

A.: I hope you do know that cutting may be performed by single-point or multipoint tools. Can you name operations which may be performed by them?

B.: Single-point tools remove material by means of one cutting edge. Mostly they are used in turning operations. Milling, drilling, and grinding tools are often multipoint tools.

A.: You are absolutely right. I wonder which characteristics cutting machine tools should have to produce quality finished parts.

B.: I am sure that they should have three main characteristics: hardness, toughness, and wear resistance. The tools must be able to withstand the heat generated in the metal-cutting process.

A.: It goes without saying. Besides, cutting tools must be made of a material harder than the material which is to be cut. We should bear in mind that safety is considered to be the key with the cutting machines because the removing bits of usually hot metal are travelling at high speeds.

B.: I fully agree with you. The advantage of having a CNC cutting machine is that it fully protects the machine operator.

A.: Moreover, due to CNC control, modern cutting machines have high precision of operations and allow achieving excellent results in production.

B.: It seems to me that soon everything will be done by robots.

Exercise 26. Role-play the following situations.

1. You are watching the turning process on a CNC lathe. Which questions will you ask the machine operator? The language of communication is English.
2. You are going to deliver a lecture on different kinds of cutting machines for foreign students. The language of international communication is English, of course.

WRITING

Exercise 27. Complete the following sentences in a logical way.

1. Metalworking includes forming, cutting and...
2. Cutting embraces the processes of removing...
3. Cutting is represented by machining, burning and...
4. Burning is a process of cutting metal parts into...
5. Chemical milling is an example of...
6. Machining is known to be...
7. Machining includes turning, boring, drilling, milling and...
8. Turning is a cutting process for producing...
9. Boring is a cutting process performed on the...
10. Milling is a complex process of removing material to...
11. Milling machines can perform cutting, planing, drilling, threading...
12. Grinding produces very fine...
13. Grinding machine uses an abrasive wheel as a...
14. Temporary mechanical joining uses bolts, screws...
15. Permanent joining processes embrace welding, brazing...

Exercise 28. Translate the following sentences from Russian into English. You will have a story on the topic as a pattern.

1. Обработка металла резанием представляет собой ряд процессов, во время которых материал приобретает особую конфигурацию путем удаления ненужного материала. 2. Обработка металла резанием практически всегда представлена механической обработкой, газовой резкой и некоторыми специальными процессами. 3. Механическая обработка в большинстве случаев связана с образованием стружки. 4. Газовая резка — это процесс, во время которого выполняется разрезание кусков металла на более мелкие. 5. Химическое фрезерование (контурное травление) — это пример специального процесса, в ходе которого удаляется излишний материал химикатами травления и защиты. 6. Механическая обработка включает обточку, расточку, фрезерование, сверление, шлифование и др. 7. Обточка — это процесс обработки резанием для изготовления цилиндрических поверхностей. 8. Обточка выполняется на то-

карном станке на внешней стороне цилиндра. 9. Расточка выполняется также на токарном станке, но на внутренней стороне цилиндра. 10. Фрезерование — это относительно сложный процесс удаления материала для получения окончательной детали. 11. Фрезерование выполняется на фрезерном станке. 12. Такие процессы, как нарезание шлицев, строгание, сверление, нарезание резьбы, прорезание пазов также могут быть выполнены на фрезерном станке. 13. Шлифовальный станок производит конечную операцию шлифовки с помощью абразивного круга в качестве обрабатывающего инструмента. 14. Изготовленные отдельные детали соединяются при помощи разъемных и неразъемных соединений. 15. Так, например, существует несколько видов неразъемных соединений: сварка, пайка с твердым припоем, пайка с мягким припоем и клепка.

Exercise 29. Make up your own story about engineering materials technology according to the following points of the plan. The words and phrases are supposed to make your story logical and interesting.

1. *Different Kinds of Cutting Processes*

Metalworking includes

Cutting is represented by

Machining is

Burning is

Chemical milling is

2. *Different Kinds of Chip Producing Processes*

There are

3. *Turning Process*

Turning produces

Turning can be done

Boring is

4. *Milling Process*

Milling is

Milling can be done

Milling machines can perform

5. *Grinding Machine*

A grinding machine produces

A grinding machine uses

6. *Different Kinds of Joining Processes*

Finished parts are assembled into

There are

Temporary mechanical joining includes

Permanent joining processes embrace

Exercise 30. Write an e-mail to your friend about your visiting a machine building enterprise. Describe cutting and joining processes in detail.

PROJECT WORK

Exercise 31. Compile information about cutting and joining processes and participate in a project. Present the project to your group. You may use the following websites: www.nmri.go.jp/eng/khirata/metalwork/index_e.html, www.mericanmachinist.com/cutting-tools/chapter-1-cutting-tool-materials

ADDITIONAL READING

Exercise 32. Make a summary of the text using the following phrases:

1. The title of the text is...
2. The text is about... The text deals with...
3. The text covers such points as... first... second... third...
4. It should be underlined that...
5. In conclusion, I may say that...
6. To my mind... In my opinion...

JOINING PROCESSES

A mechanical joint is a part of a machine which is used to connect another mechanical part or mechanism. Mechanical joints may be temporary (with the help of bolts, screws, studs, etc.) or permanent (welding, brazing, soldering, and riveting).

Bolted joints are considered to be temporary mechanical joints and may be disassembled when required. They consist of fasteners that capture and join other parts, and are secured with the help of screw threads.

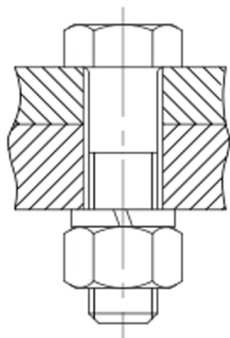
Welding is a fabrication process that joins materials, usually metals or thermoplastics, by causing coalescence. This is often done by melting the work pieces and adding a filler material to form a pool of molten material that cools to become a strong joint, but sometimes pressure is used together with heat, or by itself, to produce the weld.

Brazing is a joining process in which a filler metal is melted and drawn into a capillary formed by the assembly of two or more workpieces. The filler metal reacts with the workpiece(s) and solidifies in the capillary, forming a strong joint. Unlike welding, the workpiece is not melted. Brazing is similar to soldering, but occurs at temperatures in excess of 450 °C (842 °F).

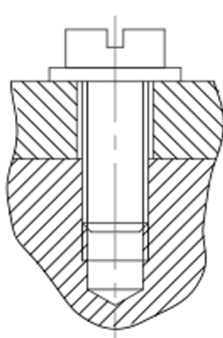
Soldering is a joining process that occurs at temperatures below 450°C (842 °F). It is similar to brazing in the fact that filler is melted and drawn into

a capillary to form a join, although at a lower temperature. Because of this lower temperature and different alloys used as fillers, the metallurgical reaction between filler and workpiece is minimal, resulting in a weaker joint.

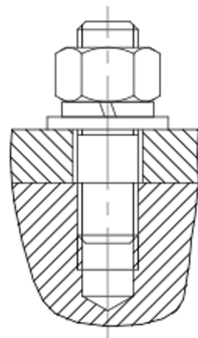
Riveting is one of the most ancient metalwork joining processes. Its use has declined markedly during the second half of the 20th century, but it still retains important in the 21st century. The earlier use of rivets is being superseded by improvements in welding and component fabrication techniques.



Bolted joint



Screw joint



Stud joint

TEST 9

1. Choose the proper words and fill in the blanks.

- Metalworking includes forming, cutting, and ... processes.*
A joining B. soldering C. knurling D. drilling
- Cutting embraces ..., burning, and some special processes.*
A. joining B. machining C. milling D. producing
- Machining is represented by turning, ..., milling, drilling, grinding.*
A. knurling B. boring C. etching D. riveting
- Turning is a cutting process for producing a cylindrical*
A. motion B. lathe C. surface D. tool
- A cutting tool is traversed along two ... of motion.*
A. axes B. axis C. lengths D. diameters
- ... material is removed.*
A. Excess B. Torch C. Etching D. Masking

7. *A milling cutter rotates about its ...* .
 A. axis B. axes C. lengths D. diameters
8. *A worktable of the milling machine can move in ... directions.*
 A. etching B. multiple C. soldering D. milling
9. *Milling machines can perform slot cutting, threading, ...* .
 A. welding B. brazing C. riveting D. rabbeting
10. *Permanent joining processes embrace welding, brazing, ...* .
 A. riveting B. temporary C. drilling D. cutting

2. Fill in the blanks with the proper grammar forms.

1. *Cutting is ... by machining, burning, and special processes.*
 A. representing C. to represent
 B. represented D. represent
2. *The metal parts are ... into pieces.*
 A. cutting B. cutted C. cuts D. cut
3. *When turning, a piece of material ...* .
 A. rotates B. to rotate C. is rotate D. are rotating
4. *Milling machines can ... multiple operations.*
 A. be performed C. performs
 B. to perform D. perform
5. *Milling is a complex process of ... material to form the final part.*
 A. remove B. to remove C. removing D. removed
6. *Milling machines are considered ... complex operations.*
 A. performing C. to have perform
 B. performed D. to perform
7. *We suppose this experiment ...* .
 A. to do B. to have done C. do D. to be done
8. *We didn't expect the drilling ... on the milling machine.*
 A. to be performed C. to have perform
 B. to perform D. perform
9. *Turning is certain ... on a lathe.*
 A. to be done C. to have done
 B. to do D. do
10. *Turning can be ... on the outside or the inside of the cylinder.*
 A. do C. doing
 B. done D. to do

- 3. The text contains different mistakes: 4 — in spelling, 3 — in grammar. Correct the mistakes and rewrite the text.**

The turning processes are typically carried out on a lathe. It is consider to be the oldest cuting mashine. It can be of four diferent types, which can produced various shapes of materials. In general, turning use simple single-point cutting tools.

- 4. Answer these multiple-choice questions about engineering materials technology.**

1. *What does metalworking include?*
 - A. cutting, forming processes
 - B. forming, cutting, special processes
 - C. cutting processes
2. *What is the most common example of a chip producing process?*
 - A. drilling a hole in a metal part
 - B. cutting into pieces
 - C. removing excess material
3. *Where is turning performed?*
 - A. on a milling machine
 - B. on a lathe
 - C. on a grinding machine
4. *What does a lathe frequently require?*
 - A. CNC
 - B. cylindrical surface
 - C. continuous supervision
5. *What material can be turned?*
 - A. wood and metal
 - B. etching chemicals
 - C. masking chemicals
6. *What are the two common types of milling machines?*
 - A. multiple and complex
 - B. horizontal and vertical
 - C. inorganic and organic
7. *What are the two common types of joining techniques?*
 - A. inorganic and organic
 - B. horizontal and vertical
 - C. temporary and permanent

Module 10

DIFFERENT TYPES OF VEHICLES

Vocabulary: exercises 1—7, 12—16.

Grammar (the Subjunctive Mood): exercises 8—9, 17—19.

Reading: exercises 10, 11, 32.

Listening: exercise 20.

Speaking: exercises 21—26.

Writing: exercises 27—30.

Project Work: exercise 31.

Test 10.

KEY VOCABULARY

Exercise 1. Read and guess the meanings of the new words. If you have some difficulties, use the dictionary at the end of this book. It will help you to read and discuss the texts and dialogues, arrange the role-plays and present the projects.

- 1) *to adopt*. The resolution was adopted.
- 2) *to be devoted*. The module was devoted to the engineering materials technology.
- 3) *vehicles and trailers*. One of the units of the resolution is devoted to the classification of vehicles and trailers.
- 4) *to be defined*. Vehicle categories may be defined according to their classification.
- 5) *carriage*. Category 'M' embraces motor vehicles with at least four wheels designed and constructed for the carriage of passengers.
- 6) *omnibuses and coaches*. Omnibuses and coaches are passenger vehicles.
- 7) *chassis frame, engine, fuel*. Passenger vehicles may be classified according to the type of chassis frame, engine, fuel, etc.
- 8) *desirable*. It is desirable to go there by a coach.
- 9) *goods*. Motor vehicles for the carriage of goods include light commercial vehicles and large goods vehicles.
- 10) *truck or lorry*. 'A large goods vehicle' is the EU term for any truck (lorry) with mass over 3.5 tonnes.

- 11) *to vary*. Trucks vary greatly in size, power, and configuration.
- 12) *bulky equipment*. A pickup is desirable for the transportation of bulky equipment.
- 13) *non-self propelled vehicles*. Trailers and semi-trailers are non-self propelled vehicles.
- 14) *to be towed*. Trailers and semi-trailers are constructed to be towed by power-driven vehicles.
- 15) *purpose*. Special purpose vehicles perform special functions with special body arrangement and equipment.
- 16) *motor caravans, armoured vehicles, ambulances*. Special purpose vehicles embrace motor caravans, armoured vehicles, ambulances, etc.
- 17) *wheeled, with caterpillar tracks*. Agricultural tractors may be wheeled or with caterpillar tracks.
- 18) *to pull, to push*. Agricultural tractors are designed to pull, push, carry or actuate certain tools, machines or trailers.
- 19) *non-road mobile machinery*. The term 'non-road mobile machinery' means any mobile machine, transportable industrial equipment or vehicle with or without body not intended for the use of passenger- or goods- transport on the road.
- 20) *to install the internal combustion engine*. The internal combustion engines are installed in the non-road mobile machinery.
- 21) *earthmoving machinery*. Non-road mobile machinery embraces earthmoving machinery.
- 22) *off-road vehicles*. Category 'G' embraces off-road vehicles.
- 23) *paved or gravel surface*. Off-road vehicles can drive on and off paved or gravel surface.
- 24) *capable*. Off-road vehicles are capable of driving on and off paved or gravel surface.
- 25) *tyres with deep open treads*. Off-road vehicles usually have large tyres with deep open treads.
- 26) *flexible suspension*. Off-road vehicles are also characterized by a flexible suspension.
- 27) *versatile*. Off-road vehicles have versatile application.

Exercise 2. Read the words following the rules of reading. Pronounce correctly. Practise aloud.

Classification, frame, pave, gravel, configuration, scraper, grader;
 carriage, category, passenger, tractor, caterpillar, ambulance, track, carry,
 actuate;

vehicle, wheel;
 excavator, suspension, self;
 define, size, drive;
 committee, commission, which, equipment;
 unit, resolution, numerous;
 construction, agricultural, bulky, truck, function, industrial, combustion;
 purpose, surface, commercial, certain, term, internal, versatile;
 with, without, either, earthmoving.

Exercise 3. Look at the following pairs of words and think if the underlined letters are pronounced in the same way, or if they are pronounced differently. Read aloud.

Frame — grader; gravel — tractor; surface — purpose; excavator — vehicle;
 with — without; which — drive; either — earthmoving; carry — actuate;
 certain — term, bulky — truck; resolution — numerous; define — size; internal — commercial; carriage — passenger.

Exercise 4. Read the international words, mind the stress.

Forum, harmonization, transport, committee, economic, commission, resolution, construction, classification, category, motor, special, tractor, mobile, type, chassis, mass, van, pickup, configuration, function, machine, industrial, scraper, grader, excavator, bulldozer, characterize.

Exercise 5. Try to enrich your vocabulary:

a) analyse the following words with different suffixes and divide them into two groups — nouns and adjectives:

harmonization, economic, commission, resolution, construction, classification, passenger, agricultural, numerous, commercial, transportation, bulky, European, special, function, arrangement, equipment, ambulance, transportable, industrial, internal, combustion, scraper, grader, capable, flexible, suspension, application, desirable;

b) make up as many words as you can by combining different parts of the words:

in-	construct	-(at)ion
	transport	-an
	Europe	-ment
	arrange	-able
	equip	
	land	

Exercise 6. Divide the following words or phrases into four groups, those which describe or belong to a) passenger vehicles; b) vehicles for the carriage of goods; c) non-road mobile machinery; d) off-road vehicles.

Coach, truck, pickup, omnibus, scraper, gravel surface, flexible suspension, lorry, excavator, caterpillar track, grader, bus, motor car, bulky equipment, large tyres, bulldozer, deep open treads.

Exercise 7. Think over the definitions of the words which appear in the texts and dialogues and then:

a) agree or disagree with the following definitions

1. *Bulky* is too big to be carried or stored easily.
2. *Bulldozer* is a heavy vehicle with a large curved open container at the front used for moving earth and stones, destroying buildings, etc.
3. *Coach* is a long comfortable vehicle for carrying a large number of passengers, especially on long journeys.
4. *Omnibus* is an old word meaning a 'bus'.
5. *Trailer* is a long container that can be fixed to a vehicle and used for moving heavy objects or large animals.

b) match each word with its correct definition

scraper, excavator, pickup, ambulance, truck

1. A machine used for removing a layer from a surface.
 2. A large road vehicle used for carrying goods.
 3. A vehicle for taking people to hospital.
 4. A truck with an open back and low sides.
 5. A large machine for digging holes in the ground.
- c) find the definitions for some other words which you consider to be important for the topic "Different Types of Vehicles". Use the website www.macmillandictionaries.com**

EXPLORING GRAMMAR

Exercise 8. Read the sentences, point out the Subjunctive Mood. Give the Russian equivalents. If you have some difficulties, use the grammar reference at the end of the book.

1. It would be desirable to be present at the conference. 2. It would be to the point to look through this resolution. 3. It is required that special purpose vehicles should have special body arrangement and equipment. 4. They recommended that you should use this pickup. 5. I wish we were there. 6. He bought an off-road vehicle so that you might drive on and off paved or gravel surface.

7. If I had time I could be present at the conference. 8. If I had had time last Monday I would have attended the conference.

Exercise 9. Make up your own sentences according to the models.

Model A: *I am sorry I cannot define this term.*
I wish I could define this term.

1. I am sorry I cannot buy this motor car. 2. I am sorry I cannot carry the luggage. 3. I am sorry I cannot drive off the road. 4. I am sorry I cannot take part in the discussion. 5. I am sorry I cannot board the bus.

Model B: *I am sorry we didn't think about it before.*
I wish we had thought about it before.

1. I am sorry I didn't do it for you before. 2. I am sorry we didn't attend that conference. 3. I am sorry they didn't tell you then about it. 4. I am sorry I wasn't there before. 5. I am sorry you didn't use that equipment.

READING

Exercise 10. Read the text, try to focus on its essential facts and choose the most suitable heading given below for each paragraph.

- 1) Trailers and Semi-trailers
- 2) Off-road Vehicles
- 3) Passenger Vehicles
- 4) Classification of Vehicles
- 5) Non-road Mobile Machinery
- 6) Vehicles for the Carriage of Goods
- 7) Special Purpose Vehicles
- 8) Tractors

VEHICLE CATEGORIES

On the 30th of November, 2011 at the World Forum for Harmonization of Vehicles, the Inland Transport Committee of Economic Commission for Europe adopted 'Consolidated Resolution on the Construction of Vehicles'. One of the units of the resolution is devoted to the classification of power-driven vehicles and trailers. Vehicle categories are defined according to the following classification: motor vehicles with at least four wheels designed and constructed for the carriage of passengers (category 'M'); motor vehicles with at least four wheels designed and constructed for the carriage of goods (category 'N'); trailers (category 'O'); special purpose vehicles; agricultural and forestry tractors (category 'T'); non-road mobile machinery; off-road vehicles (category 'G').

There are numerous types of passenger vehicles: light passenger vehicles (motor cars or cars), people carriers or mini-buses, buses (omnibuses), coaches, etc. They may be classified according to the types of chassis frame, engine, fuel, as well as the purpose for which they are used.

Motor vehicles for the carriage of goods include light commercial vehicles (also light goods vehicle) and large goods vehicles, LGV (also heavy goods vehicle, HGV). 'A large goods vehicle' is the European Union (EU) term for any truck (lorry) with mass over 3.5 tonnes. Trucks vary greatly in size, power and configuration. Light commercial vehicles with mass not more than 3.5 tonnes are called light vans. When a vehicle is required for the transportation of bulky equipment, a pickup would be often desirable.

Trailers and semi-trailers are any non-self propelled vehicles. It is required that they should be towed by power-driven vehicles.

Special purpose vehicles embrace the vehicles of categories 'M', 'N' or 'O' for the carriage of passengers or goods and for performing special functions with special body arrangement and equipment. They include motor caravans, armoured vehicles, ambulances, etc.

Agricultural and forestry tractors are power-driven vehicles, either wheeled or caterpillar tracks, which are designed to pull, push, carry or actuate certain tools, machines or trailers.

The term 'non-road mobile machinery' means any mobile machine, transportable industrial equipment or vehicle with or without body not intended for the use of passenger- or goods- transport on the road, in which the internal combustion engine is installed. Non-road mobile machinery embraces earthmoving machinery, such as scrapers, bulldozers, graders, excavators, etc.

Off-road vehicles are considered to be any types of vehicles which are capable of driving on and off paved or gravel surface. They are generally characterized by having large tyres with deep open treads, a flexible suspension, or even caterpillar tracks. They have a versatile application, e.g. several types of motorsports involve racing off-road vehicles.

Exercise 11. Agree or disagree with the following statements.

1. The classification of power-driven vehicles was defined at the World Forum for Harmonization of Vehicles.
2. Numerous types of passenger vehicles are known to be included into category 'M'.
3. Category 'G' represents off-road vehicles.
4. Light commercial vehicles are considered to be passenger vehicles.
5. Agricultural tractors may be either wheeled or with caterpillar tracks.
6. The vehicles of 'M', 'N' or 'O' categories may be special purpose vehicles.
7. Trailers are non-self propelled vehicles.

KEY VOCABULARY DEVELOPMENT

Exercise 12. Match the adjectives in column A with the nouns in column B to form meaningful phrases and then identify them at the sentence level in the text. It will help you understand the text in detail.

A	B
1) agricultural	a) classification
2) numerous	b) equipment
3) following	c) Union
4) special	d) tools
5) mobile	e) tractors
6) European	f) body
7) bulky	g) types
8) internal	h) machinery
9) flexible	i) suspension
10) certain	j) combustion

Exercise 13. Decide which of the verbs on the left collocate with the nouns on the right and then identify the word combinations at the sentence level in the text. It will help you understand the text precisely.

1) to adopt	a) categories
2) to perform	b) classification
3) to tow	c) functions
4) to involve	d) resolution
5) to define	e) trailers
6) to be devoted to	f) tools
7) to actuate	g) goods
8) to carry	h) vehicles
9) to board	i) engines
10) to install	j) coaches

Exercise 14. Try to enrich your vocabulary:

a) find words in the text which have the same meanings as the following words:

design, kinds, motor car, omnibus, aim, to embrace, big, truck, very much, to fulfil, application, motor, different, some;

b) find words in the text whose meanings are opposite to the meanings of the following words:

heavy, reconstruction, industrial, small, to pull, stationary, with, external, off the road, closed;

c) replace the words in italics with the words with similar meanings:

1. There are different *kinds* of vehicles. 2. *A truck* is a vehicle with mass over 3.5 tonnes. 3. Category 'M' includes *motor cars*. 4. The trucks vary in size *very much*. 5. They *fulfil* different functions.

Exercise 15. Complete the sentences: change the word in capitals at the end of each sentence to form a word that fits suitably in the blank space.

1. 'A large goods vehicle' is the ... Union term for any truck EUROPE.
2. This vehicle has special body ... ARRANGE.
3. It depends on the ... of the vehicle CONSTRUCT.
4. The LGV is for the ... of goods TRANSPORT.
5. This vehicle is for the carriage of the special ... EQUIP.

Exercise 16. Insert the words at the sentence level: fill in the blanks with the missing words (the first letter of each word is given).

1. V... categories are defined according to the classification. 2. There is a classification of power-driven vehicles and t... . 3. Passenger vehicles may be classified according to the types of e... . 4. Pickups are usually used for b... equipment. 5. Trucks v... in power and configuration. 6. Special purpose vehicles include armoured vehicles, a..., etc. 7. Agricultural tractors pull and p... trailers. 8. The internal c... engine is installed in the motor car. 9. The off-road vehicle has a f... s... . 10. Off-road vehicles have a v... application.

GRAMMAR DEVELOPMENT

Exercise 17. Point out the sentences with the Subjunctive Mood in the text and provide the Russian equivalents. It will help you understand the text in detail.

Exercise 18. Fill in the blanks to streamline the use of the Subjunctive Mood. The words in brackets are given to help you.

1. It ... useful to investigate this problem (to be). 2. There ... no results without these experiments (to be). 3. He suggested that you ... this article (to read). 4. I wish I ... about it (to know). 5. I brought the book for you so that you ... it (to read). 6. If I were you, I ... these lectures (to attend). 7. If you had visited the library yesterday, you ... some more information about it (to find). 8. It ... difficult to define this term (to be). 9. It is necessary that they ... there with me (to go). 10. It ... to the point to read this book (to be).

Exercise 19. Make up sentences according to the models to practise the use of the Subjunctive Mood.

Model A: *Было бы интересно побывать на этой конференции.*
It would be interesting to attend this conference.

1. Было бы полезно прочитать эту статью. 2. Было бы желательно выучить эти термины. 3. Было бы трудно решить эту проблему. 4. Было бы полезно обработать эти данные. 5. Было бы кстати посетить этот музей.

Model B: *Хотелось бы, чтобы этот автомобиль понравился вам.*

I wish you liked this motor car.

1. Хотелось бы, чтобы вы купили этот автомобиль. 2. Хотелось бы, чтобы вы определили этот термин. 3. Хотелось бы, чтобы вы приняли эту резолюцию. 4. Хотелось бы, чтобы вы использовали это оборудование. 5. Хотелось бы, чтобы вы поехали в автобусе.

LISTENING

Exercise 20. Listen to the text “Buses and Coaches”.

Before listening: mind the words and phrases given to comprehend better the information you are going to listen to.

Loading and unloading passengers — посадка и высадка пассажиров;

to provide — обеспечивать;

to prevent — мешать, препятствовать;

for conveying passengers — для перевозки пассажиров;

facilities — благоприятные условия;

luggage — багаж.

After listening: agree or disagree with the following statements and add some more information if needed.

1. Speed of loading and unloading passengers is very important in towns and cities. 2. The doors in buses are not power-operated by the driver. 3. Omnibuses transport about sixty passengers. 4. Coaches are just the same as buses. 5. Coaches are usually equipped with facilities required for longer trips.

SPEAKING

Exercise 21. Share your vision of different types of vehicles using the following phrases: to my mind, in my opinion, if I am not mistaken, as far as I remember, it seems to me, etc.

1. When and where was the classification of power-driven vehicles and trailers defined?

2. What vehicle categories do you know?

3. How are passenger vehicles classified?

4. What types of vehicles does category ‘N’ embrace?

5. Which vehicle would be desirable for the transportation of bulky equipment?
6. What do the abbreviations LGV and HGV mean?
7. What non-self-propelled vehicles can you name?
8. What is the difference between trailers and semi-trailers?
9. What category do special purpose vehicles belong to?
10. What does the term 'non-road mobile machinery' mean?
11. What does non-road mobile machinery embrace?
12. How can you define agricultural and forestry tractors?
13. How can you characterize off-road vehicles?
14. Where may off-road vehicles be used?
15. Which vehicles would you prefer to drive?

Exercise 22. Make up general and disjunctive questions and answer them according to the models to enhance your speaking skills.

Model A: *Category 'M' includes motor vehicles for the carriage of passengers. Does category 'M' include motor vehicles for the carriage of passengers? — Yes, it does.*
Category 'M' includes motor vehicles for the carriage of passengers, doesn't it? — Yes, it does.

1. Category 'N' embraces motor vehicles for the carriage of goods. 2. Category 'G' contains off-road vehicles. 3. A double-decker bus carries about sixty passengers. 4. The Forum adopts the resolution. 5. This vehicle performs special functions.

Model B: *Buses are also called omnibuses.*
Are buses also called omnibuses? — Yes, they are.
Buses are also called omnibuses, aren't they? — Yes, they are.

1. Vehicles are defined according to their classification. 2. Some units are devoted to motor cars. 3. Motor cars are classified according to the types of chassis frame. 4. Trailers are towed by power-driven vehicles. 5. The internal combustion engines are installed in the motor cars.

Exercise 23. Make up special questions according to the models, and answer them to streamline your speaking skills.

Model A: *The conference took place on the 30th of November, 2011.*
When did the conference take place?

1. They adopted the resolution on the 30th of November, 2011. 2. They defined vehicle categories long ago. 3. He attended the classes last week. 4. This wheeled tractor pulled the trailer not long ago. 5. They designed this model last year.

Model B: *Buses transport about forty passengers.*
How many passengers do buses transport?

1. Double-deckers carry about sixty passengers. 2. Coaches convey between thirty and forty passengers. 3. Special purpose vehicles embrace three vehicle categories. 4. Bulldozers embrace two types. 5. Mini-buses transport about fifteen passengers.

Exercise 24. Ask questions and use the words in italics in your answers. The words in brackets will help you.

1. The doors are usually power-operated by the driver *to prevent passengers getting on or off while the bus is moving* (why). 2. The entrance is at the front *for the driver to have a direct view of boarding passengers* in modern buses (why). 3. We may decode 'LGV' as '*light goods vehicle*' (how). 4. '*LGV*' is an official EU term (what). 5. 'HGV' means '*heavy goods vehicle*' (what).

Exercise 25. Read the following dialogue, sum up the information and act out a similar dialogue.

'LGV' AND 'HGV'

- A.: Would you be so kind as to explain what the abbreviation 'LGV' really means? We may decode 'LGV' as 'light goods vehicle' and also as 'large goods vehicle'.
- B.: You see, 'light commercial vehicle' is the official term used within the European Union for a commercial vehicle with mass not more than 3.5 tonnes. And it has an abbreviation 'LCV'. But some parts of the UK use for 'a light commercial vehicle' the abbreviation 'LGV' and decode it as 'light goods vehicle'.
- A.: So, the abbreviation 'LGV' should be used for motor vehicles which carry light goods.
- B.: Not quite so. 'Light goods vehicle', or 'LGV', can be confused with 'Large goods vehicle', also 'LGV' which is the official EU term for a vehicle with mass of over 3.5 tonnes.
- A.: As far as I remember, I have come across the abbreviation 'HGV' for such kinds of vehicles.
- B.: You are absolutely right. 'HGV' stands for 'heavy goods vehicle'. And this term is also used. Moreover, the term 'medium goods vehicle' is used within some parts of the UK to refer to goods vehicles of between 3.5 and 7.5 tonnes which according to the EU are also 'large goods vehicle'.
- A.: Oh, it's not easy to differentiate all these terms...
- B.: I do agree with you. I have spent a lot of time surfing the Internet on the point but still have a lot to clear out.

A.: I am interested in everything concerning the vehicles. I'd like to research this problem together.

B.: I don't mind. Let's do it right now.

Exercise 26. Role-play the following situations.

1. You are present at the World Forum for Harmonization of Vehicles. You are discussing with the representatives from the USA one of the units of the resolution devoted to the classification of power-driven vehicles. 2. While travelling in the coach you are discussing with an English man the coach facilities.

WRITING

Exercise 27. Complete the following sentences in a logical way.

1. Vehicle categories are defined according to the...
2. Category 'M' embraces light passenger vehicles, mini-buses, buses...
3. Category 'N' includes light commercial vehicles and...
4. Trailers and semi-trailers represent category...
5. Special purpose vehicles embrace the vehicles of categories...
6. Agricultural and forestry tractors are within category...
7. The term 'non-road mobile machinery' means any mobile machine in which...
8. Off-road vehicles are any types of vehicles which...
9. Off-road vehicles have large tyres with...
10. Off-road vehicles have a versatile application, e.g. ...

Exercise 28. Translate the following sentences from Russian into English. You will have a story on the topic as a pattern.

1. Категории транспортных средств определяются в соответствии с их классификацией. 2. Категория М включает механические транспортные средства, имеющие не менее четырех колес и используемые для перевозки пассажиров. 3. Существуют многочисленные виды пассажирских транспортных средств: легковые автомобили, мини-автобусы, городские автобусы, автобусы дальнего следования и др. 4. Категория N включает механические транспортные средства, имеющие не менее четырех колес и используемые для перевозки грузов. 5. Механические транспортные средства для перевозки грузов представлены легкими грузовыми транспортными средствами и большими грузовыми транспортными средствами. 6. Прицепы и полуприцепы — это любые несамоходные транспортные средства, которые сконструированы для

их буксировки механическими транспортными средствами. 7. Транспортные средства специального назначения включают транспортные средства со специальным кузовом и оборудованием для перевозки пассажиров и грузов, а также для выполнения специальных функций. 8. Сельскохозяйственные тракторы представляют собой механические транспортные средства на колесном или гусеничном ходу, которые сконструированы для буксировки, толкания, перевозки или приведения в действие определенных устройств, механизмов или прицепов. 9. Внедорожная подвижная техника включает в себя землеройно-транспортные машины, такие как скреперы, бульдозеры, грейдеры, экскаваторы и др. 10. Транспортные средства повышенной проходимости характеризуются большими шинами с глубокими открытыми протекторами, «мягкой» подвеской или даже гусеничным треком.

Exercise 29. Make up your own story about different types of vehicles according to the following points of the plan. The words and phrases are supposed to make your story logical and interesting.

1. *Classification of Vehicles*

The Inland Transport Committee of Economic Commission for Europe adopted

Vehicle are defined

2. *Passenger Vehicles*

There are

They may be classified

3. *Vehicles for the Carriage of Goods*

Motor vehicles for the carriage of goods include

Trucks vary

4. *Trailers and Semi-trailers*

Trailers and semi-trailers are

Trailers are towed

5. *Special Purpose Vehicles*

Special purpose vehicles embrace

They perform

They include

6. *Tractors*

Agricultural and forestry are

They pull, push, carry or actuate

7. *Non-road Mobile Machinery*

The term 'non-road mobile machinery' means

Non-road mobile machinery is not intended

Non-road mobile machinery embraces

8. *Off-road Vehicles*

Off-road vehicles are

They have

Exercise 30. Write an e-mail to your friend about your attending the World Forum for Harmonization of Vehicles. Describe one of the units of the resolution devoted to the classification of power-driven vehicles adopted at the Forum in detail.

PROJECT WORK

Exercise 31. Compile information about different types of vehicles and participate in a project. Present the project to your group. You may use the following websites: www.visualdictionaryonline.com, www.automotivecare.com

ADDITIONAL READING

Exercise 32. Make a summary of the text using the following phrases:

1. The title of the text is...
2. The text is about... The text deals with...
3. The text covers such points as... first... second... third...
4. It should be underlined that...
5. In conclusion, I may say that...
6. To my mind... In my opinion...

EARTHMOVING MACHINERY

A scraper is a heavy earthmoving machine. The rear part has a vertically moveable hopper (also known as the bowl) with a sharp horizontal front edge. The hopper can be lowered and raised. Scrapers can be very efficient on short distances where the cut and fill areas are close together and have sufficient length to fill the hopper. Most often, scrapers are large and powerful wheeled machines. But some scrapers are tracked heavy machines. The tracks give them excellent ground hold and mobility through a very rough surface.

A bulldozer is a machine equipped with a substantial metal plate (known as a blade) used to push large quantities of soil, sand, or other material. Bulldozers are also used to loosen densely-compacted materials with a claw-like device (known as a ripper) placed at the rear. There are two types of bulldozer: crawler bulldozer (crawler dozer) and wheeled bulldozer (wheel dozer).

A grader is a construction machine with a long blade used to create a flat surface, to finish the “rough grading” performed by scrapers and bulldozers. Graders are commonly used in the construction and maintenance of roads or in the preparation of the base for a wide flat surface for the asphalt to be placed on or to finish grade prior to the construction of large buildings. A more recent innovation is the outfitting of graders with GPS technology.

Excavators tracked or wheeled are heavy construction machines the parts of which are boom, sticks, bucket and cab on a rotating platform (known as the “house”). Excavators are also called diggers, mechanical shovels, or 360-degree excavators (sometimes abbreviated simply to 360).



Terex TS-14b scraper in Hudson, Ohio



A bulldozer, Hainan, China



A modern road grader



A Liebherr bulldozer



A bulldozer ripper

TEST 10

1. Choose the proper words and fill in the blanks.

- The resolution on the construction of ... was adopted.*
A. vehicles B. categories C. goods D. units
- Category 'M' includes motor vehicles for the ... of passengers.*
A. construction C. goods
B. carriage D. classification
- Motor cars may be classified according to the chassis*
A. engine B. fuel C. frame D. vehicle
- Pickups are used for the transportation of ... equipment.*
A. bulky B. desirable C. light D. wheeled
- Trucks ... in size.*
A. adopt B. power C. vary D. perform
- Tractors may have ... tracks.*
A. vehicles B. caterpillar C. tools D. trailers
- Tractors ... certain tools.*
A. perform B. embrace C. intend D. actuate
- Scrapers are powerful ... machines.*
A. rotating B. wheeled C. flat D. ground
- 'HGV' should be used for motor vehicles which carry ... goods.*
A. flat B. tracked C. wheeled D. heavy

10. 'HGV' stands for 'heavy ... vehicle'.

- A. good B. goods C. great D. greatly

2. Fill in the blanks with the proper forms of the Subjunctive Mood.

1. *It ... interesting to attend this conference.*

- A. were B. are C. would be D. been

2. *I'll tell you some more information so that you ... better understand the problem.*

- A. will B. might C. are D. were

3. *It is necessary that we ... this book.*

- A. should read C. was reading
B. has read D. reads

4. *It is desirable that they ... this car.*

- A. buys B. bought C. has bought D. should buy

5. *We wish they ... here.*

- A. are B. were C. been D. was

6. *I wish you ... about it.*

- A. knew B. know C. known D. have been known

7. *He suggested that you ... this article.*

- A. should read B. should C. have read D. have been read

8. *They proposed that the forum ... the resolution.*

- A. adopting B. was adopting C. should D. should adopt

9. *If you read this article you ... some more information.*

- A. get B. got C. would D. would get

10. *If you had done it before you ... the problem .*

- A. would have solved C. have solved
B. would solved D. solved

3. The text contains different mistakes: 4 — in spelling, 3 — in grammar. Correct the mistakes and rewrite the text.

An automobile, motor car or car are a wheeled motor vehicle used for transporting rather pasengers than goods, which also cary its own engine or motor. Most definitions of the term specifies that automobiles been desighed to run primarily on roads, to have seats for one to eight people, and to have typicly four wheels.

4. Answer these multiple-choice questions about different types of vehicles.

1. *What vehicle categories do special purpose vehicles embrace?*
 - A. 'N', 'M', 'G'
 - B. 'N', 'T', 'G'
 - C. 'M', 'N', 'O'
2. *What category do off-road vehicles represent?*
 - A. 'G'
 - B. 'O'
 - C. 'N'
3. *What types of vehicles do special purpose vehicles embrace?*
 - A. scrapers, bulldozers, graders, excavators
 - B. scrapers, graders, excavators
 - C. ambulances, motor caravans
4. *What is the characteristic feature of off-road vehicles?*
 - A. gravel surface
 - B. flexible suspension
 - C. paved surface
5. *What is the characteristic feature of a coach?*
 - A. deep open treads
 - B. overhead luggage compartments
 - C. caterpillar tracks
6. *How can we decode 'HGV'?*
 - A. hard goods vehicle
 - B. heavy good vehicle
 - C. heavy goods vehicle
7. *What is the characteristic feature of an excavator?*
 - A. metal plate
 - B. rough grading
 - C. rotating platform

Module 11

MOTOR CAR COMPONENTS

Vocabulary: exercises 1—7, 12—16.

Grammar Revision: exercises 8—9, 17—19.

Reading: exercises 10, 11, 32.

Listening: exercise 20.

Speaking: exercises 21—26.

Writing: exercises 27—30.

Project Work: exercise 31.

Test 11a

KEY VOCABULARY

Exercise 1. Read and guess the meanings of the new words. If you have some difficulties, use the dictionary at the end of this book. It will help you to read and discuss the texts and dialogues, arrange the role-plays and present the projects.

- 1) *engine, chassis, body.* The main structural components of a motor car are engine, chassis, and body.
- 2) *petrol (gasoline) engine.* A petrol (gasoline) engine is the most popular for light passenger vehicles.
- 3) *capacity.* The engine in heavy vehicles is usually a large capacity diesel.
- 4) *pulling power, reliability, low fuel consumption.* The main requirements for a diesel are high levels of pulling power, reliability, and low fuel consumption.
- 5) *transmission, drive lines, steering systems.* Chassis embraces transmission, drive lines, and steering systems.
- 6) *clutch, gearbox, propeller shaft, drive shafts, half-shafts.* Transmission includes clutch, gearbox, propeller shaft, main shaft, differentials, final drive shafts or half-shafts.
- 7) *front and rear axles, suspension.* Drive lines consist of frame, front and rear axles, suspension, and wheels.
- 8) *layout.* Motor cars may have three types of drive layout.

- 9) *rear-wheel drive, front-wheel drive, four-wheel drive*. Vehicles may contain rear-wheel drive, front-wheel drive, and four-wheel drive layout.
- 10) *accessible*. When the rear wheels act as the driving wheels, spacing out the main components makes each unit accessible.
- 11) *to intrude*. When the rear wheels act as the driving wheels, the transmission components intrude into the passenger compartment.
- 12) *to distribute*. Four-wheel drive arrangement distributes the drive to all four wheels.
- 13) *to reduce wheel spin*. It reduces the risks of wheel spin.
- 14) *springs, shock absorbers, linkages*. The suspension system involves springs, shock absorbers, and linkages.
- 15) *wheel steering, brake steering*. The steering systems involve wheel steering and brake steering.
- 16) *vehicle's handling*. The suspension system contributes to the vehicle's handling for good safety and driving pleasure.
- 17) *to isolate*. The suspension system keeps vehicle occupants comfortable and well isolated from road bumps, vibration, etc.
- 18) *integral chassis frame and body*. Most modern cars are built with integral chassis frame and body.
- 19) *stiff*. The frameless or integral arrangement provides a stiff light construction of the motor car.
- 20) *suitable*. This frameless or integral arrangement is suitable for mass-produced vehicles.
- 21) *to withstand*. A suitable body shell can withstand various frame stresses.
- 22) *unitary*. A small passenger vehicle uses a lightweight unitary construction.
- 23) *to locate*. A light unitary construction contains relatively light vehicle systems and components.
- 24) *sufficient*. A light unitary construction provides sufficient space for a driver and passengers.

Exercise 2. Read the words following the rules of reading. Pronounce correctly. Practise aloud.

Location, space, embrace, frame, brake, make, safe, acceleration, vibration;

passenger, axle, act, handling, active;

wheel, keep;

engine, differential, suspension, petrol, accessible, integral, shell, stress;

prime, provide, driver, final, line, isolate;

transmission, which, risk, spin, spring, linkage, stiff;

component, motor;
use, unitary, usual, produce, unit, during, reduce, suitable;
structure, number, construction, clutch, combustion, consumption;
purpose, internal, serve;
therefore, withstand.

Exercise 3. Look at the following pairs of words and think if the underlined letters are pronounced in the same way, or if they are pronounced differently. Read aloud.

Wheel — keep; engine — petrol; usual — unit; component — motor;
 clutch — reduce; internal — serve; final — stiff; axle — brake; make — frame;
 structure — purpose; unitary — use; combustion — consumption; during — number;
 space — embrace; acceleration — vibration; handling — safe.

Exercise 4. Read the international words, mind the stress.

Motor, structure, system, component, design, construction, chassis, transmission, differential, popular, diesel, act, compactness, modern, acceleration, risk, shock, active, comfortable, vibration, integral, mass, stress.

Exercise 5. Try to enrich your vocabulary:

a) analyse the following words with different suffixes and divide them into two groups — nouns and adjectives:

structure, requirement, location, necessary, unitary, construction, sufficient, driver, structural, transmission, propeller, suspension, usual, internal, combustion, traditional, usual, ability, reliability, accessible, intrusion, compactness, arrangement, acceleration, absorber, linkage, safety, pleasure, comfortable, vibration, integral, suitable, various;

b) make up as many words as you can by combining different parts of the words:

in-	require	-ment	-ly
un-	construct	-er	
	drive	-ty	
	access	-able	
	comfort	-ion	
	arrange	-ible	
	absorb	-ness	
	suit	-age	
	compact		
	usual		
	traditional		
	link		

Exercise 6. Divide the following words or phrases into five groups, those which describe or belong to a) engine; b) transmission; c) drive lines; d) steering system; e) body.

Rear axle, capacity, clutch, pulling power, propeller shaft, wheels, springs, suspension, shock absorber, half-shafts, integral arrangement, gearbox, differentials, linkages, stiff light construction, main shaft, frame, front axles, wheel steering, diesel, brake steering, internal combustion, petrol, fuel consumption, gasoline, rear-wheel drive.

Exercise 7. Think over the definitions of the words which appear in the texts and dialogues and then:

a) agree or disagree with the following definitions

1. *Accessible* means easy for anyone to obtain and use.
2. *Unitary* means relating to or existing as a single thing.
3. *Sufficient* means as much as is needed.
4. *Capacity* is the amount of something that can be put in a container.
5. *Brake* is the equipment in a car or other vehicle that you use for slowing down or stopping.

b) match each word with its correct definition

clutch, gearbox, axle, suspension, transmission

1. The part of the vehicle that takes power from the engine to the wheels.
2. A metal box that contains the gears of the vehicle.
3. A piece of equipment in a vehicle that you press with your foot when you change gear.
4. The equipment that makes a vehicle move smoothly when it goes over bumps on the ground.
5. A metal bar that connects a pair of wheels on a car or other vehicle.

c) find the definitions for some other words which you consider to be important for the topic “Motor Car Components”. Use the website www.macmillan-dictionaries.com

GRAMMAR REVISION

Exercise 8. Read the sentences, point out the Subjunctive Mood, the modal verbs and their equivalents. Give the Russian equivalents. If you have some difficulties, use the grammar reference at the end of the book.

1. They have to provide the necessary tools.
2. This structure should fulfil a number of requirements.
3. The structure must contain all the systems and components.
4. They are able to arrange all the components.
5. The suspension

system is to keep the vehicle occupants comfortable. 6. Being rather stiff the frameless or integral arrangement can withstand various frame stresses. 7. The front-wheel drive is designed to be rather compact. 8. The four-wheel drive is to reduce the risks of wheel spin. 9. It would be desirable to install a diesel in this vehicle. 10. I wish we were isolated from road bumps.

Exercise 9. Make up your own sentences according to the models.

Model A: *He can drive this motor car.* *He must drive this motor car.*
He is able to drive this motor car. *He has to drive this motor car.*

1. He can arrange these components. 2. He can provide the proper model design. 3. He must provide the proper model design. 4. The four-wheel drive arrangement must distribute the drive to all four wheels. 5. She must handle the vehicle very carefully.

Model B: *This motor car hasn't a petrol engine.*
I wish this car had a petrol engine.

1. This vehicle hasn't a diesel. 2. This car hasn't sufficient space for a driver and passengers. 3. This motor car hasn't a four-wheel drive layout. 4. This automobile hasn't a good suspension system. 5. This vehicle hasn't a stiff light construction.

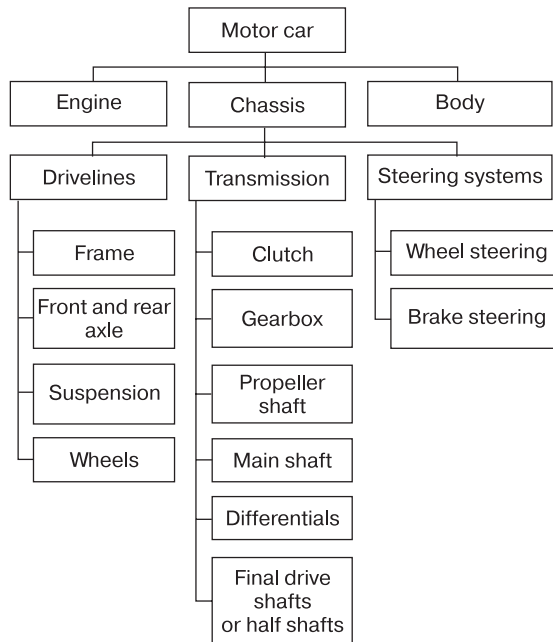
READING

Exercise 10. Read the text, try to focus on its essential facts and choose the most suitable heading given below for each paragraph.

- 1) Engine
- 2) Suspension System
- 3) Integral Chassis Frame and Body
- 4) Motor Car Components
- 5) Transmission and Drive Lines

MOTOR CAR STRUCTURE

A structure of a vehicle has to fulfil a number of requirements. The prime purpose of the vehicle structure is to provide a location for all the necessary vehicle systems and components. The purpose of the vehicle will also dictate the size and weight of the vehicle systems and components and therefore the structure will be designed accordingly. The main structural components of a motor car are engine, chassis and body. Chassis embraces transmission (clutch, gear-box, propeller shaft, main shaft, differentials, final drive shafts or half-shafts), drive lines (frame, front and rear axles, suspension and wheels) and steering systems (wheel steering and brake steering).

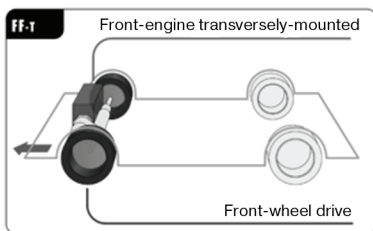


Motor car components

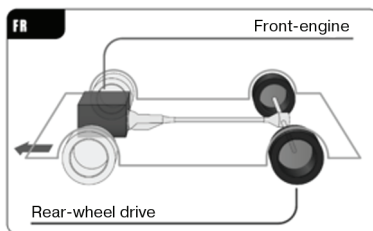
The usual source of power for a motor car is an internal combustion engine. A petrol (gasoline) engine has traditionally been the most popular for light passenger vehicles. The engine in heavy vehicles is usually a large capacity diesel, the main requirements for which are an ability to produce high levels of pulling power, reliability, and low fuel consumption.

The power of the engine is transmitted through the transmission and drive lines to the drive wheels. For the rear-wheel drive (RWD) layout, the rear wheels act as the driving wheels. Spacing out the main components in this layout makes each unit accessible but a drawback is the intrusion of the transmission components into the passenger compartment. The compactness of the front-wheel drive (FWD) layout has made it very popular on modern cars, especially on small cars. The arrangement of four-wheel drive (4WD) is safer because it distributes the drive to all four wheels and during acceleration it reduces the risks of wheel spin.

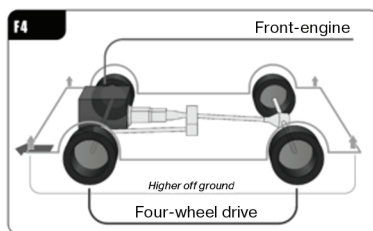
The suspension system involving springs, shock absorbers and linkages serves a dual purpose: contributing to the vehicle's handling for good active safety and driving pleasure, and keeping vehicles occupants comfortable and reasonably well isolated from road bumps, vibrations, etc.



Front-wheel drive



Rear-wheel drive



Four-wheel drive

Most modern cars are built with an integral chassis frame and body. This frameless or integral arrangement provides a stiff light construction to the motor car, which is particularly suitable for mass-produced vehicles. A suitable designed body shell can withstand various frame stresses. A lightweight unitary construction contains relatively light vehicle systems and components and provides sufficient space for a driver and passengers.

Exercise 11. Agree or disagree with the following statements.

1. To provide a location for all the necessary vehicle systems and components is the prime purpose of the vehicle structure. 2. The usual source of power for a motor car is a diesel. 3. The front-wheel drive layout is rather compact. 4. Most of the modern cars are designed with an integral chassis frame and body. 5. A small passenger vehicle with a light unitary construction doesn't provide sufficient space for a driver and passengers.

KEY VOCABULARY DEVELOPMENT

Exercise 12. Match the adjectives in column A with the nouns in column B to form meaningful phrases and then identify them at the sentence level in the text. It will help you understand the text in detail.

A	B
1) dual	a) space
2) necessary	b) source
3) unitary	c) systems
4) sufficient	d) vehicles
5) structural	e) components
6) usual	f) purpose
7) heavy	g) wheels
8) high	h) arrangement
9) rear	i) levels
10) integral	j) construction

Exercise 13. Decide which of the verbs on the left collocate with the nouns on the right and then identify the word combinations at the sentence level in the text. It will help you understand the text precisely.

1) to fulfil	a) drive
2) to provide	b) risks
3) to transmit	c) requirements
4) to distribute	d) structure
5) to reduce	e) systems and components
6) to withstand	f) location
7) to design	g) vehicle
8) to locate	h) power
9) to serve	i) stresses
10) to handle	j) purpose

Exercise 14. Try to enrich your vocabulary:

a) find words in the text which have the same meanings as the following words:

to perform, some, most important, aim, to construct, integral, enough, major, parts, motor, big, disadvantage, embrace, different;

b) find words in the text whose meanings are opposite to the meanings of the following words:

external, heavy, low, big, passive, old, frameless, unsuitable, unusual;

c) replace the words in italics with the words with similar meanings:

1. A structure of a vehicle should *perform some* requirements. 2. This vehicle provides *enough* space for a driver and passengers. 3. The *major* structural parts of a motor car are engine, chassis, and body. 4. The rear-wheel drive has a *disadvantage*. 5. The integral chassis frame and body can withstand *different* frame stresses.

Exercise 15. Complete the sentences: change the word in capitals at the end of each sentence to form a word that fits suitably in the blank space.

1. The frameless arrangement is ... for mass-produced vehicles SUIT.
2. This unitary structure has sufficient space for a ... and passengers DRIVE.
3. In the rear-wheel drive layout each unit is ... ACCESS.
4. The suspension system involves shock ... ABSORB.
5. This integral ... provides a stiff light construction to the motor car AR-RANGE.

Exercise 16. Insert the words at the sentence level: fill in the blanks with the missing words (the first letter of each word is given).

1. This car provides s... space for vehicle's occupants.
2. Besides p... shaft, transmission embraces m... shaft and half-shafts.
3. S... is a component of the drive lines.
4. Steering system embraces w... steering and b... steering.
5. One of the requirements for the engine is low f... c... .
6. The most popular engine for light passenger vehicles is a p... engine.
7. The s... system involves springs, shock absorbers, etc.
8. The passengers are isolated from road b... .
9. This body shell can w... frame stresses.
10. This frameless arrangement is rather s... .

GRAMMAR REVISION

Exercise 17. Point out the sentences with the Present Simple and Present Perfect in the text. Provide the Russian equivalents. It will help you understand the text in detail.

Exercise 18. Fill in the blanks to streamline the use of the Present Simple and Present Perfect. The words in brackets are given to help you.

1. The operations ... usually ... by this structure (to fulfil).
2. The engineer ... already ... the components (to arrange).
3. As a rule, the engine ... high levels of pulling power (to produce).
4. This suspension system always ... vehicles occupants comfortable (to keep).
5. Lately, most cars ... with integral chassis frame and body (to build).

Exercise 19. Make up sentences according to the models to practise the use of tenses.

Model A: *Как правило, они работают в офисе.*
As a rule, they work in the office.

1. Как правило, мы выполняем много заданий.
2. Назначение транспортного средства обычно определяет его размер и вес.
3. Небольшое пассажирское транспортное средство обычно использует легкий несущий

кузов. 4. Шасси включает трансмиссию, ходовую часть и системы управления. 5. Устройство полного привода снижает риск буксования колес.

Model B: *Легкие несущие кузова используются в небольших автомобилях.*
Lightweight unitary constructions are used in small passenger vehicles.

1. Все системы и компоненты автомобиля размещаются в несущем кузове. 2. Пружины, амортизаторы и направляющий аппарат входят в систему подвески. 3. Большинство современных автомобилей проектируются с несущим кузовом. 4. Риск буксования колес уменьшается при наличии устройства полного привода. 5. Высокие тяговые показатели обеспечиваются мощными дизельными двигателями.

LISTENING

Exercise 20. Listen to the text “The Motor Car Electrical/Electronic Equipment”.

Before listening: mind the words and phrases given to comprehend better the information you are going to listen to.

To be fitted — быть оснащенным;
sidelights — габаритные фонари;
headlights — фары;
poor visibility — плохая видимость;
to turn — поворачивать;
windscreen wipers and washers — стеклоочистители;
horns — сигналы;
central locking — централизованное закрывание дверей;
to achieve — достигать;
acceptable emission level — требуемый уровень выхлопных газов.

After listening: agree or disagree with the following statements and add some more information if needed.

1. A motor car uses side lights and headlights only in darkness. 2. Brake lights are not required during the application of the brakes. 3. Windscreen wipers and washers are operated electrically. 4. Modern cars use electronically controlled systems to achieve acceptable emission levels. 5. A motor car is fitted with an accumulator.

SPEAKING

Exercise 21. Share your vision of motor car components using the following phrases: to my mind, in my opinion, if I am not mistaken, as far as I remember, it seems to me, etc.

1. What is the prime purpose of the vehicle structure?
2. What determines the size and weight of the vehicle systems and components?
3. What are the main structural components of a light passenger vehicle?
4. The usual source of power for a motor car is an internal combustion engine, isn't it?
5. What engine is the most popular for light passenger vehicles? Why?
6. What engine is the most popular for heavy vehicles? Why?
7. Chassis includes transmission, drive lines, and steering systems, doesn't it?
8. What components does transmission embrace?
9. Can you name the drive lines units?
10. What is the difference between rear-wheel drive, front-wheel drive, and four-wheel drive layout? Which drive layout is safer? Why?
11. Which system isolates vehicles occupants from road bumps and vibrations?
12. Does a lightweight unitary construction provide sufficient space for a driver and passengers?
13. Have you any ideas how to improve a motor car structure?
14. Have you ever driven a car?
15. Which motor car body do you prefer?

Exercise 22. Make up general and disjunctive questions and answer them according to the models to enhance your speaking skills.

Model A: *A structure of a vehicle fulfils a number of requirements.*

A structure of a vehicle fulfils a number of requirements, doesn't it? — Yes, it does.

Does a structure of a vehicle fulfil a number of requirements? — Yes, it does.

1. A structure of a vehicle provides a location for all necessary systems and components. 2. The purpose of a vehicle dictates the size and weight of a vehicle. 3. Chassis embraces transmission, drive lines, and steering systems. 4. Transmission includes clutch, gearbox, propeller shaft, etc. 5. The suspension system involves springs, shock bumpers, and linkages.

Model B: *The main structural components of a motor car are engine, chassis, and body.*

The main structural components of a motor car are engine, chassis, and body, aren't they? — Yes, they are.

Are the main structural components of a motor car engine, chassis, and body? — Yes, they are.

1. The main components of transmission are clutch, gearbox, propeller shaft, main shaft, differentials, and half-shafts. 2. The main components of drive lines are frame, front and rear axles, suspension, and wheels. 3. The major parts of steering systems are wheel steering and brake steering. 4. The components of the suspension system are springs, shock absorbers, and linkages. 5. Brake lights are required during the application of the brakes.

Exercise 23. Make up special questions according to the models and answer them to streamline your speaking skills.

Model A: *Motor cars are fitted with sidelights and headlights.*
What are motor cars fitted with?

1. Motor cars are fitted with a considerable number of electrical and electronic systems. 2. Coaches are usually equipped with facilities required for longer trips. 3. Motor cars are equipped with different items. 4. Buses are equipped with the entrance step. 5. Motor cars are used for the carriage of passengers.

Model B: *Buses are designed to transport about forty passengers.*
What are buses designed for?

1. Indicators or flashers are used to inform others of the direction in which a motor car is turning. 2. Electrical power in motor cars is needed to operate the electrical and electronic equipment. 3. Sidelights and headlights are needed to be used in darkness and in poor visibility. 4. Electronically controlled systems are used in motor cars to operate the electrical items. 5. Brake lights are used to inform others about braking.

Exercise 24. Ask questions and use the words in italics in your answers. The words in brackets will help you.

1. A motor car contains the following components: *engine, chassis, and body* (what components). 2. The power of the engine is transmitted *through the transmission and drive lines* to the wheels (how). 3. The usual source of power for a motor car is *an internal combustion engine* (what). 4. A large capacity diesel should fulfil the following requirements: *an ability to produce high levels of pulling power, reliability, and low fuel consumption* (what requirements). 5. *Spacing out the main components* in the rear-wheel drive layout makes each unit accessible (what).

Exercise 25. Read the following dialogue, sum up the information and act out a similar dialogue.

CHASSIS FRAME

A.: I wonder what a motor vehicle frame is?

B.: A frame is considered to be the main structure of the chassis of a motor vehicle. All other components are fastened to it.

- A.: It seems to me that now almost all the vehicles are frameless.
- B.: I cannot agree with you. In 1920, every motor vehicle besides a few cars based on motorcycles had a frame. Since then, nearly all cars have shifted to a unitary construction but nearly all trucks and buses still use frames.
- A.: Then maybe, you'll remind me how frame rails are designed.
- B.: Sure. There are three main designs for frame rails: C-shaped, boxed, and hat.
- A.: If I am not mistaken, the most common is the C-shaped frame rail which is made by taking a flat piece of steel and rolling both sides over to form a C-shaped beam running the length of the vehicle.
- B.: You are right. And a boxed frame rail is made by bending a piece of steel into four sides and then welding where both ends meet. So the construction resembles a box.
- A.: And I have no idea what a hat frame rail is. What does it resemble?
- B.: A hat frame rail resembles a "U" and may be either right-side-up or inverted with the open area facing down.
- A.: Is it commonly used?
- B.: You see, they were not commonly used due to weakness, however they could be found on 1936—1954 Chevrolet cars and some Studebakers. Forgotten for a while, the hat frame rail gained popularity again when companies started welding it to the bottom of unitary construction.
- A.: Thanks a lot for your comments. I'd like to continue our discussion a little bit later.
- B.: You are welcome.

Exercise 26. Role-play the following situations.

1. At the motor cars exhibition you are discussing the main components of the exhibited models with English-speaking people.
2. You are buying a car in Japan. The language of communication is English.

WRITING

Exercise 27. Complete the following sentences in a logical way.

1. A structure of a vehicle fulfils a number of...
2. The vehicle structure provides a location for all the necessary vehicle systems and...
3. The purpose of the vehicle dictates the size and weight of...
4. The main structural components of a motor car are engine, chassis, and...
5. An internal-combustion engine is the usual source of...

6. A petrol engine is the most popular for...
7. A large capacity diesel is the most popular for...
8. The power of the engine is transmitted through the transmission and drive lines to...
9. The steering systems consist of wheel steering and...
10. Most modern cars are built with an integral chassis frame and...

Exercise 28. Translate the following sentences from Russian into English. You will have a story on the topic as a pattern.

1. Главные структурные компоненты автомобиля: двигатель, шасси и кузов. 2. Источник энергии для автомобиля — двигатель внутреннего сгорания. 3. Бензиновый двигатель — самый популярный для легких пассажирских транспортных средств, двигатель в тяжелых транспортных средствах в большинстве случаев — мощный дизельный двигатель. 4. Шасси состоит из трансмиссии, ходовой части и системы управления. 5. Трансмиссия включает сцепление, коробку передач, карданную передачу, главную передачу и приводные валы или полуоси. 6. Ходовая часть вмещает раму, передний и задний мосты, подвеску, колеса. 7. Энергия двигателя передается через трансмиссию и ходовую часть к ведущим колесам. 8. Система подвески, включающая пружины, амортизаторы и направляющий аппарат, служит двойной цели: улучшает безопасность и надежность управления автомобилем и предоставляет пассажирам комфорт и уберегает их от изъязнов дороги, вибраций и т.д. 9. Системы управления состоят из рулевого управления и тормозной системы. 10. Большинство современных автомобилей сконструированы с несущим кузовом.

Exercise 29. Make up your own story about engineering materials technology according to the following points of the plan. The words and phrases are supposed to make your story logical and interesting.

1. *Motor Car Components*

The main structural components of a motor car are

2. *Engine*

An internal combustion engine is

A petrol engine is

A diesel engine is

3. *Transmission and Drive Lines*

The power of the engine is transmitted

There are

4. *Suspension System*

The suspension system involves

It contributes

It keeps

5. *Integral Chassis Frame and Body*

Most modern cars are built

Exercise 30. Write an e-mail to your friend about your new car. Describe all systems and components of your car in detail.

PROJECT WORK

Exercise 31. Compile information about motor car components and participate in a project. Present the project to your group. You may use the following websites: www.visualdictionaryonline.com , www.automotivecare.com

ADDITIONAL READING

Exercise 32. Make a summary of the text using the following phrases:

1. The title of the text is...
2. The text is about... The text deals with...
3. The text covers such points as... first... second... third...
4. It should be underlined that...
5. In conclusion, I may say that...
6. To my mind... In my opinion...

TYPES OF A MOTOR CAR BODY

The main purpose of a motor car body is to provide comfortable accommodation for a driver and passengers. With the introduction of unitary constructions, the body has become the main structure onto which all other vehicle elements are attached. Therefore, the body is both a load-bearing structure and a comfortable location for the occupants. One can distinguish between some body types of a motor car, such as saloon, estate, hatchback, coupe, convertible, etc.

Saloon is a fully enclosed body with either two or four passenger doors. The common shape of the saloon body is based on three 'boxes': the front box forms the engine compartment, the centre section is the container for the occupants and the rear box is a storage space, called a boot (trunk) for the luggage.

Estate (station wagon) has the roofline extended to the rear of the body to enlarge floor area for the carriage of luggage or goods. The rear door enables bulky or long objects to be loaded easily. Stronger suspension springs are fitted in the rear to support the extra load.

The hatchback design is usually based on a saloon body but with the boot or trunk area blended into the centre section of the body therefore the hatchback is halfway between a saloon and an estate car.

Coupe is usually two-door type intended for two people: a driver and one passenger. Some coupe models are designed '2 + 2' but the back area is more suitable for children or for occasional adult use.

Convertible, also called cabriolet or drop-head coupe, can be changed into an open car by either removing a rigid roof or lowering a collapsible fabric roof.

The majority of mass-produced cars have a pressed steel body, although aluminium bodies are being used increasingly due to their lighter weight. Another common practice is to mould body panels from GRP (glass-reinforced plastics, often referred to as fibreglass). Other materials are also now used, such as carbon fibre, to produce body panels and structures.



Saloon



Estate (station wagon)



Hatchback



Coupe



Convertible

TEST 11

1. Choose the proper words and fill in the blanks.

1. *A structure of a vehicle provides a ... for all necessary vehicle systems.*
A. location B. number C. requirement D. purpose
2. *A motor car includes engine, chassis, and*
A. suspension B. body C. diesel D. clutch
3. *Transmission embraces ..., gearbox, propeller shaft, etc.*
A. frame B. brakes C. clutch D. rear axle
4. *... systems are wheel steering and brake steering.*
A. Main B. Major C. Sufficient D. Steering
5. *Drive lines include ..., front and rear axles, etc.*
A. frame B. gearbox C. clutch D. space
6. *Suspension involves ..., shock absorbers, and linkage.*
A. propeller shaft C. capacity
B. springs D. handling
7. *For the RWD. ..., the rear wheels act as the driving wheels.*
A. space B. linkage C. spacing out D. layout
8. *In the ... layout each unit is accessible.*
A. RWD. B. FWD. C. 4WD.
9. *Relatively light vehicle systems and components are located in a light-weight ... construction.*
A. sufficient B. unitary C. usual D. main
10. *The frameless arrangement provides a ... light construction to the motor car.*
A. isolated B. driving C. front D. stiff

2. Fill in the blanks with the proper grammar forms.

1. *The power of the engine ... through the transmission and drive lines.*
A.is to be transmitted C.is to transmit
B.are to be transmitted D. to be transmitted
2. *The main purpose of a motor car ... comfortable accommodation for occupants.*
A.is to be provided C. provides
B.provided D. is to provide
3. *Bulky equipment ... easily into the estate body car.*
A.can load C.can loaded
B.can be loaded D. can be load
4. *The hatchback design ... on a saloon body.*
A.to be based B.are based C.is based D. based
5. *Cabriolet ... into an open car.*
A.can change C.can be change
B.can changed D. can be changed
6. *Aluminium bodies ... due to their lighter weight.*
A. used B.use C.are being D. are being used
7. *Most mass-produced cars ... a pressed steel body.*
A.have B.is to have C.has D. having
8. *Coupe models ... as two-door models.*
A.have designed B.have C.to be designed D. are designed
9. *This construction ... a box.*
A.resemble B.resembles C.resembling D. are to resemble
10. *Electrical power ... to operate the motor car electrical and electronic equipment.*
A.needs B.need C.is needed D. are needed

3. The text contains different mistakes: 4 — in spelling, 3 — in grammar. Correct the mistakes and rewrite the text.

In British English, the term ‘transmission’ refer to the whole drive train, including klutch, gearbox, propeller shaft (for rear-wheel drive), diferential, and final drive shafts. In American English, a gearbox are any device which convert speed and torque, whereas a transmisión is a type of gearbox that can be “shifted” to change the speed-torque ratio dynamically.

4. Answer these multiple-choice questions about motor car components.

1. *What are the main structural components of a motor car?*
 - A. engine, body, chassis
 - B. suspension, transmission, engine
 - C. chassis, transmission, engine
2. *What are the chassis components?*
 - A. suspension, transmission, steering system
 - B. drive lines, transmission, steering systems
 - C. brakes, wheel steering, transmission
3. *What is the usual source of energy for a heavy vehicle?*
 - A. diesel
 - B. petrol engine
 - C. gasoline engine
4. *What does transmission embrace?*
 - A. clutch, gearbox, propeller shaft, etc.
 - B. main shaft, differentials, frame, etc.
 - C. main shaft, half-shafts, drive lines, etc.
5. *What do drive lines contain?*
 - A. frame, front and rear axles, suspension
 - B. frame, suspension, wheels
 - C. frame, front and rear axles, suspension, wheels
6. *What does the suspension system involve?*
 - A. springs, shock absorbers
 - B. springs, linkages
 - C. springs, shock absorbers, linkages
7. *How many types of drive layout are used?*
 - A. one
 - B. two
 - C. three

Module 12

ENGINES

Vocabulary: exercises 1—7, 12—16.

Grammar Revision: exercises 8—9, 17—19.

Reading: exercises 10, 11, 32.

Listening: exercise 20.

Speaking: exercises 21—26.

Writing: exercises 27—30.

Project Work: exercise 31.

Test 12.

KEY VOCABULARY

Exercise 1. Read and guess the meanings of the new words. If you have some difficulties, use the dictionary at the end of this book. It will help you to read and discuss the texts and dialogues, arrange the role-plays and present the projects.

- 1) *confined space.* An internal combustion engine is an engine in which combustion of the fuel takes place in a confined space.
- 2) *profound impact.* The invention and development of the internal combustion engine had a profound impact on human life.
- 3) *ignition.* The first internal combustion engines did not include compression of gas before ignition.
- 4) *fossil fuel.* Generally using fossil fuel (mainly petroleum), these engines appeared in transport in almost all vehicles.
- 5) *significant distinction.* The most important significant distinction between modern internal combustion engines and the early designs is the use of compression.
- 6) *spark ignition.* According to the type of ignition, engines can be divided into spark-ignition and compression-ignition engines.
- 7) *four-stroke cycle, piston.* A four-stroke cycle engine has four piston movements over two engine revolutions for each cycle.
- 8) *valve, I-head engine, L-head engine.* In accordance with valve location, engines are called I-head and L-head engines.

- 9) *reciprocating engine*. A reciprocating engine has one or more cylinders in which pistons reciprocate back and forth.
- 10) *combustion chamber*. The combustion chamber is located in the closed end of each cylinder.
- 11) *crankshaft*. Power is delivered to a rotating output crankshaft by mechanical linkage with the pistons.
- 12) *single-cylinder engine, in-line engine, V-type engine, opposed-cylinder engine, W-type engine, opposed-piston engine, radial engine*. Reciprocating engines are classified on the base of position and number of cylinders into single-cylinder engines, in-line engines, V-type engines, opposed-cylinder engines, W-type engines, opposed-piston engines, and radial engines.
- 13) *straight line*. In-line engine, cylinders are positioned in a straight line.
- 14) *at an angle*. In V-type engine, two banks of cylinders are at an angle to each other.
- 15) *opposite to each other*. An opposed-cylinder engine has two banks of cylinders opposite to each other on a single crankshaft.
- 16) *flat*. These engines are often called flat engines.
- 17) *connecting rod*. The connecting rods of the pistons are connected to a master rod.
- 18) *in turn*. The connecting rods of the pistons are connected to a master rod, which in turn, is connected to the crankshaft.
- 19) *rotary engine*. A rotary engine is made of a block (stator) built around a large non-concentric rotor and crankshaft.
- 20) *to slide against the inner surface*. The moving combustion chambers are formed by the corners of the rotor sliding against the inner surface of the non-rotating block
- 21) *carburetted engine, multipoint port fuel injection engine, throttle body fuel injection engine, gasoline direct injection engine*. By method of fuel input, spark ignition engines are divided into carburetted engines, multipoint port fuel injection engines, throttle body fuel injection engines, and gasoline direct injection engines.
- 22) *to facilitate*. Air and fuel are mixed to facilitate the combustion process in carburetted engines.
- 23) *intake*. A multipoint port fuel injection engine has one or more injectors at each cylinder intake.
- 24) *intake manifold*. In throttle body fuel injection engines, injectors upstream in intake manifold.
- 25) *to be mounted*. In gasoline direct injection engines, injectors are mounted in combustion chambers with injection directly into cylinders.

- 26) *homogeneous*. Well-mixed fuel and oxidizer are compressed to the point of auto-ignition in homogeneous charge compression-ignition engines.
- 27) *to identify*. Several or all of these classifications can be used at the same time to identify a given engine.

Exercise 2. Read the words following the rules of reading. Pronounce correctly. Practise aloud.

Invention, development, engine, century, compression;
 place, application, location, rotating, plane, chamber;
 crankshaft, transport, gas, angle, back, valve;
 life, time, type, wide, provide, mobile, confine, slide;
 ignition, efficient, drill, distinction, piston, mixture, linkage, single, facilitate;
 coal, stroke, over, motion;
 fossil, rod, adoption, common, block, opposite, possibly;
 produce, include, use, during, revolution, fuel, human;
 combustion, result, number, multipoint;
 internal, first, circular, third, turn.

Exercise 3. Look at the following pairs of words and think if the underlined letters are pronounced in the same way, or if they are pronounced differently. Read aloud.

Combustion — producing, automobile — mobile, space — place, engine — design, advance — transport, cylinder — cycle, include — build, dual — fuel, usually — number, confine — impact, motion — power, compression — fossil, form — work, ignition — injection, result — direct.

Exercise 4. Read the international words, mind the stress.

Mechanical, gas, commercial, compression, transport, automobile, mixture, modern, cylinder, technical, revolution, rotor, petroleum, location, design, cycle, block, complex, engineering, concept, process, injection, method.

Exercise 5. Try to enrich your vocabulary:

- a) analyse the following words with different suffixes and divide them into two groups — nouns and adjectives:

internal, combustion, development, successful, efficient, commercial, mixture, different, ignition, distinction, mechanical, injector, classification, motion, invention, operation, compression, production, application, significant, different;

b) make up as many words as you can by combining different parts of the words:

re-	inject	-ment
dis-	intern	-al
multi-	compress	-age
	link	-or
	point	-ion
	place	

Exercise 6. Divide the following terms into two groups, those which belong to a) spark-ignition engines; b) compression-ignition engines.

Gasoline direct injection engines, homogeneous charge compression-ignition engines, multipoint port fuel injection engines, throttle body fuel injection engines, indirect injection engines, carburetted engines, direct injection engines.

Exercise 7. Think over the definitions of the terms which appear in the texts and dialogues and then:

a) agree or disagree with the following definitions

1. *An internal combustion engine is an engine* in which combustion of the fuel takes place in a confined space, producing expanding gases that are used directly to provide mechanical power.

2. *A four-stroke cycle engine* is an engine which has two piston movements over two engine revolutions for each cycle.

3. *A two-stroke cycle engine* is an engine which has four piston movements over one revolution for each cycle.

4. *A single-cylinder engine* is an engine which has some cylinders and pistons connected to the crankshaft.

5. *A reciprocating engine* is an engine which has one or more cylinders in which pistons reciprocate back and forth.

b) match each word with its correct definition

rotary engine, radial engine, in-line engine, W-type engine, carburetted engine

1. This engine is made of a block (stator) built around a large non-concentric rotor and crankshaft.

2. Cylinders are positioned in a straight line, one behind the other along the length of the crankshaft in this engine.

3. Pistons are positioned in a circular plane around a circular crankshaft in this engine.

4. Air and fuel are mixed to facilitate the combustion process in this engine.

5. This is an engine of two different cylinder arrangements.

- c) find the definitions for some other terms which you consider to be important for the topic “Engines”. Use the website www.macmillandictionaries.com

GRAMMAR REVISION

Exercise 8. Read the sentences, point out the Passive Voice. Give the Russian equivalents. If you have some difficulties, use the grammar reference at the end of the book.

1. Different internal-combustion engines are created by engineers.
2. A petrol engine has traditionally been used in light passenger vehicles.
3. The power of the engine is being transmitted through transmission and drive lines to the drive wheels.
4. Most modern cars are built with the integral chassis frame and body.
5. The internal-combustion engines are used in automobiles, locomotives, marines, aircrafts, and others.

Exercise 9. Make up your own sentences with the Passive Voice according to the model.

Model: *In the 19th century engineers developed various forms of internal combustion engines. In the 19th century various forms of internal combustion engines were developed by engineers.*

1. Étienne Lenoir created the first internal combustion engine in 1860.
2. Designers use engines in automobiles, locomotives, submarines, aircrafts, and others.
3. We usually use gasoline, diesel oil or fuel oil in automobiles.
4. A single combustion process causes two power strokes at the same time.
5. The scientists have classified engines of two different cylinder arrangements as W-type engines.

READING

Exercise 10. Read the text, try to focus on its essential facts and choose the most suitable heading given below for each paragraph.

- 1) Engines Classification According to the Types of Ignition, Engine Cycle, Valve Location, Cooling
- 2) Reciprocating Engines
- 3) Identification of a Given Engine
- 4) Rotary Engines
- 5) Spark-Ignition Engines
- 6) Invention and Development of the Internal Combustion Engine
- 7) Compression-Ignition Engines
- 8) Different Kinds of Fuel Used in Engines

AN INTERNAL COMBUSTION ENGINE

An internal combustion (IC) engine is an engine in which combustion of the fuel takes place in a confined space, so that expanding gases provide mechanical power and produce motion. The invention and development of the internal combustion engine in the 19th century had a profound impact on human life. The first commercially successful internal combustion engine was created by a Frenchman, Étienne Lenoir in 1860. It ran on coal gas, but worked on a cycle of operations, which did not include compression of the gas before ignition: as a result, it was not very efficient. Although various forms of internal combustion engines had been developed before the 19th century, their widespread adoption in a variety of applications began with the commercial drilling and production of petroleum. Generally using fossil fuel (mainly petroleum), these engines appeared in almost all vehicles in the late 19th century. The most significant distinction between modern internal combustion engines and the early designs is the use of compression and, in particular, in-cylinder compression.

Modern internal combustion engines can be classified in a number of different ways. According to the type of ignition, they can be divided into spark-ignition (SI) and compression-ignition (CI) engines. Depending on the engine cycle, they are four-stroke cycle and two-stroke cycle ones. A four-stroke cycle engine has four piston movements over two engine revolutions for each cycle. A two-stroke cycle engine has two piston movements over one revolution for each cycle. In accordance with the valve location, the internal combustion engines are called I-head engines if valves are in head (overhead valve), and L-head engines if valves are in block (flat head). According to the type of cooling, engines can be classified as air-cooled engines and liquid-cooled engines (water-cooled engines).

Basic design divides engines into reciprocating and rotary ones. A reciprocating engine has one or more cylinders in which pistons reciprocate back and forth. The combustion chamber is located in the closed end of each cylinder. Power is delivered to a rotating output crankshaft by mechanical linkage with the pistons. Reciprocating engines are classified on the base of position and number of cylinders. These are single-cylinder engine, in-line engine, V-type engine, opposed-cylinder engine, W-type engine, opposed-piston engine, and radial engine. A single-cylinder engine has one cylinder and piston connected to the crankshaft. In-Line engine cylinders are positioned in a straight line, one behind the other along the length of the crankshaft. In V-type engine, two banks of cylinders are at an angle with each other along a single crankshaft, allowing for a shorter engine block. Opposed-cylinder engine has two banks of cylinders opposite to each other on a single crankshaft. These engines are

often called flat engines. Engines of two different cylinder arrangements have been classified as W-type engines in the technical literature. An opposed-piston engine has two pistons in each cylinder with the combustion chamber in the centre between the pistons. Radial engines are engines with pistons positioned in a circular plane around a circular crankshaft. The connecting rods of the pistons are connected to a master rod, which in turn, is connected to the crankshaft.

A rotary engine is made of a large non-concentric rotor with a built-in gearwheel, moving around a stationary block (stator). The moving combustion chambers are formed by the corners of the rotor sliding against the inner surface of the non-rotating block (housing). A number of experimental engines have been tested using this concept, but the only design that has ever become common in an automobile is the Wankel engine which has one, two, and three rotors.

By method of fuel input, spark-ignition engines are divided into four types: carburetted engines in which air and fuel are mixed to facilitate the combustion process; multipoint port fuel injection engines in which one or more injectors at each cylinder intake; throttle body fuel injection engines in which injectors upstream in intake manifold; gasoline direct injection engines in which injectors are mounted in combustion chambers with injection directly into cylinders.

By method of fuel input, compression-ignition engines are divided into three types: direct injection engines in which fuel is injected into the main combustion chamber; indirect injection engines in which fuel is injected into the secondary combustion chamber; homogeneous charge compression ignition engines in which well-mixed fuel and oxidizer (typically, air) are compressed to the point of auto-ignition.

Besides, different kinds of fuel are used in engines: diesel oil, motor oil, naphtha; kerosene or benzol-oil mixtures; gas, natural gas methane; alcohol-ethyl, methyl; dual fuel. There are several engines that use a combination of two or more fuels.

Several or all of these classifications can be used at the same time to identify a given engine. Thus, a modern engine might be called a reciprocating, spark-ignition, four-stroke cycle, I-head, water-cooled, gasoline, multipoint port fuel injection automobile engine.

Exercise 11. Agree or disagree with the following statements.

1. The first commercially successful internal combustion engine was very efficient. 2. The most significant distinction between modern internal combustion engines and the early designs is the use of compression and, in particular, in-cylinder compression. 3. Depending on the engine cycle, engines are four-

stroke cycle and five-stroke cycle ones. 4. In accordance with the valve location, the internal combustion engines are called I-head engines if valves are in head (overhead valve), and L-head engines if valves are in block (flat head). 5. Radial engines are often called flat engines.

KEY VOCABULARY DEVELOPMENT

Exercise 12. Match the words in column A with the words in column B to form meaningful phrases and then identify them at the sentence level in the text. It will help you understand the text in detail.

A	B
1) mechanical	a) designs
2) fossil	b) power
3) profound	c) result
4) significant	d) impact
5) in-cylinder	e) space
6) combustion	f) chamber
7) expanding	g) gases
8) efficient	h) compression
9) early	i) fuel
10) confined	j) distinction

Exercise 13. Decide which of the verbs on the left collocate with the nouns on the right and then identify the word combinations at the sentence level in the text. It will help you understand the text precisely.

1) to run on	a) coal gas
2) to deliver	b) cylinders
3) to push	c) air (fuel) mixture
4) to inject	d) power
5) to slide against	e) process
6) to identify	f) surface
7) to facilitate	g) engines
8) to mix	h) air and fuel
9) to position	i) piston
10) to produce	j) motion

Exercise 14. Try to enrich your vocabulary:

a) find words in the text which have the same meanings as the following words:

limited, to construct, plane, important, to join, car, energy, to throw out, different, forward, application, to place;

b) find words in the text whose meanings are opposite to the meanings of the following words:

unusual, inefficient, small, to disjoin, to end, ancient, mobile, solid, forward, external, after, the last, outer, in front of, longer;

c) replace the words in italics with the words with similar meanings:

1. The most *important* distinction between modern internal combustion engines and the early designs is the *application* of compression and, in particular, in-cylinder compression. 2. *Power* is delivered to a rotating output crankshaft by mechanical linkage with the pistons. 3. The connecting rods of the pistons are *joined* to a master rod. 4. Opposed-cylinder engines are common on some *automobiles* with an even number of cylinders from two to eight or more. 5. He *constructed* the internal combustion engine.

Exercise 15. Complete the sentences: change the word in capitals at the end of each sentence to form a word that fits suitably in the blank space.

1. The first internal combustion engines did not have in-cylinder... COM-PRESS.

2. In accordance with valve ..., the internal combustion engines are called I-head engines and L-head engines LOCATE.

3. Basic design divides engines into ... and rotary ones RECIPROCATATE.

4. The ... chambers are built into the non-rotating block in rotary engines COMBUST.

5. The ... of the internal combustion engine had a profound impact on human life INVENT.

Exercise 16. Insert the words at the sentence level: fill in the blanks with the missing words (the first letter of each word is given).

1. The invention and development of the internal combustion engine in the nineteenth century has had a p... impact on human life. 2. The first internal combustion engines did not have c... before i... . 3. Opposed-cylinder engines are often called f... engines. 4. A two-stroke cycle engine has two p... movements over one revolution for each cycle. 5. Radial engines are engines with pistons positioned in a circular plane around a circular c... 6. According to the basic design, engines are divided into r... and rotary engines. 7. In h... charge compression ignition engines, well-mixed fuel and oxidizer are compressed to the point of auto-ignition. 8. According to the type of c..., engines can be classified as air-cooled engines and liquid-cooled engines (water-cooled engines). 9. Engines of two different c... arrangements have been classified as W-type engines in the technical literature. 10. In-line engine cylinders are positioned in a s... line.

GRAMMAR REVISION

Exercise 17. Point out the sentences with the Passive Voice in the text and provide the Russian equivalents. It will help you understand the text in detail.

Exercise 18. Fill in the blanks to streamline the use of the Passive Voice. The words in brackets are given to help you.

1. Yesterday this letter ... to our British partners (to send). 2. The engines of a new type ... at Russian automobile plants next year (to produce). 3. This type of engine ... for the new model of the car recently (to test). 4. Every year the modern designs of the automobiles ... by the engineers and scientists at the international conferences (to discuss). 5. Such common fuel as gasohol consisting of 90% gasoline and 10% alcohol also ... in IC engines (use).

Exercise 19. Make up sentences according to the model to practise the use of the Passive Voice.

Model: *Современные двигатели внутреннего сгорания классифицируются по различным параметрам.*

Modern internal combustion engines are classified in a number of different ways.

1. В двигателе карбюраторного типа сжатая топливовоздушная смесь поступает в цилиндры и поджигается системой зажигания. 2. В технической литературе современный двигатель называют бензиновым двигателем, четырехтактным двигателем, поршневым двигателем, двигателем с турбонагнетателем, двигателем с искровым зажиганием, двигателем с V-образным расположением цилиндров, двигателем с верхним расположением клапанов, двигателем с водяным охлаждением, двигателем с распределённым впрыском топлива. 3. В двигателях с непрямым впрыском топливо впрыскивается в отдельную дополнительную камеру сгорания. 4. В бензиновых двигателях с прямым впрыском топлива форсунки расположены в камерах сгорания, и топливо впрыскивается непосредственно в цилиндры. 5. В двигателях с распределённым впрыском топлива топливо попадает в каждый цилиндр через впускные клапаны.

LISTENING

Exercise 20. Listen to the text “Petrol Cars and Electric Cars”.

Before listening: mind the words and phrases given to comprehend better the information you are going to listen to.

To propel — приводить в движение;
the entire system — вся система;
weight dispersion — распределение веса;
pollutant — загрязняющее вещество;
to argue in favour or against — высказывать аргументы за и против;
wastage — износ.

After listening: agree or disagree with the following statements and add some more information if needed.

1. Petrol cars are better than electric cars. 2. Both the petrol and electric technologies work on the same principles. 3. The petrol combustion process produces a lot of smoke and dust, while electric batteries do not produce such pollutants. 4. Petrol cars should be completely replaced with electric cars. 5. Petrol cars have more disadvantages in comparison with electric cars.

SPEAKING

Exercise 21. Share your vision of engines using the following phrases: to my mind, in my opinion, if I am not mistaken, as far as I remember, it seems to me, etc.

1. Who was the first commercially successful internal combustion engine created by? When was it created?
2. Why wasn't it very efficient?
3. What vehicles are internal combustion engines generally used in?
4. What is the most significant distinction between modern internal combustion engines and the early designs?
5. What types of reciprocating engines do you know? Describe them.
6. What part of a reciprocating engine is the combustion chamber located in?
7. How is power delivered to a rotating output crankshaft?
8. What is a rotary engine made of?
9. What types of spark-ignition engines can you name? Describe them.
10. What types are compression-ignition engines divided into? Describe them.
11. Could you name common kinds of fuel used in engines?
12. How can engines be classified according to the type of cooling?
13. What vehicles are internal combustion engines used in?
14. Why do internal combustion engines find wide application?
15. How might a modern engine be identified according to numerous classifications?

Exercise 22. Make up general and disjunctive questions and answer them according to the models to enhance your speaking skills. Pay your attention to the forms of the verb “to be”.

Model A: *This internal combustion engine is very efficient.*

Is this internal combustion engine very efficient? — Yes, it is.

This internal combustion engine is very efficient, isn't it? — Yes, it is.

1. **An internal combustion engine is an engine** in which combustion of the fuel takes place in a confined space, producing expanding gases used directly to provide mechanical power. 2. The most significant distinction between modern internal combustion engines and the early designs is the use of compression. 3. The Wankel engine is the only design that has ever become common in an automobile. 4. The combustion chamber is in the closed end of each cylinder in reciprocating engine. 3. The rotary engine is made of a block (stator) built around a large non-concentric rotor and crankshaft.

Model B: *Different kinds of fuel are used in engines.*

Are different kinds of fuel used in engines? — Yes, they are.

Different kinds of fuel are used in engines, aren't they? — Yes, they are.

1. Combined fuels are used in developing third world countries because of the high cost of the diesel fuel. 2. In radial engines, the pistons are positioned in a circular plane around a circular crankshaft. 3. In V-type engine, two banks of cylinders are placed at an angle with each other along a single crankshaft. 4. The combustion chambers are built into the non-rotating block. 5. The connecting rods of the pistons are connected to a master rod.

Exercise 23. Make up special questions according to the models and answer them to streamline your speaking skills.

Model A: *Modern internal combustion engines can be classified in a number of different ways.*

How can modern internal combustion engines be classified?

1. Engines of two different cylinder arrangements can be classified as W-type engines. 2. According to the type of cooling, engines can be divided into air-cooled engines and liquid-cooled engines (water-cooled engines). 3. A modern engine also might be called a reciprocating, spark ignition, four-stroke cycle, I-head, water-cooled, gasoline, multipoint fuel injected automobile engine. 4. Opposed-cylinder engines can be called flat engines. 5. According to the type of ignition, engines can be divided into spark-ignition engines and compression-ignition engines.

Model B: *This engine uses a combination of natural gas and diesel fuel.*

What does this engine use?

1. A single combustion process causes two power strokes at the same time. 2. An opposed-cylinder engine contains two banks of cylinders opposite to each other on a single crankshaft. 3. Such common fuel as gasohol consists of 90% gasoline and 10% alcohol. 4. This engine runs on diesel oil. 5. Basic design divides engines into reciprocating and rotary ones.

Exercise 24. Ask questions and use the words in italics in your answers. The words in brackets will help you.

1. The first internal combustion engine ran on *coal gas* (what fuel). 2. *Étienne Lenoir* created the first commercially successful internal combustion engine (who). 3. A four-stroke cycle engine involves *four* piston movements over two engine revolutions for each cycle (how many). 4. *Power* is delivered to a rotating output crankshaft by mechanical linkage with the pistons (what). 5. Opposed-cylinder engines are often called *flat engines* (how).

Exercise 25. Read the following dialogue, sum up the information and act out a similar dialogue.

APPLICATION OF ENGINES

- A.: No doubt, internal combustion engines have taken a very important part in the technical progress.
- B.: Yes, you are right! It's one of the best inventions of the mankind!
- A.: Having studied the history of transport we have realized, that the invention and development of the internal combustion engines in the nineteenth century had a profound impact on human life.
- B.: It goes without saying. Moreover, after the commercial drilling and production of petroleum in the mid-1850s engineering advances led to their widespread adoption in a variety of applications.
- A.: I do know about it. These engines appeared in transport in almost all vehicles: automobiles, trucks, motorcycles, boats, and in a wide variety of aircraft and locomotives.
- B.: It's great! And what about the main differences between them? I mean their sizes and mechanical power. I believe the engines must differ from each other.
- A.: I agree with you on this point. But engines technology is constantly changing and at present some engines manufacturers are producing definite types for different kinds of vehicle.
- B.: I wonder what ways the internal combustion engines are classified into.
- A.: You see, modern internal combustion engines can be classified in a number of different ways, depending on their technical characteristics and their usage in different types of vehicles.

- B.: By the way, the Wankel engine is considered to be one of the most reliable and the simplest one. What do you think about it?
- A.: I think so, too. It is really simpler and much lighter. It contains far fewer moving parts. For instance, it has no valves or complex valve trains. But most engineers and scientists from different countries of the world discuss its advantages and disadvantages. They also do their best to make it more advanced and effective.
- B.: It's going to be interesting to see if the popularity of the Wankel engine continues to increase in the future.
- A.: To my mind, it will be used in modern models of different kinds of transport.
- B.: I see. Thanks a lot for your comments.
- A.: You are welcome.

Exercise 26. Role-play the following situations.

1. You are discussing the application of engines with a representative of the manufacturing plant from Japan at the international technical exhibition, where modern models of the automobiles are presented. 2. You are discussing the advantages and disadvantages of engines and their best usage in different types of vehicle at the motor-car plant in the UK.

WRITING

Exercise 27. Complete the following sentences in a logical way.

1. Internal combustion engine is an engine in which...
2. The first commercially successful internal combustion engine was created by Étienne Lenoir in...
3. The first internal combustion engines did not have compression, but ran on...
4. The most significant distinction between modern internal combustion engines and the early designs is the use of...
5. According to the type of ignition, they can be divided into...
6. By method of fuel input, spark-ignition engines are divided into four types...
7. By method of fuel input, compression-ignition engines are divided into three types...
8. Depending on the engine cycle, they are four-stroke cycle and...
9. In accordance with the valve location, the internal combustion engines are called...
10. According to the type of cooling, engines can be classified as air-cooled engines and...

11. Basic design divides engines into reciprocating and...
12. The rotary engine is made of a large non-concentric rotor with...
13. Reciprocating engines are classified on the base of position and number of cylinders, these are...
14. The only design of a rotary engine that has ever become common in an automobile is the Wankel engine which has...
15. Such kinds of fuel can be used in engines: ...

Exercise 28. Translate the following sentences from Russian into English. You will have a story on the topic as a pattern.

1. Двигатель внутреннего сгорания представляет собой двигатель, в котором происходит сжигание топлива в замкнутом пространстве; в процессе теплового расширения нагретые до высокой температуры газы совершают механическую работу и преобразовывают ее в движение. 2. Несмотря на то, что различные модификации двигателей внутреннего сгорания были разработаны еще до 19 века, их широкое применение началось тогда, когда добыча и перегонка нефти приобрели промышленные масштабы в конце 19 столетия. 3. Первый двигатель внутреннего сгорания не имел такта сжатия. 4. В соответствии с расположением клапанов существуют двигатели с верхним расположением клапанов, когда клапаны расположены над цилиндрами, и двигатели с нижним расположением клапанов — при этом впускные и выпускные клапаны расположены сбоку от цилиндра. 5. По базовой конструкции двигатели подразделяются на двигатели поршневые (возвратно-поступательного действия) и роторные. 6. Двигатели поршневые также различаются по расположению и количеству цилиндров: существуют одноцилиндровые двигатели, двигатели с рядным расположением цилиндров, с V-образным расположением, W-образным расположением, с оппозитным и с радиальным расположением цилиндров. 7. По способу впрыска топлива двигатели с искровым зажиганием делятся на двигатели карбюраторного типа, двигатели с мультивпрыском топлива, двигатели с впрыском топлива через корпус дроссельных заслонок, бензиновые двигатели с прямым впрыском топлива. 8. По способу впрыска топлива двигатели с воспламенением от сжатия подразделяются на двигатели с непосредственным впрыском топлива, двигатели с непрямым впрыском, двигатели с воспламенением от сжатия, использующие однородную топливную смесь. 9. Двигатели внутреннего сгорания работают на следующих видах топлива: дизельное топливо, автомобильные бензины, лигроины, керосины и бензол-бензиновые смеси, природный газ метан, этиловый и метиловый спирт, смесь жид-

кого и газообразного топлива. 10. Двигатели внутреннего сгорания используются в автомобилях, железнодорожных локомотивах, морских судах, самолетах и т.д.

Exercise 29. Make up your own story about the engines according to the following points of the plan. The words and phrases are supposed to make your story logical and interesting.

1. *The Role of Engines in Human Life*

Engines have played
Early humans dreamed
Civilizations realized
Modern technologies made

2. *Types of Engines*

Engines can be classified
The most common engines are
The main advantages of the engine (I consider to be one of the best) are

3. *Types of Fuels*

Different kinds of fuel are used
A combination of two or more fuels is
The most common fuel is

Exercise 30. Write an e-mail to your friend about your attending the exhibition devoted to modern models of automobiles and describe their engines.

PROJECT WORK

Exercise 31. Compile information about engines and participate in a project. Give reasons why this or that engine is widely used in the machine building industry. Present the project to your group. You may use the following web-sites: www.visualdictionaryonline.com , www.automotivecare.com

ADDITIONAL READING

Exercise 32. Make a summary of the text using the following phrases:

1. The title of the text is...
2. The text is about... The text deals with...
3. The text covers such points as... first... second... third...
4. It should be underlined that...
5. In conclusion, I may say that...
6. To my mind... In my opinion...

THE WANKEL ENGINE

The most successful rotary engine is the Wankel engine. German engineer Felix Wankel first conceived his rotary engine in 1924 and finally received a patent for it in 1929. He worked through the 1940s to improve the design. Considerable effort went into designing rotary engines in the 1950s and 1960s. They were of particular interest because they were running smoothly and quietly, and because of the reliability resulting from their simplicity. The Company NSU, where Wankel worked at that time, then licensed the concept to companies around the world, which continued to improve the design. Among the manufacturers signing licensing agreements to develop Wankel engines were the automobile companies of Europe, America, Japan, Russia, and other countries.

The Wankel engine is a type of an internal combustion engine in which the four strokes of a typical Otto cycle occur in the space between a three-sided symmetric rotor and the inside of a housing. Its four-stroke cycle is generally generated in a space between the inside of an oval-like epitrochoid-shaped housing and a roughly triangular rotor. In the basic single-rotor Wankel engine, the oval-like epitrochoid-shaped housing surrounds a rotor which is triangular with bow-shaped flanks. It has a disk that looks like a triangle with bulging sides rotating inside a cylinder shaped like a figure eight with a thick waist. Intake and exhaust are through ports in the flat sides of the cylinder. The spaces between the sides of the disk and the walls of the cylinder form combustion pockets. During a single rotation of the disk, each pocket alternately grows smaller, then larger because of the contoured outline of the cylinder. This provides compression and expansion. The engine runs on a four-stroke cycle. The expansion phase of the Wankel cycle is much longer than that of the Otto cycle.

The Wankel engines have some advantages. They are considered to be simpler and contain far fewer moving parts. For instance, they have no valves or complex valve trains. Moreover, since the rotor is geared directly to the output shaft, there is no need for connecting rods, a conventional crankshaft, crankshaft balance weights, etc. The elimination of these parts makes a Wankel engine not only much lighter, but it also completely eliminates the reciprocating mass of a piston engine with its internal strain and inherent vibration due to repeated acceleration and deceleration, producing not only a smoother flow of power but also the ability to produce more power by running at higher rpm. Though the Wankel engine has about 50% fewer parts and about a third the bulk and weight of a reciprocating engine, its main advantage is that advanced pollution control devices are easier to design for it than for the conventional piston engine. Besides, higher engine speeds are made possible by rotating in-

stead of reciprocating motion, but this advantage is partially offset by the lack of torque at low speeds, leading to greater fuel consumption. Moreover, the shape of the Wankel combustion chamber and the turbulence induced by the moving rotor prevent localized hot spots from forming, thereby allowing the use of fuel of very low octane number without preignition or detonation, a particular advantage for hydrogen cars. The simplicity of design and smaller size of the Wankel engine also allows for savings in construction costs, compared to piston engines of comparable power output.

The Wankel engine has also some disadvantages. The design of the Wankel engine requires numerous sliding seals and a housing that is typically built as a sandwich of cast iron and aluminum pieces that expand and contract by different degrees when exposed to heating and cooling cycles in use. These elements led to a very high incidence of loss of sealing, both between the rotor and the housing and also between the various pieces making up the housing. Besides, the shape of the Wankel combustion chamber prevents preignition, it also leads to incomplete combustion of the air-fuel charge, with the remaining unburned hydrocarbons released into the exhaust. One more disadvantage of the Wankel engine is the difficulty of expanding the engine to more than two rotors. The complex shapes of the rotor, housing, and output shaft and the way they fit together requires that engines with more than two rotors use an output shaft made of several sections assembled during the assembly of the rest of the engine. While this technique has been used successfully in Wankel powered racing cars, it negates a great deal of the relative simplicity and lower cost of the Wankel engine construction.

Because of their compact, lightweight design, Wankel rotary engines have been installed in a variety of vehicles and devices such as automobiles and racing cars, aircraft, go-karts, personal water craft, and auxiliary power units. The simplicity of the Wankel makes it ideal for macro, mini, micro, and micro-mini engine designs.

TEST 12

1. Choose the proper words and fill in the blanks.

- An internal combustion (IC) engine is an engine in which ... of the fuel takes place in a confined space.*
A. melting B. combustion C. forging D. cutting
- The first internal combustion engine ran on..., but worked on a cycle of operations, which did not include compression of the gas before ignition.*
A. natural gas B. petrol C. coal gas D. diesel oil

3. *The most significant distinction between modern internal combustion engines and the early designs is the use of*
 A. pressure B. damping C. ignition D. compression
4. *A reciprocating engine has one or more cylinders in which pistons reciprocate*
 A. up and down C. left and right
 B. back and forth D. round the cylinder
5. *Basic design divides engines into reciprocating and ... ones.*
 A. royal B. round C. rotary D. rolling
6. *Reciprocating engines are classified on the base of position and number of*
 A. pistons B. cylinders C. crankshafts D. valves
7. *A single-cylinder engine has one cylinder and piston connected to the*
 A. crankshaft C. rotor
 B. combustion chamber D. stator
8. *Opposed-cylinder engine has... banks of cylinders opposite to each other on a single crankshaft.*
 A. two B. three C. four D. five
9. *An opposed-piston engine has ... pistons in each cylinder with the combustion chamber in the centre between the pistons.*
 A. two B. three C. four D. five
10. *A rotary engine is made of a large non-concentric rotor with a built-in..., moving around a stationary block (stator).*
 A. cylinder B. crankshaft C. piston D. gearwheel

2. Fill in the blanks with the proper forms of the Passive Voice.

1. *The first commercially successful internal combustion engine ... by a Frenchman, Étienne Lenoir in 1860.*
 A. is created B. was created C. are created D. will be created
2. *The combustion chamber... in the closed end of each cylinder.*
 A. am located B. are located C. is located D. were located
3. *Power... to a rotating output crankshaft by mechanical linkage with the pistons in reciprocating engine.*
 A. am delivered C. are delivered
 B. is delivered D. were delivered

4. *In-Line engine cylinders ... in a straight line, one behind the other along the length of the crankshaft.*
 - A. are positioned
 - B. is positioned
 - C. was positioned
 - D. am positioned
5. *Engines of two different cylinder arrangements... as W-type engines in the technical literature.*
 - A. are classified
 - B. is classified
 - C. has been classified
 - D. was classified
6. *Air and fuel ... to facilitate the combustion process in carburetted engines.*
 - A. is mixed
 - B. are mixed
 - C. am mixed
 - D. has been mixed
7. *Injectors ... in combustion chambers with injection directly into cylinders in gasoline direct injection engines.*
 - A. is mounted
 - B. has been mounted
 - C. am mounted
 - D. are mounted
8. *Fuel ... into the main combustion chamber in direct injection engines.*
 - A. have been injected
 - B. is injected
 - C. are injected
 - D. were injected
9. *Well-mixed fuel and oxidizer (typically, air) ... to the point of auto-ignition in homogeneous charge compression ignition engines.*
 - A. is compressed
 - B. has been compressed
 - C. are compressed
 - D. was compressed
10. *Different kinds of fuel ... in engines.*
 - A. has been used
 - B. are used
 - C. is used
 - D. was used

3. The text contains different mistakes: 4 — in spelling, 3 — in grammar. Correct the mistakes and rewrite the text.

Modern internal combustion engines can to be clasified in a number of different ways. Several or all of these classifications can be use at the same time to identify a given engine. Thus, a modern engine might be calles a reciprocating, spark-ignition, four-stroke cycle, I-head, woter-cooled, gasoline, multipoint port fuel injection avtomobile engine.

4. Answer these multiple-choice questions about engineering materials technology.

1. *What types can engines according to the type of ignition be divided into?*
 - A. spark-ignition and compression-ignition engines

- B. cylinder-ignition and piston-ignition engines
 - C. valve-ignition and crankshaft-ignition engines
2. *What types can engines depending on the engine cycle be divided into?*
 - A. three-stroke cycle and five-stroke cycle
 - B. four stroke cycle and two-stroke cycle
 - C. six-stroke cycle and seven-stroke cycle
 3. *What engine has two piston movements over one revolution for each cycle?*
 - A. a rotary engine
 - B. a four stroke cycle engine
 - C. a two-stroke cycle engine
 4. *How are the internal combustion engines called in accordance with the valve location?*
 - A. J-head engines and K-head engines
 - B. Y-head engines and B-head engines
 - C. I-head engines and L-head engines
 5. *How are engines called with pistons positioned in a circular plane around a circular crankshaft?*
 - A. reciprocating engines
 - B. radial engines
 - C. rotary engines
 6. *How are the opposed-cylinder engines often called?*
 - A. house engines
 - B. flat engines
 - C. room engines
 7. *How many strokes occur in the Wankel engine?*
 - A. two strokes
 - B. four strokes
 - C. eight strokes

Module 13

OIL & GAS AND PETROCHEMICAL INDUSTRIES

Vocabulary: exercises 1—7, 12—16.

Grammar (the Complex Sentences): exercises 8—9, 17—19.

Reading: exercises 10—11, 32.

Listening: exercise 20.

Speaking: exercises 21—26.

Writing: exercises 27—30.

Project Work: exercise 31.

Test 13.

KEY VOCABULARY

Exercise 1. Read and guess the meanings of the new words. If you have some difficulties, use the dictionary at the end of this book. It will help you to read and discuss the texts and dialogues, arrange the role-plays and present the projects.

- 1) *primary products.* Natural gas and natural gas liquids are the primary products of oil and gas industry.
- 2) *crude oil.* Crude oil was used for fuel and medicine many years ago.
- 3) *oil and gas extraction industry.* The oil and gas extraction industry can be classified into four major processes.
- 4) *exploration.* Exploration is the first step in oil production.
- 5) *oil or natural gas deposits.* Exploration involves the search for oil and gas deposits.
- 6) *well development.* Well development means the construction of wells.
- 7) *site abandonment.* Site abandonment occurs when a well does not have economic quantities of oil or gas.
- 8) *to plug the well.* Site abandonment involves plugging the wells.
- 9) *to lack.* Site abandonment involves plugging the wells and restoring the site when a recently-drilled well lacks the potential to produce economic quantities of oil and gas.

- 10) *casing*. Casing is mounted in the well at the initial stage of the well development.
- 11) *drilling rig, production rig*. When the drilling rig is removed, then the production rig is installed.
- 12) *tubing*. Tubing carries the liquids and gas to the surface.
- 13) *flow of fluid*. A series of valves is installed to control the flow of fluid from the well.
- 14) *pump, rod pump*. The most common pump is the rod pump.
- 15) *formation pressure*. The pumping is required if the formation pressure is low.
- 16) *artificial lift*. If pumps are added, then such kind of production is called 'an artificial lift'.
- 17) *to suspend*. The rod pump is suspended on a string of rods from a pumping unit.
- 18) *to remove impurities*. Equipment is needed to remove impurities.
- 19) *pipeline, to facilitate*. A pipeline is connected to the well to facilitate transportation.
- 20) *storage container, to store*. A storage container is connected to the well to store the product.
- 21) *pores, fractures*. Sometimes hydrocarbons can hardly move easily through the pores or fractures into the reservoir.
- 22) *acidizing, fracturing*. There are some forms of stimulation such as acidizing and fracturing.
- 23) *light and heavy fraction*. Lighter fractions are collected at the top of the tower, and heavier fractions are collected at its bottom.
- 24) *fractioning column*. The separation of the mix of hydrocarbons is performed in a fractioning column, also known as an atmospheric distillation tower.
- 25) *refinery*. Crude oil is turned into usable products at refineries.
- 26) *perforated trays*. An atmospheric distillation tower is a tall steel tower with perforated trays.
- 27) *residual products, waxes, greases*. The residual products of the distillation are further processed to produce refinery fuels, waxes, greases, etc.
- 28) *cracking, coking*. The most widely used conversion methods are cracking and coking.
- 29) *derrick*. Wooden derricks were constructed long ago.
- 30) *domain*. The business of oil refining was John D. Rockefeller's domain.

Exercise 2. Read the words following the rules of reading. Pronounce correctly. Practise aloud.

Primary, liquids, oil, site, rig, fluid, refinery, acidizing, derricks;
enough, development, economically, deposit, chemical, household;
struck, use, manufacturing, petroleum, quantities, produce, usually, push;
means, non-saleable, readily, features;
sufficient, diesel, believe, series;
scientific, classified;
methan, ethan, this;
store, wellbore;
liquid;
artificial, associated, viable;
food, boom, wooden.

Exercise 3. Look at the following pairs of words and think if the underlined letters are pronounced in the same way, or if they are pronounced differently. Read aloud.

Move — boom, pump — fracturing, oil — reservoir, removing — rod,
means — created, chief — diesel, pumping — stimulating, gas — lack, site —
drill, natural — column, also — valves, remove — gasoline, one — more, quan-
tities — site, well — extracting, great — means, device — chemicals, cell —
called, diesel — believe.

Exercise 4. Read the international words, mind the stress.

Natural, gas, industry, process, fact, product, production, construction,
potential, economic, operation, control, type, electric, motor, phase, contain-
er, transport, stimulation, physical, chemical, reservoir, form, mixture, com-
ponent, mix, transformation, diesel, atmospheric, distillation, temperature,
methane, propane, butane, kerosene, conversion, molecule.

Exercise 5. Try to enrich your vocabulary:

a) analyse the following words with different suffixes and divide them into two groups — nouns and adjectives:

important, connection, production, petrochemical, scientific, primary,
development, chemical, significant, importance, abandonment, pressure,
physical, economic, stimulation, exploration, geophysical, construction,
equipment, appearance, different, available;

b) make up as many words as you can by combining different parts of the words:

re-	search	-er/or	-ly
non-	experiment	-al	
	store	-tion	
	move	-ment	
	equip	-able	
	sale		
	construct		

Exercise 6. Divide the following words into two groups, those which describe a) oil & gas industry; b) petrochemical industry.

Polymers, distillation, organic components, waxes, cracking, lubricants, refinery, well development, detergents, liquid hydrocarbons, synthetic rubbers, wellbore, crude oil, derrick, exploration, acidizing.

Exercise 7. Think over the definitions of the words which appear in the texts and dialogues and then:

a) agree or disagree with the following definitions

1. *Distillation tower* is a long vertical cylinder used in fractional distillation where the separation of high and low boiling fractions takes place.

2. *Derrick* is a tall tower built over an oil well that is used for raising and lowering the drill.

3. *Lubricants* are such substances as grease or oil that reduce friction when applied as a surface coating to moving parts.

4. *A well* is a deep hole in the earth to obtain oil, gas.

5. *A drilling rig* is a special apparatus used for drilling oil wells.

b) match each word with its correct definition

to process, to distill, to store, to lack, to prospect

1. To be without or not to have enough.

2. To explore for oil.

3. To separate or extract the essential elements.

4. To prepare, to treat or convert by subjecting to a special process.

5. To keep or accumulate for future use.

c) find the definitions for some other words which you consider to be important for the topic “Oil & Gas and Petrochemical Industries”. Use the website www.macmillandictionaries.com

EXPLORING GRAMMAR

Exercise 8. Read the sentences, point out the complex sentences. Give the Russian equivalents. If you have some difficulties, use the grammar reference at the end of the book.

1. Hydrogen and carbon making up petroleum came from plants and animals which were living on land and in sea long ago. 2. This explanation that you managed to listen to is generally accepted by scientists. 3. I believe you know, that carbon and hydrogen are the primary constituents of organic materials, both plant and animal. 4. Moreover, according to the material that you read before, carbon, hydrogen, and hydrocarbons are constantly produced by life processes of plants and animals. 5. Gas accumulates on the top of the reservoir as a “gas cap” over the oil in a typical trap, which one can be aware of. 6. Most of the world’s petroleum was found trapped in rocks, which are porous by nature. 7. It occurs because natural gas is lighter than oil, which in its turn is lighter than water. 8. Porosity is the ability of the rock which is characterized by holding oil and gas like water in a sponge. 9. Geophysicists can identify the structure, configuration, thickness, and depth of new basins if they apply measuring. 10. It is a well-known fact that heat and pressure transformed the organic materials into solid, liquid or gaseous hydrocarbons.

Exercise 9. Make up your own sentences according to the models.

Model A: *Main products are crude oil and natural gas. They have been used throughout the history.*

Main products are crude oil and natural gas which have been used throughout the history.

1. The oil industry has four processes. They are of great importance 2. The four processes are exploration, well development, production, and site abandonment. They make up entire cycle. 3. Well development is the first phase. It means the construction of wells. 4. Production is the second stage. It implies extracting of hydrocarbons and separating them. 5. Site abandonment is the final stage. It involves plugging the well.

Model B: *Drilling, casing, and testing are completed. The drilling rig is removed. When drilling, casing, and testing are completed, the drilling rig is removed.*

1. Drilling rig is removed. The production rig is installed. 2. Formation pressure is not sufficient. Pumps are added. 3. Natural gas cannot be stored easily. A pipeline connection is connected to the well. 4. The stimulation of the formation is required. The hydrocarbons can hardly move more easily to the

wellbore through the pores and fractures into the reservoir. 5. The stimulation is done in some cases. The pump is removed for maintenance.

READING

Exercise 10. Read the text, try to focus on its essential facts and choose the most suitable heading given below for each paragraph.

- 1) Oil and Gas Production Equipment
- 2) The Primary Products and the Main Processes
- 3) The Stimulation of the Formation

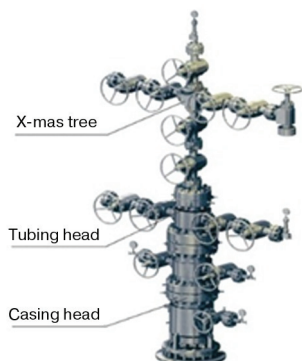
OIL AND GAS INDUSTRY

The oil and gas industry is an important link in the energy supply of the countries. The primary products of the industry are crude oil, natural gas liquids, and natural gas. The oil and gas extraction industry can be classified into four major processes: exploration, well development, production, and site abandonment. Exploration involves the search for rock formations associated with oil or natural gas deposits, and involves geophysical prospecting and/or exploratory drilling. Well development means the construction of one or more wells. Production is the process of extracting the hydrocarbons and separating the mixture of liquid hydrocarbons, gas, water, and solids; removing the constituents that are non-saleable; and selling the liquid hydrocarbons and gas. Finally, site abandonment involves plugging the well and restoring the site when a recently-drilled well lacks the potential to produce economic quantities of oil or gas.

Production equipment installation is of great importance. When drilling, casing, and testing operations are completed, the drilling rig is removed and the production rig is installed. In most cases, tubing is installed in the well which carries the liquids and gas to the surface. At the surface, a series of valves collectively called the Christmas tree because of its appearance is installed to control the flow of fluid from the well.

Pumps are added if the formation pressure is not sufficient to force the formation fluid to the surface. While some oil wells contain enough pressure to push oil to the surface, most oil wells drilled today require pumping. This is also known as artificial lift. Different types of pumps are available; the most common is the rod pump. The rod pump is suspended on a string of rods from a pumping unit, and the prime mover for pumping units can be an electric motor, or a gas engine. Equipment is usually installed on site to separate natural gas and liquid phases of the production and remove impurities. Finally, a pipe-

line connection or storage container (tank) is connected to the well to facilitate transportation or store the product. In the case of natural gas, which cannot be stored easily, a pipeline connection is necessary before the well can be placed on production.



Christmas tree

In many oil and gas wells, one additional step is required — stimulating the formation by physical or chemical means so that the hydrocarbons can move more easily to the wellbore through the pores or fractures into the reservoir. This is usually done before installing a pump or when the pump is removed for maintenance. Some forms of stimulation such as acidizing and fracturing are commonly employed if required.

Exercise 11. Agree or disagree with the following statements.

1. The primary products of the industry are crude oil, natural gas liquids, and natural gas. 2. The main process characterizing oil and gas industry are the following: exploration, production, site abandonment. 3. Production equipment is of great importance. 4. If the formation pressure is not enough for the formation to flow by gravity, pumps are added. 5. The formation can be stimulated by physical or chemical means.

KEY VOCABULARY DEVELOPMENT

Exercise 12. Match the adjectives in column A with the nouns in column B to form meaningful phrases and then identify them at the sentence level in the text. It will help you understand the text in detail.

- A**
- 1) primary
 - 2) artificial
 - 3) non-saleable
 - 4) geophysical
 - 5) liquid
 - 6) economic
 - 7) sufficient
 - 8) different
 - 9) prime
 - 10) electric

- B**
- a) hydrocarbons
 - b) constituents
 - c) prospecting
 - d) pressure
 - e) mover
 - f) motor
 - g) pumps
 - h) lift
 - i) products
 - j) quantities

Exercise 13. Decide which of the verbs on the left collocate with the nouns on the right and then identify the word combinations at the sentence level in the text. It will help you understand the text precisely.

- | | |
|------------------|----------------|
| 1) to plug | a) equipment |
| 2) to lack | b) stimulation |
| 3) to store | c) products |
| 4) to suspend | d) site |
| 5) to employ | e) transport |
| 6) to remove | f) drilling |
| 7) to facilitate | g) potential |
| 8) to restore | h) impurities |
| 9) to complete | i) pumps |
| 10) to install | j) wells |

Exercise 14. Try to enrich your vocabulary:

- a) find words in the text which have the same meanings as the following words:
significant, connection, main, to embrace, to manufacture, to finish, various;
- b) find words in the text whose meanings are opposite to the meanings of the following words:
artificial, to join, solid, to buy, long ago, to star;
- c) replace the words in *italics* with the words with similar meanings:
 1. The oil and gas industry is a *significant link* in the energy supply of the countries.
 2. The operations are *finished*.
 3. There are *various* types of pumps.
 4. The oil and gas extraction industry can be classified into four *main* processes.
 5. Exploration *embraces* the search for oil and gas deposits.

Exercise 15. Complete the sentences: change the word in capitals at the end of each sentence to form a word that fits suitably in the blank space.

1. Some constituents are ... SALE.
2. Production is a process of ... the hydrocarbons EXTRACT.
3. They lack the potential to produce ... quantities of oil and gas ECONOMY.
4. Production ... installation is of great importance EQUIP.
5. A distillation tower can separate ... fractions VARY.

Exercise 16. Insert the words at the sentence level: fill in the blanks with the missing words (the first letter of each word is given).

1. W... development means the construction of one or more wells. 2. The drilling r... is removed. 3. C... is an important phase as well as testing operations. 4. Site a... involves plugging the w... . 5. Exploration involves the search for oil or natural gas d... . 6. T... is installed in the well which carries the liquids and gas to the surface. 7. P... are added if the formation pressure is not sufficient. 8. The r... pump is ... on a string of rods from a pumping unit. 9. Equipment is installed to remove i... . 10. The hydrocarbons can move easily through the pores or f... into the reservoir.

GRAMMAR DEVELOPMENT

Exercise 17. Point out the complex sentences in the text and provide the Russian equivalents. It will help you understand the text in detail.

Exercise 18. Fill in the blanks to streamline the use of the complex sentences.

1. A fractioning column, ... is also known as a distillation tower, plays a very important role. 2. It is a tall steel tower, ... has perforated trays. 3. Several trays are required ... each fraction has a different boiling range. 4. There are light and heavy distillates ... people produce at refineries. 5. Residual products are further processed ... waxes, greases, and asphalt are produced. 6. ... some oil wells contain enough pressure to push oil to the surface, pumping is not necessary. 7. ... testing operations are completed, the drilling rig is removed. 8. ... a well fails to produce required quality of oil or gas, then the decision about abandonment of the site is made.

Exercise 19. Make up sentences according to the models to practise the use of the complex sentences.

Model A: *Мы знаем, что эта проблема требует особого внимания.*
We know that this problem requires special attention.

1. Они знают, что буровая установка неисправна. 2. Мы информированы о том, когда нефтеразведка закончится. 3. Они полагают, что

найденный пласт породы содержит залежи нефти и газа. 4. Мы знаем, что установка этого оборудования очень важна. 5. Они уверены, что насосы необходимы.

Model B: *Когда вы проведете испытание скважины, мы сможем оценить дебит скважины.*

When you make the well test, we'll be able to determine its flow rates.

1. Когда они установят обсадную колонну, мы будем готовы об-суждать мощность скважины. 2. Когда они уберут буровую установку, мы будем монтировать установку по добыче. 3. Если они начнут опе-рации по обсадке скважины трубами на этой неделе, то мы закончим все работы в срок. 4. Если это будет необходимо, мы сможем применить гидравлический разрыв пласта залежи нефти.

LISTENING

Exercise 20. Listen to the text “The History of Oil Industry”.

Before listening: mind the words and phrases given to comprehend better the information you are going to listen to.

To trace back — восходить к определенному периоду в прошлом;

steam engine — паровой двигатель;

to spark — побуждать;

an oil boom — нефтяной бум;

to buy out competitors — выкупать конкурентов;

associates — партнеры;

to spread — распространяться;

to take the lead — занимать первое место;

annual — ежегодный;

to replace — заменять.

After listening: agree or disagree with the following statements and add some more information if needed.

1. Many centuries ago Native Americans used crude oil for fuel and medi- cine. 2. By 1860s wooden derricks had covered the hills of Western Pennsylv- ania. 3. The business of oil refining was mainly Ford's domain. 4. Fourteen states had active oil deposits. 5. The first major oil discovery in the Middle East occurred in 1908.

SPEAKING

Exercise 21. Share your vision of the oil & gas industry using the following phras- es: to my mind, in my opinion, as far as I remember, it seems to me, etc.

1. What are the primary products of the oil & gas industry?
2. What major processes may this industry be classified into?
3. What does exploration involve?
4. What does well development mean?
5. What kind of process is production?
6. What activities does site abandonment involve?
7. Does production equipment play an important role? If yes, explain why.
8. What kind of rigs do you know? When are they installed?
9. When is it necessary to add pumps?
10. What is an artificial lift?
11. In what cases is stimulation required?
12. What forms of stimulation do you know?
13. What are the main stages of turning crude oil into different usable products?
14. What are the final products of the distillation?
15. What are the most widely used conversion methods?

Exercise 22. Make up general and disjunctive questions and answer them according to the models to enhance your speaking skills.

Model A: *The industry produces crude oil, natural gas liquids, and natural gas. Does the industry produce crude oil, natural gas liquids, and natural gas? — Yes, it does.*
The industry produces crude oil, natural gas liquids, and natural gas, doesn't it? — Yes, it does.

1. Exploration involves the search of rock formation and exploratory drilling. 2. Well development means the construction of one or more wells. 3. Production aims at extracting the hydrocarbons. 4. Production equipment plays a prominent role. 5. A well contains enough pressure to push oil to the surface.

Model B: *Native Americans used crude oil for fuel and medicine. Did Native Americans use crude oil for fuel and medicine? — Yes, they did.*
Native Americans used crude oil for fuel and medicine, didn't they? — Yes, they did.

1. Retired railroad conductor E. Drake drilled a well in Pennsylvania. 2. In 1860s wooden derricks covered the hills of western Pennsylvania. 3. J.D. Rockefeller dominated in the oil refining business. 4. He bought out his competitors. 5. The first major oil discovery in the Middle East occurred in Iran in 1908.

Exercise 23. Make up special questions according to the models and answer them to streamline your speaking skills.

Model A: *Drilling rig is removed.*
What is removed?

1. The production rig is installed. 2. Tubing is mounted. 3. Equipment is usually installed to separate natural gas and liquid phases of the production. 4. The pump is removed for maintenance. 5. Acidizing is commonly employed.

Model B: *Valves can control the flow of fluid from the well.*
What can valves control?

1. Pumps can increase formation pressure. 2. Equipment can remove impurities. 2. A pipeline connection can facilitate product transportation. 3. It can speed up product storage. 4. The hydrocarbons can move more easily to the wellbore through the pores or fractures into the reservoir. 5. They can add one more form of stimulation.

Exercise 24. Ask questions and use the words in italics in your answers. The words in brackets will help you.

1. In producing gas and oil, *efficient performance* of producing wells has more and more importance (what). 2. A variety of tests must be made *to determine the performance of oil and gas well* (what, what for). 3. There are some well tests *to obtain certain information about the flow rates* (what for). 4. *Potential* test is a measurement of the largest amount of oil and gas produced by a well in a 24-hour period (what kind of). 5. The oil goes *to stock tanks* (where).

Exercise 25. Read the following dialogue, sum up the information and act out a similar dialogue.

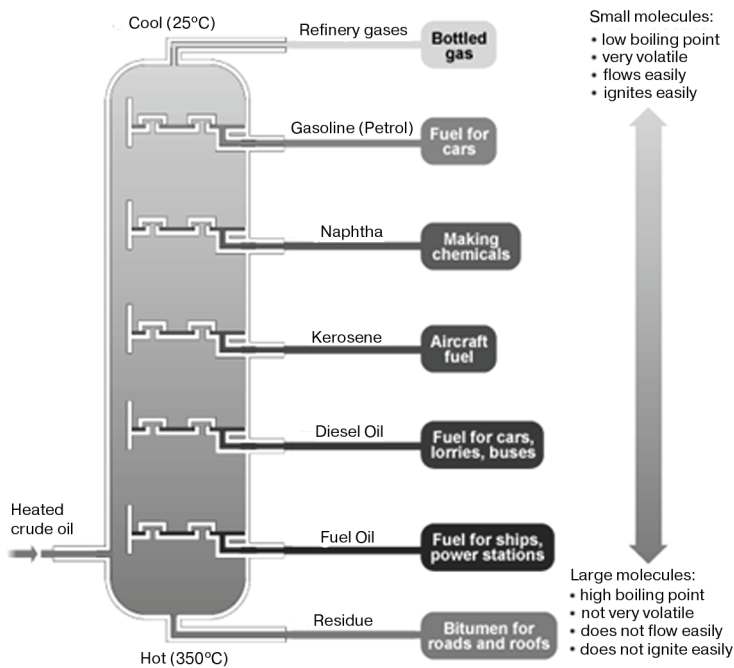
HOW TO TURN CRUDE OIL INTO USABLE PRODUCTS

- A.: Would you be so kind as to name the important stages of turning crude oil into different usable products?
- B.: Well, you see, crude oil is a mixture of many hydrocarbon components, so refineries must first separate and then process the mix of hydrocarbons which make up crude oil before they can be transformed into gasoline, diesel, and jet fuels, to name a few.
- A.: I've never been at the refinery! Could you tell me at least about the first stage, I mean the separation step?
- B.: Sure. This process takes place in a fractionating column, also known as an atmospheric distillation tower.

- A.: Excuse me please, did you say “atmosphere distillation tower”?
- B.: No, that is atmospheric distillation tower!
- A.: I see. What is this?
- B.: This is a tall steel tower with perforated trays. A number of trays are needed as each fraction has a different boiling range, and a distillation tower can separate various fractions using heat and cooling.
- A.: I know from the tutorials that heavier hydrocarbons boil at much higher temperatures than lighter hydrocarbons.
- B.: Right you are. So they settle in trays at the bottom of the tower closest to furnace. As for lighter fractions, they are collected at the top. As each fraction reaches the tray where the temperature is just below its own boiling point, it condenses, liquefies and is drawn off the tray by pipes
- A.: Oh, my God! What a complicated process it is! I wish I saw it with my own eyes! What are the final products of the distillation then?
- B.: First, gases and light gasoline such as methane, ethane, propane, and butane. Second, light distillates naphta, and kerosene.
- A.: What is naphta used for?
- B.: Naphta is used in the production of gasoline and petrochemicals. The third product is middle distillates (light and heavy gas oils). Light gas oils are turned into jet, diesel, and furnace fuels. Heavy gas oils undergo further chemical processing such as cracking to produce naphta and other products. And the forth product is residual products that are further processed to produce refinery fuels, heavy fuel oil, waxes, greases and asphalt.
- A.: You said ‘cracking’, didn’t you? What does it mean?
- B.: It’s the next step — conversion. By the way, the most widely used conversion methods are cracking and coking!
- A.: Why cracking?
- B.: This method uses heat and pressure to ‘crack’ heavy hydrocarbon molecules into lighter ones.
- A.: It’s so interesting! I believe this information can be of great help for my exam!
- B.: You are always welcome! Wish you luck at your exam!

Exercise 26. Role-play the following situation.

You are at the International scientific conference for the first time. You meet a famous American scientist there and have a talk about refineries. Use the scheme given below to present information about products, distilled in the fractioning column.



Fractioning column

WRITING

Exercise 27. Complete the following sentences in a logical way.

1. The primary products of oil and gas industry are crude oil, natural gas...
2. The oil and gas industry can be classified into four processes exploration, well development, production, and...
3. Exploration involves the search for rock formation, associated with...
4. Well development means the construction of one or...
5. Production is the process of extracting the hydrocarbons and separating...
6. Site abandonment involves plugging the well and restoring site when...
7. When drilling rig is removed then production rig...
8. In most cases tubing is installed in the well which carries...

9. At the surface a series of valves which are collectively called...
10. Pumps are added to force formation fluid to...
11. Equipment is installed to separate natural gas and liquid phases...
12. One additional step is required to stimulate the formation by...
13. Some forms of simulation are acidizing and...
14. There are two stages of turning crude oil into different usable products...
15. The products of distillation can be divided into 4 phases: gases and light gasoline; light distillates, middle distillates; and residual...
16. Gases and light gasoline are methane, ethane...
17. Light distillates are naphta...
18. Middle distillates include light and heavy...
19. Residual products are further processed to produce refinery fuel, waxes...

Exercise 28. Translate the following sentences from Russian into English. You will have a story on the topic as a pattern.

1. Первичными продуктами нефтегазовой промышленности являются сырая нефть (промысловая нефть), газоконденсат (газоконденсатные жидкости) и природный газ. 2. Нефть — это природная смесь углеводородов. 3. Нефтегазовая индустрия охватывает следующие процессы: разведка месторождений; установка разведочной скважины; добыча нефти; ликвидация объекта (скважины). 4. Нефтеразведка означает поиск пласта породы, в котором есть залежи нефти. 5. Добыча — это процесс очистки добытой нефти от нефтяного газа, различных примесей. 6. Этот процесс называется первичной сепарацией нефти. 7. Процесс ликвидации объекта происходит тогда, когда скважина не имеет достаточного потенциала производить нефть и газ в объеме, который экономически выгоден. 8. Оборудование для добычи играет существенную роль. 9. Когда закончено бурение, обсадка (скважины трубами), и проведены испытания скважины, тогда убирают буровую установку и монтируют установку для добычи нефти. 10. В большинстве случаев устанавливают НКТ (насосно-компрессорную трубу) для нагнетания и подъема газоконденсата и природного газа на поверхность. 11. Некоторые нефтяные скважины содержат давление, чтобы подкачивать нефть на поверхность. 12. В большинстве скважин установлены штанговые глубинные насосы, и эта добыча называется механизированной добычей (насосно-компрессорная добыча). 13. Иногда применяют физическую или химическую стимуляции, такие как гидравлический разрыв пласта, кислотная обработка скважины или

пласта. 14. Промысловая нефть после первичной сепарации поступает в ректификационную колонну на атмосферную перегонку. 15. Здесь нефть разделяется на несколько фракций: легкую и тяжелую бензиновую фракции, керосиновую фракцию, дизельную и остаток атмосферной перегонки — мазут.

Exercise 29. Make up your own story about the oil and gas industry according to the following points of the plan. The words and phrases are supposed to make your story logical and interesting.

1. *The primary products of the oil & gas industry*

The oil and gas industry is

The primary products of the industry are

2. *The major processes of the oil & gas industry*

Exploration involves

Well development means

Production is

Site abandonment embraces

3. *Production equipment*

Drilling rigs is removed

Production rig is installed

Tubing is installed

Pumps are added

4. *Stimulation*

Stimulation the formation can be done by

Stimulation is used

5. *The product of distillation*

There are

Residual products are processed

Exercise 30. Write an e-mail to your friend about the products of distillation that present the greatest value for you as a specialist in the oil and gas industry.

PROJECT WORK

Exercise 31. Compile information about the oil and gas industry and participate in a project. Give reasons why this field of industry is of interest for our country. Present the project to your group. You may use the following website: www.shell.com/globalsolutions, www.usctcgateway.net/tool

ADDITIONAL READING

Exercise 32. Make a summary of the text using the following phrases:

1. The title of the text is...
2. The text is about... The text deals with...
3. The text covers such points as... first... second... third...
4. It should be underlined that...
5. In conclusion, I may say that...
6. To my mind... In my opinion...

PETROCHEMISTRY

All spheres of modern life are directly connected with chemical products. Petrochemistry has one of the key roles in the production of polymers, synthetic rubbers, lubricating oils, dissolvent, colorants, additives, detergents, and raw materials for most organic compounds.

Petrochemistry is a science that can readily be applied to fundamental human needs, such as health, hygiene, housing, and food. Yet, it is an inventive business sector constantly adapting to new environments and meeting new challenges.

Chemicals derived from petroleum or natural gas — petrochemicals — are an essential part of the chemical industry today. Today, the main purposes of petrochemistry are the study and development of methods of hydrocarbons, natural gas and other oil component processing for the creation of optimal processes of producing organic compounds. The organic compounds are used as raw material for production of the marketable chemical products (such as polymers, films, synthetic rubbers, detergents, lubricants, colorants, additives, etc.). Most organic compounds are “petrochemical”, but usually this term is applied to the products, which are made in relatively large quantities.

Petrochemistry is a fairly young industry. According to the opinion of Russian scientists, the beginning of the petrochemistry development is 1920, when the American company “Standard Oil” started to produce isopropyl alcohol from propylene. The first petrochemical plant, involved in ethylene production, was put in operation in 1923 by another American company — Union Carbide.

Before then, it used to be an experimental sector, starting with basic materials: synthetic rubbers in the 1900s, Bakelite, the first petrochemical derived in 1907, the first petrochemical in the 1920s, polystyrene in the 1930.

The new industry started to grow rapidly only in the 1940s, more than 80 years after the drilling of the first commercial oil well in 1859. During World War II, the demand for materials to replace costly and sometimes less efficient

products caused the petrochemical industry to develop into a major sector in today's economy and society.

The petrochemistry industry includes an incredible variety of areas — from household goods to medicine, from leisure to highly specialized fields like archaeology or crime detection.

However, all this is little known. Petrochemicals do not reach the final consumer; they are first sold to customer industries, undergo several transformations, and then go into products that seem to bear no relation whatsoever to the initial raw material. As a result, few of us make the connection between the petrochemical industry and their equipment, their CDs, food packaging or computers; few realize the amount of scientific efforts that went into these commonplace objects.

Although benefiting daily from end products that have been made thanks to the input of the petrochemical industry, we don't see an obvious connection between these everyday commodities and petrochemistry.

TEST 13

1. Choose the proper words and fill in the blanks.

- The primary products of the oil & gas industry are... .*
A. crude oil, natural gas liquids
C. mazute
B. jet fuel
D. crude oil, natural gas liquids, natural gas
- The major processes are... .*
A. exploration
C. exploration, production, well development, site abandonment
B. production
D. production, exploration, site abandonment
- Crude oil is the mixture of... .*
A. hydrocarbons B. hydrogen C. oxygen D. carbon
- Most of the world's petroleum was found trapped in ... rocks.*
A. porous B. deep C. sedimentary basins D. high
- ... transformed the organic materials into solid, liquid or gaseous hydrocarbons.*
A. Distillation B. Coking C. Heating D. Cooling
- Porosity is the ability of rock to hold oil and gas like water in*
A. a sponge B. a pipe C. a tanker D. a reservoir

7. *The products of light distillates are... .*
A. jet fuel and stove oil B. asphalt C. grease D. butane
8. *The products of middle distillation are... .*
A. jet, diesel, fuel oil B. methane C. propane D. jet and stove oil
9. *Residual products are... .*
A. heavy fuel oils B. wax C. grease D. diesel oil
10. *The most common type of pumps is ... pump.*
A. rod B. pipe C. production D. deep

2. Fill in the blanks with the proper grammatical forms.

1. *If you ... very hard, you can master your skills.*
A. try B. will try C. would try D. had tried
2. *Time will be saved if we ... a pump.*
A. use B. will use C. would use D. to use
3. *It would be a good thing if that well ... lack the potential to produce economic quantities of oil and gas.*
A. didn't B. will not C. wouldn't D. will
4. *If I ... in your place, I would use that equipment.*
A. were B. was C. am D. will be
5. *We are speaking about the crude oil... can be transformed into gasoline.*
A. whose B. who C. what D. that
6. *Potential test is a measurement ... is the most frequently conducted.*
A. which B. who C. — D. as
7. *There are many well tests ... to determine the performance.*
A. which B. that C. should D. —
8. *When casing ... completed, the drilling rig ... removed.*
A. is, is B. will be, will be C. is, was D. are, is
9. *Equipment is installed... separate natural gas and liquid phases.*
A. — B. in order to C. so that D. with the aim
10. *... casing ... testing have been completed yet.*
A. Neither, nor B. Neither, or C. Both, and D. Either, or

3. The text contains different mistakes: 2 — in spelling, 5 — in grammar. Correct the mistakes and rewrite the text.

When crude oil is first bring to the surface, it may to contain a miktüre of natural gas and produced fluids such as salt water and both dissolved and

suspended solids. Natural gas is separated at the well site and is process for sale if natural gas pipelines is nearby. Metane is the predominant component of natural gas, but ethane, propane and butane are also significant component.

4. Answer these multiple-choice questions about the oil and gas industry

1. *What are the major processes of the oil & gas industry?*
 - A. production and exploration
 - B. exploration, well development, production, site exploration
 - C. exploration, well development, production, site abandonment
2. *What is installed in the well to carry the liquids and gas to the surface?*
 - A. tubing
 - B. casing
 - C. restoring
3. *What is the most common type of the pumps used in the well?*
 - A. drilling rig
 - B. rod pump
 - C. production rig
4. *What prevents water from getting into the wellbore?*
 - A. tubing
 - B. well
 - C. rock
5. *Chemicals derived from petroleum and natural gas are*
 - A. petrochemicals
 - B. additives
 - C. hydrocarbons

Module 14

INDUSTRIAL AND ENVIRONMENTAL BIOTECHNOLOGY

Vocabulary: exercises 1—7, 12—16.

Grammar Revision: exercises 8—9, 17—19.

Reading: exercises 10, 11, 32.

Listening: exercise 20.

Speaking: exercises 21—26.

Writing: exercises 27—30.

Project Work: exercise 31.

Test 14.

KEY VOCABULARY

Exercise 1. Read and guess the meanings of the new words. If you have some difficulties, use the dictionary at the end of this book. It will help you to read and discuss the texts and dialogues, arrange the role-plays and present the projects.

- 1) *to alter*. Biotechnology is application of science and technology to living organisms, products, and models to alter living and non-living materials for the production of knowledge, goods, and services.
- 2) *to derive from*. Biotechnology is derived from biological knowledge.
- 3) *detergents*. Industrial enzymes are used in detergents.
- 4) *fine chemicals*. They manufacture some antibiotics, vitamins, and other fine chemicals.
- 5) *ubiquitous applications*. The term ‘bio-based products’ comprises a great variety of innovative products in ubiquitous applications.
- 6) *perceptible characteristics*. No external, perceptible characteristics differentiate bio-based products from traditional products.
- 7) *to recognize*. Most bioproducts cannot be easily recognized by consumers.
- 8) *to play a vital role*. Healthcare biotechnology plays a vital role in addressing unmet medical needs.
- 9) *fungi, yeast*. Industrial biotechnology uses fungi, yeast, bacteria to make sustainable energy.

- 10) *gene, genomics, genetic engineering*. One of the main biotechnical techniques is DNA/RNA that deals with genomics, gene probes, and genetic engineering.
- 11) *engineering, synthesis engineering, cell and tissue engineering*. Synthesis engineering as well as cell and tissue engineering are well known biotechnological techniques.
- 12) *biobleaching, bioleaching, biopulping*. A biomodel is represented in biobleaching, bioleaching, and biopulping.
- 13) *feedstock*. Crude oil is used as feedstock in the production of chemicals and fuels.
- 14) *greenhouse effect*. Global warming is the result of the 'greenhouse effect', which is caused by carbon dioxide and other gases.
- 15) *carbon dioxide*. Carbon dioxide is a result of the combustion of hydrocarbons and coal.

Exercise 2. Read the words following the rules of reading. Pronounce correctly. Practise aloud.

Used, biofuel, human, reduce;
 lubricants, industrial, agricultural, products, substitute;
 chemical, technology;
 carbons, can, clearly, consumers, construction, constitute, cell;
 bioleaching, easily, bioleaching, yeast;
 feed, street, been, seem;
 bioremediation, phytoremediation;
 sustainable, daily;
 materials, people;
 protein, perceptible;
 peptides, traditional, thing, tissue.

Exercise 3. Look at the following pairs of words and think if the underlined letters are pronounced in the same way, or if they are pronounced differently. Read aloud.

Daily — fairly; variety — efficient; reach — areas; cell — carbon; three — feed; chemical — characteristics; product — used; variety — scientific; peptide — fibers; industry — manufacturing; fall — all; however — growg; comprise — carbon; treatment — yeast; field — factories; promise — medical.

Exercise 4. Read the international words, mind the stress.

Technology, chemical, product, polymer, synthetic, term, industry, company, sector, operation, object, biotechnology, bioplastics, biomass, organic, micro-organism, ethanol, material, biodiesel, alternative, sector, carbon, plat-

form, vitamin, antibiotics, niche, potential, element, innovative, traditional, bacteria, fermentation, biofiltration, diagnostics, process, complex, bioinformatics, basis.

Exercise 5. Try to enrich your vocabulary:

a) analyse the following words with different suffixes and divide them into two groups — nouns and adjectives:

biogradable, external, sustainable, scientific, biotechnological, biofiltration, natural, industrial, incredible, consumer, initial, organic, treatment, bioremediation, application, evolution, biological, medical, pharmaceutical, innovative;

b) make up as many words as you can by combining different parts of the words:

nano-	visible	-al	-ly
petro-	experiment	-or	
bio-	technology		
in-	chemical		
	react		

Exercise 6. Divide the following words into two groups, those which describe a) white biotechnology; b) bioremediation.

Antibiotics, biogradable plastics, fine chemicals, enzyme, genomics, cell engineering, bioreactor, bioprocessing, biosystem, corn, wheat, bioethanol, biodiesel, substitute, biofuel.

Exercise 7. Think over the definitions of the words which appear in the texts and dialogues and then:

a) agree or disagree with the following definitions

1. *Biotechnology* is derived from biological knowledge.
2. *White biotechnology* is a broad field using new enzymes for a variety of industrial needs.
3. *Biofuel production* is a part of white biotechnology.
4. *DNA (deoxyribonucleic acid)* is a chemical substance that contains generic information and is found in all living cells and some viruses.
5. *RNA (ribonucleic acid)* is an acid in all living cells that uses information from DNA to make protein.

b) match each word with its correct definition

enzyme, detergent, genome, protein, cell

1. The total amount of generic information in the chromosomes of a living thing, including its genes and DNA.

2. A liquid or powder used for washing clothes or dishes.
 3. A natural chemical produced by animal and plant cells that helps reactions and other processes to start.
 4. A substance in food such as meat, eggs, and milk that people need in order to grow and be healthy.
 5. The smallest part of a living structure that can operate as an independent unit or an individual unit inside a structure consisting of many similar units.
- c) **find the definitions for some other words which you consider to be important for the topic “Industrial and Environment Biotechnology”. Use the website www.macmillandictionaries.com**

GRAMMAR REVISION

Exercise 8. Read the sentences, point out the finite forms of the verbs. Give the Russian equivalents. If you have some difficulties, use the grammar reference at the end of the book.

1. The main task is to reduce the environmental impact of manufacturing. 2. Although bio-based polymers and plastics are still in their infancy, this industry has been characterized by great potential. 3. Today we also see the results of recent developments of new processes combining biotechnology and chemical synthesis. 4. Biosensors can be used for real-time monitoring of environmental pollutants. 5. Enzymes and other biological organisms can perform industrial processes in such traditional industries as food industry, leather and textile industries, etc. 7. Biotechnology techniques are adapted and adopted for biofuel production. 8. Biorefineries are able to reuse waste materials as feedstock for energy and materials. 9. Some current biotechnological applications reduce emissions but also lead to a high degree of carbon feedstock. 10. The production of biofuel will create the technological foundation for replacing oil-based materials with bio-based materials.

Exercise 9. Make up your own sentences according to the models.

Model A: *Red biotechnology plays a vital role in addressing unmet medical needs.*

Red biotechnology has recently played a vital role in addressing unmet medical needs.

1. Biodiesel provides alternatives to fossil fuels. 2. Industrial biotechnology encompasses many waste treatments. 3. It produces biofuel from renewable raw materials. 4. It produces ethanol as a substitute for gasoline. 5. The term “bio-based products” comprises a great variety of innovative products.

Model B: *We use bio-based products in construction.*
Bio-based products are used in construction.

1. We add industrial enzymes in detergents. 2. We use bacteria in food processing. 3. They transform feedstock into organic chemicals. 4. We use biodegradable plastics in household application. 5. We transform sugar-cane, sugar beet and wheat into main feedstocks.

READING

Exercise 10. Read the text, try to focus on its essential facts and choose the most suitable heading given below for each paragraph.

- 1) Main Biotechnological Techniques
- 2) Three Areas of Biotechnology
- 3) Biotechnology Is the Evolution of Biological Science
- 4) Biotechnology Domain
- 5) Differentiation Between Bio-based products and Traditional Products

BIOTECHNOLOGY: THE SCIENCE BEHIND

Biotechnology is defined as the application of science and technology to living organisms as well as parts, products, and models to alter living or non-living materials for the production of knowledge, goods, and services. In other words, biotechnology is derived from biological knowledge and finally is associated with the evolution of the biological science.

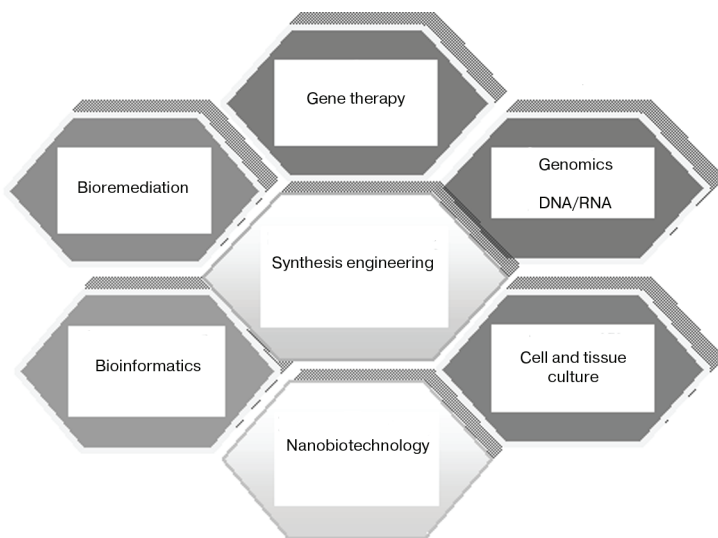
Traditionally, biotechnology has been associated with the medical and pharmaceutical sectors. However, its domain is far wider. Bio-based products already existing on the market include biopolymer fibers used both in construction and household applications, biodegradable plastics, biofuels, lubricants, and industrial enzymes such as those used in detergents or in paper and food processing. Biotechnological processes also constitute a key element in the manufacturing of some antibiotics, vitamins, amino acids, and other fine chemicals.

The term ‘bio-based products’ comprises a great variety of innovative products in ubiquitous applications. However, due to the fact that no external, perceptible characteristics differentiate bio-based products from traditional products that are made with petrochemicals, most bioproducts cannot be easily recognized as such by consumers. The specific features of the bioproducts are mostly invisible for people.

Due to different historical reasons, biotechnology can fall within three areas: healthcare/red biotechnology that plays a vital role in addressing unmet medical needs; agricultural/green biotechnology provides farmers with

the technology to grow food; industrial/white biotechnology that uses fungi, yeast, bacteria, and/or enzymes as ‘cell factories’ to make sustainable energy, chemicals, and a lot of other everyday things. Although the application and objectives of the three biotechnological areas are clearly differentiated, they have the same scientific and technological basis.

The main biotechnological techniques can be summarized as: DNA/RNA (genomics, gene probes, genetic engineering); proteins and other molecules (synthesis engineering of proteins and peptides); cell and tissue culture and engineering; processing biotechnological techniques (fermentation using bioreactors, bioprocessing, biobleaching, biopulping, bioleaching, bioremediation, biofiltration and phytoremediation); gene and RNA vectors (gene therapy); bioinformatics (construction of databases of genomes, modeling complex biological processes); nanobiotechnology (application of nano/microfabrication to build devices for studying and diagnostics of biosystems).



Biotechnological techniques

Exercise 11. Agree or disagree with the following statements.

1. Biotechnology has been associated with the medical and pharmaceutical sectors.
2. The specific features of the bioproducts are mostly invisible to people.
3. There are three areas within biotechnology: red, green and white.
4. These areas have the same scientific and technological basis.
5. The main

biotechnical techniques are DNA/RNA, proteins, cell engineering, processing, bioinformatics, nanobiotechnology.

KEY VOCABULARY DEVELOPMENT

Exercise 12. Match the adjectives in column A with the nouns in column B to form meaningful phrases and then identify them at the sentence level in the text. It will help you understand the text in detail.

A	B
1) white	a) oil
2) pharmaceutical	b) features
3) specific	c) science
4) biological	d) biotechnology
5) biodegradable	e) sector
6) ubiquitous	f) applications
7) perceptible	g) chemicals
8) vital	h) plastics
9) fine	i) role
10) crude	j) characteristics

Exercise 13. Decide which of the verbs on the left collocate with the nouns on the right and then identify the word combinations at the sentence level in the text. It will help you understand the text precisely.

1) to alter	a) evolution
2) to derive from	b) detergents
3) to associate with	c) needs
4) to exist on	d) variety
5) to be used in	e) materials
6) to comprise	f) knowledge
7) to recognize	g) market
8) to play	h) food
9) to address	i) role
10) to grow	j) bioproducts

Exercise 14. Try to enrich your vocabulary:

a) find words in the text which have the same meanings as the following words:

use, field, broad, to embrace, main, various, aim, foundation, major, method, gadget;

b) find words in the text whose meanings are opposite to the meanings of the following words:

living, internal, visible, beyond, narrow, minor, common;

c) replace the words in italics with the words with similar meanings:

1. The 'white biotechnology' is a *wide* field. 2. The term 'bio-based product' *embraces* a great variety of innovative products. 3. The *aims* of the three biotechnological areas are clearly differentiated. 4. They have the same scientific and technological *foundation*. 5. There are some biotechnological *methods*.

Exercise 15. Complete the sentences: change the word in capitals at the end of each sentence to form a word that fits suitably in the blank space.

1. Biotechnology is derived from ... knowledge BIOLOGY.

2. Biopolymer fibers are used in construction and household ... APPLY.

3. Bioproducts comprise a great variety of ... products INNOVATE.

4. They have the same scientific and ... basis TECHNOLOGY.

5. Biotechnology is ... associated with the evolution of biological science FINAL.

Exercise 16. Insert the words at the sentence level: fill in the blanks with the missing words (the first letter of each word is given).

1. Biotechnology has been traditionally associated with the medical and p... sectors. 2. Industrial enzymes are used in d... . 3. There is no e... p... characteristics of a 'bio-based product'. 4. It is difficult for a consumer to r... a 'bio-based product'. 5. Red biotechnology plays a v... role in addressing unmet medical needs. 6. The term 'bio-based product' comprises a wide variety of i... products in u... applications. 7. White biotechnology uses f..., y..., bacteria, and e... to make sustainable energy. 8. Cell and t... culture and engineering is one of the main biotechnical techniques.

GRAMMAR REVISION

Exercise 17. Point out the sentences with the verbals in the text and provide the Russian equivalents. It will help you understand the text in detail.

Exercise 18. Fill in the blanks to streamline the use of the verbals. The words are given to help you.

1. ... features of the bioproducts are not visible at once (to distinguish). 2. Many countries think of ... an alternative fuel ... their emission reduction targets (to use, to meet). 3. Natural gas when ... emits 50-70% less carbon dioxide (to burn). 4. Biofuels are extremely useful, at least in the short term, for ... the energy challenge (to address). 5. A new biomodel is ... (to represent).

6. ... the technological and business potential of biotechnologies takes time (to understand). 7. Multiple product biorefinery models include a complex network of individual process chains ... from biorenewable feedstocks to different intermediates and ... in diverse bio- and chemical end products (to start, to end). 8. In order to turn research into products, a crucial step is ... a proof of the concept and ... it under industrial conditions (to establish, to test). 9. The biotechnological techniques can ... a key role in ... knowledge to commercial success stories (to play, to convert).

Exercise 19. Make up sentences according to the models to practise the use of the verbals.

Model A: *Мы разработали ряд мер по улучшению работы завода посредством привлечения новых инвесторов.*

We developed a set of measures of improving the plant's performance by attracting new investors.

1. Они сконцентрировались на некоторых шагах по внедрению биотехнологий посредством поставки возобновляемого сырья. 2. Он проанализировал слабые стороны производства биопродуктов, используя данные о поставке сырьевого материала. 3. Они нашли эффективные пути повышения производства биотоплива посредством преодоления проблем первого поколения биотоплива. 4. Промышленная биотехнология реализовала поставленные цели посредством неуклонного следования выбранной стратегии. 5. Они решили усовершенствовать производство за счет строительства бионефтеперерабатывающего завода, использующего сельскохозяйственные отходы как ценное сырье.

Model B: *Они решили увеличить применение энзимов для большего количества химических продуктов.*

They decided to increase enzyme application for a growing range of chemical products.

1. Они планируют применять биосенсоры для мониторинга в режиме реального времени за загрязнением окружающей среды. 2. Они начали производить биоразлагаемые пластмассы. 3. Завод планирует внедрить технологию биовосстановления, следуя за другими производителями. 4. Ожидается, что они разработают модули с применением микротехнологий для диагностики биосистем.

LISTENING

Exercise 20. Listen to the text “Global Warming”.

Before listening: mind the words and phrases given to comprehend better the information you are going to listen to.

To induce — вызывать;
to trap infrared radiation — поглощать инфракрасное излучение;
to retain the energy — сохранять энергию;
damage — повреждение;
disaster — бедствие;
endangered species — подвергающиеся опасности виды животных

и птиц;

indigenous species — местные виды животных и птиц;
to release in the atmosphere — выпускать в атмосферу;
to derive the energy — получать энергию;
nitrogen oxides — оксид азота, двуокись азота;
propulsion — движение;
combustion — горение, сгорание.

After listening: agree or disagree with the following statements and add some more information if needed.

1. Global warming is a result of the 'greenhouse effect', which is caused by carbon dioxide and other gases. 2. An increased Earth temperature leads to major ecological disasters affecting both ecosystem and human population. 3. Carbon dioxide is the result of the combustion of hydrocarbons and coal. 4. Besides carbon dioxide and water, the combustion products contain a certain amount of nitrogen oxides (NO_x), carbon monoxides (CO), and unburned hydrocarbons (HC), all of which are toxic for human health.

SPEAKING

Exercise 21. Share your vision of biotechnology using the following phrases: to my mind, in my opinion, as far as I remember, if I am not mistaken, etc.

1. What is the definition of the biotechnology?
2. What science is it associated with?
3. Are bioproducts already used? If yes, name a few.
4. Are there clear differentiating features of bioproducts for them to stay apart from traditional ones?
5. Do they have the same scientific and technological basis?
6. What biotechnological techniques do you know?
7. What can you say about 'white biotechnology'?
8. How is ethanol produced? What kind of fuel is it?
9. What alternatives to fossil fuels in transport sector do you know?
10. Why may biotechnology become as ubiquitous as chemical industry now?

Exercise 22. Make up general and disjunctive questions and answer them according to the models to enhance your speaking skills.

Model A: *'White biotechnology' appears to have used new enzymes for a variety of industrial needs.*

Does 'white biotechnology' appear to have used new enzymes for a variety of industrial needs? — Yes, it does.

'White biotechnology' appears to have used new enzymes for a variety of industrial needs, doesn't it? — Yes, it does.

1. This plant seems to have shifted to new feedstock. 2. A biofuel seems to be producing rapidly. 3. Biobutanol proves to have become an alternative to fossil fuels. 4. Government calls for all commercial vehicles drivers to shift to biofuels. 5. The plant seems to replace industrial chemical catalysts by biocatalysts.

Model B: *They managed to have used ethanol as a substitute for gasoline.*

Did they manage to have used ethanol as a substitute for gasoline? — Yes, they did.

1. They offered to use biopolymer fibers in construction. 2. It planned to include biopolymer fibers in household applications. 3. They expected to benefit from the fast uptake of industrial biotechnology. 4. He advised to apply bioremediation. 5. They started to take actions to cut dioxide emissions. 6. They attempted to contribute to emission reduction.

Exercise 23. Make up special questions according to the models and answer them to streamline your speaking skills.

Model A: *They identified industrial biorefineries as one possible solution to eliminate the threat of climate change.*

How did they identify industrial biorefineries?

1. He considered that question as the major growth factor to protect the environment. 2. They approved the concept of biorefineries as a set of inter-related operations. 3. They presented the idea of converting biomass into fuel as a global trend. 4. They characterized going green as a long-term driver for economic growth. 5. We saw this innovation as a step to improve efficiency in the use of energy and materials.

Model B: *It is (was) important to develop efficient enzymes.*

Why is (was) it important to develop efficient enzymes?

1. It (was) crucial to make full use of the biomass for both food and non-food application. 2. It is (was) significant to secure a sustainable supply of feedstock. 3. It is (was) crucial to develop novel fibers, utilizing components

from plants and other living things. 4. It is (was) urgent to replace energy-demanding chemical treatment with enzyme treatment in textile and leather processing. 5. It is (was) actual to build biofactories, where crop plants produce chemicals and plastics.

Exercise 24. Ask questions and use the words in italics in your answers. The words in brackets will help you.

1. Internationally, *chemicals and plastics companies* have adopted industrial biotechnologies *to replace hazardous and energy-demanding* synthesis processes with enzyme-based processes (what, what for, what kind of). 2. Industrial *biotechnologies* can assist industry *to reduce water usage and increase water reuse and recycling* through *water treatment technologies* (what, what to do, how). 3. Most *people* are unaware of the fact that *industrial* biotechnological applications are already used in a broad range of *everyday activities* (who, what, where, what kind of). 4. They are used *to reduce time* to bake bread, *to save heat* in *laundry washing*, *textile* making, to increase the yield in wine, cheese and vegetable oil production (where, what for). 5. *Industrial biotechnology* can be used *to create new products*, *to modify and develop new industrial processes* (what, what for).

Exercise 25. Read the following dialogue, sum up the information and act out a similar dialogue.

- A.: Look here, Alex! I've just read about the growth of economies of countries in Asia-Pacific region. Impressive figures! Just only China is projected annual 6.5% growth to 2030!
- B.: Fantastic! I guess the first challenge facing China is to make the best use of the country energy resources.
- A.: Actually it regards not only China, it's a global concern! The climate crisis is out of control. Moreover, by 2050 the global human population will have reached 9 billion.
- B.: It means that what we really need is a shift in focus. It requires exploring alternative systems and technologies!
- A.: New technologies? It seems to me, first of all, biotechnologies.
- B.: Yes, right you are!
- A.: Do you happen to know any industrial biotechnologies?
- B.: A lot of them! For example, biocatalyst, bioprocessing of materials and processes.
- A.: To my mind, it's vital nowadays to replace industrial chemical catalysts by biocatalysts using biologically derived enzymes.

- B.: I fully agree with you. But I'd like to add that bioprocessing, for example, organic synthesis of pharmaceuticals and microbial desulfurization of diesel fuels are of great importance at the moment as well.
- A.: No doubt! There is great potential in 'white' biotechnology!
- B.: What drives international adaptation of biotechnology?
- A.: First of all, environmental standards, economic drivers such as water, energy saving, consumer demand for natural products and improved quality.
- B.: Which sectors can benefit from the fast uptake of industrial biotechnology?
- A.: For example, such sectors as chemicals and plastics, textiles and leather, waste treatment, biotreatment of waste water and food processing, to name a few!
- B.: OK! I see! Thanks a lot for your comments! Bye!
- A.: You are welcome! See you soon!

Exercise 26. Role-play the following situations.

1. You are at the International scientific conference for the first time. You meet a famous American scientist there and have a talk with him about bio-product development in both countries. 2. You discuss the problems of biodiesel production with an upstream production department chief at the refinery.

WRITING

Exercise 27. Complete the following sentences in a logical way.

1. Biotechnology is defined as application of science and technology to living or non-living...
2. Biotechnology is derived from biological knowledge and...
3. Existing bio-based products include biopolymer fibers...
4. There are no differentiating features for...
5. Historically, biotechnology can fall within the following areas...
6. 'Red biotechnology' plays a vital role in addressing...
7. 'Green biotechnology' provides farmers with the technology to...
8. 'White biotechnology' uses fungi, yeast, bacteria to make...
9. The main biotechnical techniques are...
10. Environmental biotechnology may become...

Exercise 28. Translate the following sentences from Russian into English. You will have a story on the topic as a pattern.

1. Биотехнология — это применение научных методов и технологий для производства различных веществ и продуктов с использовани-

ем природных биологических объектов и для осуществления целевых превращений. 2. Биотехнология основывается на знаниях биологии, и ее развитие связано с эволюционным развитием последней. 3. Биопродукты уже присутствуют на рынке, такие как биополимерные волокна, биоразлагаемые пластмассы, биотопливо, СОЖ (смазочно-охлаждающие жидкости), промышленные ферменты. 4. Слово «биопродукты» включает в себя огромное разнообразие инновационных товаров, которые применяются повсеместно. 5. В силу исторических причин, биотехнология распадается на три области применения: медицина, сельское хозяйство, промышленность. 6. Хотя область применения и цели каждой из этих областей различны, они имеют общую научную и технологическую основу. 7. В состав биотехнологии входят генная, клеточная и экологическая инженерии. 8. Так называемая «белая биотехнология» помимо производства биопродуктов, также занимается борьбой с загрязнением окружающей среды, используя ферменты, которые получены биологическим методом. 9. Производство биотоплива тоже относится к «белой», производственной биотехнологии. 10. Исходным сырьем для биотоплива сегодня являются сахарный тростник, сахарная свекла и пшеница. 11. Биоэтанол, биодизель, биобутанол представляют собой альтернативу горючим полезным ископаемым. 12. Другая область применения — это производство химических веществ тонкого органического синтеза («тонкие химикаты»), такие как аминокислоты, липиды, органические кислоты, витамины и т.д. 13. Сейчас биотехнология занимает в производстве незначительную часть, но из-за ее огромного потенциала она может стать такой же вездесущей, какой сегодня является химическая промышленность.

Exercise 29. Make up your own story about biotechnologies and environmental problems according to the following points of the plan. The words and phrases are supposed to make your story logical and interesting.

1. *What Is Biotechnology?*

Biotechnology is

It is derived from

It is associated with

2. *Biotechnological Areas*

Healthcare/red biotechnology plays

Agricultural/green biotechnology provides

Industrial/white biotechnology uses

3. *Bio-based Products*

In construction, we see

In household application, there is

In the chemical industry, there are

Biofuel is produced from

4. *The Main Biotechnological Techniques*

DNA/RNA deals with

Proteins and other molecules are produced by

Process biotechnology techniques include

Nanobiotechnology comes up with

Bioinformatics constructs

Exercise 30. Write an e-mail to your friend about your participation in the workshop on biotechnology.

PROJECT WORK

Exercise 31. Compile information about biotechnology. Present the project to your group. You may use the following websites: www.industry.gov.au, www.fosters.com.au, www.oecd.org, www.ec.europa.eu

ADDITIONAL READING

Exercise 32. Make a summary of the text using the following phrases:

1. The title of the text is...
2. The text is about... The text deals with...
3. The text covers such points as... first... second... third...
4. It should be underlined that...
5. In conclusion, I may say that...
6. To my mind... In my opinion...

‘WHITE’ BIOTECHNOLOGY

The so-called ‘white biotechnology’ is a broad and expanding field that makes use of new enzymes for a variety of industrial applications, embraces the manufacture of non-oil-based and biodegradable bioplastics and biofuels, as well as artificial fibres. The process works by transforming biomass — e.g. agricultural (by)products, organic waste, algae — into biofuels and bio-based chemicals, in the same way as crude oil is used as feedstock in the production of chemicals and fuels. Industrial biotechnology encompasses many waste treatments and abatement of pollution, using microorganisms and plants, known as bioremediation.

Biofuel production is part of white biotechnology. Ethanol, a biofuel, is produced from renewable raw materials. Today, starch from corn, sugarcane, sugar beet and wheat are the main feedstocks. It is transformed into

ethertiobutylether (ETBE) — a mixture of isobutylene, a by-product of the oil industry, and ethanol — before being mixed with petrol. Bioethanol, biodiesel, and biobutanol can provide alternatives to fossil fuels in transportation sector, particularly for internal combustion engines, and potentially could help car manufactures meet their commitment on reducing CO₂ emissions that are used to produce ethanol as a substitute for gasoline. Another established sector is the production of fine chemicals, such as amino acids, lipids, organic acids, vitamins, etc.

In the chemical industry, an important step in increasing the share of bio-based chemicals is the creation of biotechnological platform intermediates based on the use of renewable carbon sources. In this way, renewable feedstocks can be transformed into a similar set of end-products (organic chemicals) which are produced today from fossil fuel. Bio-based products already existing on the market include biopolymer fibers used both in construction and in household applications, biogradable plastics, some antibiotics, vitamins, amino acids and other fine chemicals.

‘White’ biotechnology, or industrial and environmental biotechnology, may now only seem to occupy a small niche. Some analysts are currently comparing the current status of biotechnology to that of chemistry in the 1870s, when chemists were applying their new knowledge to a limited range of application. However, because of its enormous promise and potential, it may become as ubiquitous as the chemical industry today.

TEST 14

1. Choose the proper words and fill in the blanks.

- The so-called ‘white biotechnology’ makes use of ... for industrial purposes.*
A. new enzymes B. genomes C. tissue D. proteins
- Biotechnology falls within ... areas.*
A. two B. three C. four D. many
- There are ... main biotechnological techniques.*
A. two B. three C. four D. seven
- Sugar cane, corn, sugar beet and wheat are... .*
A. foodstuffs B. dishes C. feedstock D. stock
- Acids, lipids, organic acids, vitamins are... .*
A. fine chemicals B. chemicals C. fibers D. biomass

6. *Bioethanol, biodiesel, biobutanol provide ... to fossil fuels.*
A. field C. alternative
B. fine chemicals D. commitment
7. *Bioproducts have ... external characteristics to differentiate them from traditional ones.*
A. no B. some C. many D. much
8. *Biobleaching, biopulping, bioleaching, bioremediation belong to ... biotechnology.*
A. red B. green C. white D. green and white
9. *Three areas of biotechnologies have ... scientific and technological basis.*
A. the same B. different C. similar D. external
10. *Abatement of pollution using microorganisms and plants is known as*
A. fine chemicals C. bioremediation
B. forestation D. bio-feedstocks

2. Fill in the blanks with the proper grammatical forms.

1. ... bacterial enzymes *has* for use in cheese making, food manufacturing *has* existed for decades.
A. Purifying B. Purify C. To purify D. To be purify
2. In 1988 Danish company Novozymes ... *the first transgenic enzyme, a fat-digester for detergents.*
A. produce B. produced C. had produced D. has produced
3. Genesco is also trying ... *hypoallergenic proteins, which would penetrate the cosmetics.*
A. to develop C. develop
B. developing D. having developed
4. The example of vitamin — B2 synthesis ... *how a new biotechnology process can benefit both in environment and in economics.*
A. illustrates B. illustrate C. is illustrating D. is illustrated
5. Some companies hope to ... *from producing plastics using bacteria to manufacturing them in plants (through photosynthesis).*
A. to switch B. switch C. have switched D. is switching
6. The process ... *from successful laboratory trials.*
A. is being scaled up C. was scaled up
B. scales up D. is scaling up
7. It is also ... *to produce plastics in transgenic plant species.*
A. foreseen B. foresee C. foresaw D. has foreseen

8. *In France the biofuels ... from groundnut, oilseed rape, soybeans and palm oil.*
A. produce B. are produced C. is produced D. to produce
9. *Another promising biotech idea is ... the whole plant as a chemical feed-stock.*
A. to use B. use C. uses D. having used
10. *Another switch that may prove crucial ... is the move from ethanol to biotechnologically produced hydrogen.*
A. to watch B. watch C. watching D. is watched

3. The text contains different mistakes: 2 — in spelling, 5 — in grammar. Correct the mistakes and rewrite the text.

Bioremediation a key area of 'white biotechnology', because the elimination of wide range of pollutants from water and soils are an absolute requirement for sustainable development. There numerous processes of clean water and solid wastes, using microorganisms aerobically and anaerobically. Some of them are quit sophisticated, while others is simple and are adapted to the conditions of countries.

4. Answer these multiple-choice questions about biotechnology.

1. *What does the word 'biotechnology' mean?*
A. broad field
B. Latin word
C. knowledge
2. *What fields is biotechnology associated with?*
A. medical sector
B. medical and pharmaceutical sectors
C. medical and biological
3. *What areas can biotechnology fall within?*
A. green, white, red
B. green, orange, red
C. green, white, blue
4. *What kind of biotechnology deals with biofuel production?*
A. white
B. red
C. blue
5. *What niche does white biotechnology occupy?*
A. small
B. large
C. promising

LISTENING SCRIPTS

MODULE 2

EDUCATION IN THE USA

Alex, a Russian student, is talking with James Mitchell, an American from Las Vegas, Nevada. Their conversation is about the education in the USA.

- Mr Mitchell, what system of education is there in your country?
- You see, the USA has no national education system. Instead, each state is responsible for organizing and regulating its own system of education. There are common elements in the separate state systems, however.
- And what are these elements?
- Well, formal education is divided into the following stages: elementary, secondary, and higher education. School attendance is compulsory in every state.
- Are there any private schools in the USA?
- The state provides schooling at all stages of education, but parents can send their children to private schools.
- Mr Mitchell, have you got children? What school do they attend?
- Oh, Alex. I have a daughter, a nice girl, Chelsea by name. She attends a private school.
- Mr Mitchell, and what is the difference between “high schools” and “higher schools”?
- A great one. High schools, junior and senior, provide secondary education. Most of them offer both general and vocational courses of study. And higher schools provide higher learning...
- Mr Mitchell, sorry for interrupting you. At what educational institutions can one get higher education?
- Places of higher learning include community and junior colleges, technical institutes, universities, and separate professional schools.
- Thank you very much. I have a great desire to visit your country.
- You are welcome!

MODULE 3

M.V. LOMONOSOV

M.V. Lomonosov is the first Russian scientist of world-wide importance. He was born in the village in Arkhangelsk region. Already in his childhood he

was interested in a wide variety of subjects. When he was a young boy he went on foot to Moscow to get his education. He entered Moscow Academy and became one of its best pupils. He was sent to St Petersburg and then to Germany to continue his further education. In 1741 he returned to St Petersburg Academy of Sciences.

M.V. Lomonosov was the first who delivered public lectures on physics in the Russian language. He also established the first chemical laboratory at the Imperial Academy in 1748. And on his initiative Moscow University was founded in 1755. At present Moscow University is named after M.V. Lomonosov.

It is impossible to name a phenomenon which M.V. Lomonosov did not try to explain. He described the Earth structure, explained the origin of many minerals, foretold the importance of Siberia. He systematized knowledge in philosophy, natural science, history, language, and engineering. His scientific activities influenced greatly the development of Russia.

MODULE 4

AUTOMOTIVE ENGINEERING

The automobile has undergone significant changes largely due to advancements in the **automotive engineering** industry. Behind every car, truck, bus or bike on the roads and in the store there is an automobile engineer who played a key role in their design and construction. Because of the massive amount of vehicles on the roads today, the automobile engineering industry has a lot of responsibility both to ensure the safety of those vehicles and to make them more efficient.

Automobile engineering employs different engineering disciplines to assist in the design and manufacture of any kind of vehicles such as cars and buses, bikes and trucks. So, for example, one automobile engineer is in charge of working on the body of the vehicle to make sure that it is as aerodynamic as possible. It leads to performance maximization and makes sure that a vehicle uses as little fuel as possible. While another is working on the structural integrity of the vehicle to make sure that in case of any sort of crash, the people inside the vehicle are as protected as possible, and so on. If you imagine all the components that make up a vehicle, then it is clear that there is someone who is responsible for making sure that a vehicle functions properly. Some of these jobs and tasks overlap. To make sure that all these subsystems of the car work together there is generally a systems engineer or a development engineer who has an overseer role.

MODULE 5

FMS IN THE AUTOMOBILE INDUSTRY

The main goal of a flexible manufacturing system is offering the speed needed to change quickly in accord with market conditions, but not sacrifice any quality. Equipping production with a flexible manufacturing system may initially be more expensive than traditional equipment, but the overall goal of reducing expenses can be achieved easier. Manufacturers are capable of saving money by using the same equipment for performing two or more functions.

One of the most common examples of a flexible manufacturing system can be seen in the manufacturing of automobiles. Certain equipment is used for attaching doors to a sedan. With just a few simple adjustments, the same line and equipment may be used to attach doors to a sport utility vehicle or some other type of vehicle. In fact, the automobile industry keeps on saving a substantial amount of money using a flexible manufacturing system. A report in 2011 indicated that Ford Motor Company saved approximately \$2.5 billion US dollars by putting flexible systems in at five manufacturing plants. The company estimated that it could save at least half of the cost of manufacturing updated models using the systems.

In some cases, the machines may not only be used for producing or assembling different parts for different models, but to make customizations. These customizations, without a flexible system in place, would take much longer and be much more expensive for the customer. Using machines with the ability to be flexible can not only speed the process up, but can improve customer satisfaction by bringing down the price.

MODULE 6

APPLICATION OF COMPUTERS

The use of computers, playing a prominent role in our life, is becoming widespread today. It regards industry, business, education, medicine, just to name a few. As for industries concerned, versatile computers, controlling FMS, are able to improve the quality of manufactured products and to increase the productivity of industry. Computers are engaged in the control of power stations, plants and refineries. But computers are being used not only in science and industry. Thanks to them, modern medicine can diagnose diseases faster and more thoroughly, while they are becoming valuable medical diagnostic tools.

Also in banking system computers have become indispensable and irreplaceable. Furthermore, architects, designers, and engineers can't imagine

their work without computers. Computers form a part of many military systems including communication and fire control. They are applied for automatic piloting and automatic navigation, space exploration.

Moreover, computers are widespread in education. Except their classic tasks such as administration and accountancy they are used in process of learning. Firstly, they store enormous amount of data which helps students receive information. Secondly, thanks to special teaching techniques and programmes they enhance cognitive skills of getting and accumulating knowledge.

These machines are really everywhere and we depend on them. They have become so popular that not knowing how to use those means to be illiterate. Many uses of computers that we cannot imagine at present will become commonplace soon.

MODULE 7

ELEMENTS, COMPOUNDS, MIXTURES, AND COMPOSITES

Taking into consideration the chemical composition of materials, that is the chemicals they contain, and how the chemicals are combined, we may distinguish the following main categories of materials: elements, compounds, mixtures and composites.

Pure materials in their basic form are called elements. They cannot be broken into separate constituents. The most common elements widely used in engineering are iron, aluminium and carbon.

Materials which consist of two or more elements combined by chemical reaction present a category of compounds. An everyday example is water — a compound of hydrogen and oxygen.

Mixtures include two or more elements or compounds which are mixed together but are not chemically bound. The most common mixtures used in engineering are alloys. Steel, an iron-carbon alloy, can include in small quantities other elements such as chromium, manganese and tungsten.

A composite material is a matrix with a reinforced material inside it. Fiberglass, correctly called glass-reinforced plastic, is a composite with a plastic matrix reinforced with fiberglass. Composite materials are considered to be hi-tech materials.

MODULE 8

DIFFERENT KINDS OF CASTING

The casting process is subdivided into different kinds according to the mold material, such as sand or metal, and pouring method, such as gravity,

vacuum or pressure. Only some kinds of casting are mentioned here: sand casting, shell-mold casting, die casting, spin casting.

Sand casting is a metal casting process characterized by using sand as the mold material which is relatively cheap and sufficiently refractory even for steel foundry use.

Shell-mold casting uses resin covered sand to form the mold. As compared to sand casting, this process has better dimensional accuracy, a higher productivity rate, and lower labour requirements.

During die casting the molten metal is forced under high pressure into a mold cavity. The mold for die casting is created using two hardened tool steel dies.

While spin casting, the centrifugal force is utilized to produce castings from a rubber mold. Typically, a disc-shaped mold is spun along its central axis at a set speed. The casting material, usually molten metal or liquid thermoset plastic is then poured in through an opening at the top-centre of the mold. The filled mold then continues to spin as the metal solidifies or the thermoset plastic sets.

MODULE 9

A LATHE

The turning processes are typically carried out on a lathe. It is considered to be the oldest machine tool. A workpiece of some material is rotated on a lathe so that when abrasive, cutting or deformation tools are applied to the workpiece, it can be shaped to produce an object with the rotational symmetry about an axis of rotation. Turning usually uses simple single-point cutting tools. The operations that can be performed with a single-point tool on a lathe are chamfering, parting, threading, boring, drilling, knurling.

A lathe can be of four different types such as straight turning, taper turning, profiling and external grooving. They can produce various shapes of workpieces, such as straight, conical, curved, and grooved. Each group of workpieces has an optimum set of tools operations which have been developed through the years.

Modern computer numerical control (CNC) lathes and CNC machining centres can do also other operations, e.g. milling by using driven tools. Most modern CNC lathes are able to produce most objects in 3D.

MODULE 10

BUSES AND COACHES

Buses (also called omnibuses) are designed to transport about forty passengers. In towns and cities there are usually short distances between stops,

and speed of loading and unloading passengers is very important. The entrance step to the bus is about 300 mm above the road and it provides an easy step up. Another step up leads to the deck of the bus. The doors are usually power-operated by the driver to prevent passengers getting on or off while the bus is moving. A double-decker bus is carrying about sixty passengers. In modern designs the entrance is at the front for the driver to have a direct view of boarding passengers.

A coach is a type of a bus for conveying between thirty and forty passengers on excursions or for fairly long distances between towns and even countries. Unlike buses designed for shorter journeys, coaches have a luggage hold separate from the passenger cabin and are normally equipped with facilities required for longer trips: comfortable seats, air-conditioning, overhead luggage compartments, small tables for small snacks, video screens to show movies, and sometimes even a toilet.

MODULE 11

THE MOTOR CAR ELECTRICAL/ELECTRONIC EQUIPMENT

A modern motor car has a considerable number of electrical and electronic systems. It is fitted with certain lights, sidelights and headlights to be used in darkness and in poor visibility. Indicators, or flashers, are used to inform others of the direction in which a motor car is turning. Brake lights are required during the application of the brakes. There are a lot of other items which are operated electrically, such as windscreen wipers and washers, horns, heaters, audio systems, conditioning systems, central locking, etc.

The modern motor vehicle uses electronically controlled systems to operate many of the electrical items which were once controlled by simple on/off switches. Lately, electronically controlled engine systems have become common to achieve good performance and acceptable emission levels.

To operate the motor car electrical and electronic equipment electrical power is needed. It comes from a generator which is driven from the engine. Since certain items may be needed when engine is not running, a battery or accumulator is fitted. The battery is charged by the generator when the engine is running.

MODULE 12

PETROL CARS AND ELECTRIC CARS

People have been using cars for ages. Nowadays, the main competition seems to be between petrol cars and electric cars. The main difference between

these two cars is the technology that powers the cars to run. Petrol driven cars are built using internal combustion engines that use petrol as fuel, whereas electric cars run on battery power that is recharged.

A petrol combustion engine works on the principle of combustion, or the mixing of fuel with air to release gasses that cause the vehicle parts to move. The heat energy produced inside the engine is transmitted to propel the outside mechanical parts. These parts transmit the movement across the chassis to finally move the wheels accordingly. Petrol cars used to be fitted with carburetors and now use fuel injection systems. An electric car is fitted with batteries that are rechargeable. The batteries are placed across the entire system in a balanced way to manage equivalent weight dispersion and are connected with cables. These batteries power the mechanical parts to move.

Both the petrol and electric technologies work on different principles. However, certain important comparisons can be made in terms of the rate of conversion between a petrol engine and electric batteries which shows higher efficiency in the case of electric batteries. Moreover, the petrol combustion process produces a lot of smoke and dust, while electric batteries do not produce such pollutants. The energy transmission is better in electric battery driven vehicles when compared with petrol vehicles resulting in lesser wastage and transmission loss.

Electric battery car technology is still being developed by the engineers. Though people argue in favour or against electric cars, the emerging situation demands to move away from petrol cars. More and more research and process improvements should be done to bring advancements in the technology. It can help people to save the environment from pollution.

MODULE 13

THE HISTORY OF OIL PRODUCTION

Many centuries ago, Native Americans used crude oil for fuel and medicine. But the start of the oil industry as it is known today can be traced back to 1859. In that year, retired railroad conductor Edwin L. Drake drilled a well near Titusville, Pennsylvania. The well, powered by an old steam engine, soon produced oil and sparked an oil boom. By the 1860s, wooden derricks had covered the hills of western Pennsylvania. In 1865, the first successful oil pipeline was built from an oil field near Titusville to a railroad station five miles away. From there, railcars transported oil to refineries on the Atlantic coast.

The business of refining oil was largely the domain of John D. Rockefeller. The New York-born industrialist financed his first refinery in 1862. Then he went on to buy out competitors, and, along with his brother, William, and sev-

eral associates, he created Standard Oil Company. By 1878, Rockefeller had controlled 90 per cent of the oil refineries in the United States.

Drilling for oil spread quickly beyond Pennsylvania. By 1900, Texas, California, and Oklahoma had taken the lead in oil production, and eleven other states had had active oil deposits. Annual U.S. oil production climbed from two thousand barrels in 1859 to 64 million barrels in 1900. Other countries were also getting into the oil business. Russia was producing slightly more than the United States around the beginning of the twentieth century. Smaller producers were Italy, Canada, Poland, Peru, Venezuela, Mexico, and Argentina. The first major oil discovery in the Middle East occurred in Iran in 1908. Prospectors struck oil in Iraq in 1927 and in Saudi Arabia in 1938.

The demand for petroleum products became even greater after World War II. Petroleum use in the United States went from about 1.75 billion barrels in 1946 to almost 2.5 billion barrels in 1950. By the early 1950s, petroleum had replaced coal as the country's chief fuel. And plastic was the primary reason.

MODULE 14

GLOBAL WARMING

Global warming is the result of the 'greenhouse effect' induced by the presence of carbon dioxide and other gases, such as methane, in the atmosphere.

These gases trap the Sun's infrared radiation reflected by the ground, thus retaining the energy in the atmosphere and increasing the temperature. An increased Earth temperature results in major ecological damages to its ecosystems and in many natural disasters that affect human populations.

Among the ecological damages induced by global warming, the disappearance of some endangered species is a concern because it destabilizes the natural resources that feed some populations. There are also concerns about the migration of some species from warm seas to previously colder northern seas, where they can potentially destroy indigenous species and the economies that live off those species.

The large amount of carbon dioxide released in the atmosphere by human activities. We are largely responsible for the increase of dioxide emissions. Carbon dioxide is the result of the combustion of hydrocarbons and coal. At present all vehicles rely on the combustion of hydrocarbons fuels to derive the energy necessary for their propulsion. Actually the combustion is never ideal. Besides carbon dioxide and water, the combustion products contain a certain amount of nitrogen oxides, carbon monoxides and unburned hydrocarbons, all of which are toxic for human health.

PHRASES AND PATTERNS FOR ORAL AND WRITTEN SPEECH

1. MEETING PEOPLE AND SAYING GOOD-BYE

Good morning (afternoon, evening)! — Доброе утро (день, вечер)!

Hello (Hi)! — Привет!

Nice (glad) to see you. — Приятно (рад) видеть вас.

How are you? — Как вы себя чувствуете?

How's life? — Как жизнь?

How are you getting on? — Как вы поживаете?

Fine, thanks. — Хорошо, спасибо.

Not too (so) bad. — Неплохо.

Can't complain. — Не могу пожаловаться.

So-so. — Так себе.

Pretty bad. — Очень плохо.

Could be better. — Могло бы быть лучше.

Let's go somewhere together. — Давай сходим куда-нибудь вместе.

I don't mind, but now I am in a hurry. — Я не возражаю, но сейчас я тороплюсь.

Good-bye! — До свидания!

Bye-bye! — Пока!

So long. — Пока, до встречи.

See you soon. — Пока, до скорой встречи.

I hope we'll meet soon. — Я надеюсь, мы скоро увидимся.

Good luck to you. — Удачи вам.

I wish you success. — Я желаю вам успехов.

All the best. — Всего хорошего.

The same to you. — Того же и тебе.

Please, remember me to... — Пожалуйста, передай привет...

Have a nice holiday (journey). — Хорошего вам отдыха (поездки).

Call me some time. — Позвони мне как-нибудь.

* * *

— Hello, Mike! Nice to see you.

— Hello, Sam! How are you?

- I'm fine, thanks. And how are you?
- Thank you. Not so bad. Can't complain.
- Let's go somewhere together.
- I don't mind, but now I am in a hurry. Call me some time. So long.

I wish you success.

- The same to you. Remember me to your sister. I hope we'll meet soon.

2. CONGRATULATIONS. COMPLIMENTS

I congratulate you on your excellent results. — Я поздравляю тебя с отличными результатами.

My congratulations. — Мои поздравления.

Happy birthday! — С днем рождения!

Happy New Year! — С Новым годом! Счастливого Нового года!

Merry Christmas! — С Рождеством! Веселого Рождества!

May all your dreams come true. — Пусть все ваши мечты исполнятся.

I wish you success (good health, luck). — Я желаю вам успехов (хорошего здоровья, удачи).

You look wonderful (lovely) today. — Вы выглядите чудесно (замечательно) сегодня.

You were great. — Вы были великолепны.

Good for you! — Молодец!

Well done. — Отлично сработано.

* * *

— Hi, David! How are you getting on?

— Fine, thanks.

— You were great at the conference yesterday. My congratulations on your excellent results!

— Thanks a lot. It was nice to meet you. Let's keep in touch.

— Have a nice weekend! Bye!

— Good luck to you. See you later.

3. EXPRESSING SYMPATHY. OFFERING HELP

Don't worry. — Не волнуйтесь.

Everything will be alright. — Все будет хорошо.

Relax. — Расслабьтесь.

Take it easy. — Воспринимайте это легко.

Don't take it to heart. — Не принимайте это близко к сердцу.
Let's hope for the best. — Давайте надеяться на лучшее.
Things happen. — Всякое бывает.
Let me help you. — Позвольте мне помочь вам.
Let me do it. — Позвольте мне сделать это.
What can I do for you? — Что я могу сделать для вас?
Give it to me. — Оставьте это мне.
Can I help you? — Могу я помочь тебе?
Good luck. — Удачи вам.

* * *

— What's about your exams results?
— Don't know yet. I hope that everything will be alright. But I am a little bit nervous about it.
— Don't worry and relax. Let's hope for the best.
— Thanks. We'll wait and see.

* * *

— Hello, Jim! Glad to see you. How's life?
— Hello, Jane! Glad to see you too. I'm fine, thanks. And what about you?
— Could be better!
— What's about your exams results?
— Don't know yet. I hope that everything will be alright. But I am a little bit nervous about it.
— Don't worry and relax. Let's hope for the best.
— Thanks. We'll wait and see.
— And you were great at the conference yesterday. My congratulations on your excellent results!
— Thanks a lot. Let's go somewhere together.
— I don't mind, but now I'm in a hurry. It was nice to meet you. Have a nice weekend.
— The same to you. Remember me to your sister.
— O.K. Call me some time. See you soon!
— All the best. Bye!

4. EXPRESSING GRATITUDE

Thanks a lot. — Спасибо большое.
Thanks awfully. — Ужасно благодарен.

Thank you very much. — Спасибо вам большое.

A thousand thanks. — Тысяча благодарностей.

I would like to thank you. — Мне бы хотелось поблагодарить вас.

Thank you for... — Спасибо за...

My gratitude cannot be expressed in words. — Моя благодарность не может быть выражена словами.

I don't know how to thank you. — Я не знаю, как поблагодарить вас.

Don't mention it. — Не стоит упоминать об этом.

Not at all. — Не стоит благодарности.

You are welcome. — Всегда пожалуйста.

It's O.K. — Все хорошо.

That's all right. — Все хорошо.

It was no trouble at all. — Мне это ничего не стоило.

It was a real pleasure for me to do it. — Мне было приятно сделать это для вас.

* * *

— I'd like to invite you to our party.

— A thousand thanks. At what time?

— Does 7 o'clock suit you?

— Fine. Thanks for inviting me...

— You are welcome!

* * *

— Good morning, Tom! How are you getting on?

— Good morning, Jane! Not too bad. Can't complain.

— You were great at the exam yesterday. My congratulations on your excellent results!

— Thank you very much. And what about your exam results?

— Don't know yet.

— Don't worry and relax. Don't take it to heart. I'd like to invite you to our party.

— Thank you for inviting me. At what time?

— Does 8 o'clock suit you?

— O.K.! Can I help you?

— Give it to me. See you soon.

— Bye for now!

5. ASKING SMB'S PARDON

Sorry. — Извините.

Excuse me. — Извините меня.

I must apologize to you. — Я должен извиниться перед вами.

I beg your pardon. — Я прошу прощения.

Forgive me, please. — Простите меня, пожалуйста.

Excuse my interrupting you. — Извините, что перебиваю вас.

Sorry for being late. — Извините, что опоздал.

That's alright. — Ничего страшного.

It's O.K. — Все хорошо.

No need to be sorry. — Нет нужды извиняться.

Don't worry. — Не волнуйтесь.

Forget it. — Забудьте это.

Please, don't apologize. — Пожалуйста, не извиняйтесь.

Never mind. — Ничего страшного.

* * *

— I'm terribly sorry I'm late. It was very difficult to find your office.

— That's quite all right. Sit down, please. Perhaps now I could start asking you questions... Why do you want to leave your present job and join us?

— I don't feel my qualifications are being properly used, and what does the job of a general assistant in your office involve? What...

— Excuse my interrupting you, but you may read all about this job in this leaflet.

* * *

— Oh, David! I'm terribly sorry. I'm late.

— Hi, Kate! That's all right! Glad to see you!

— Nice to see you too. What about your exam results?

— Don't know yet. But I'm a little bit nervous about...

— Excuse my interrupting you. Don't worry. Everything will be all right!

— We'll wait and see. Let's go somewhere together.

— I don't mind.

6. EXPRESSING AGREEMENT AND DISAGREEMENT

Of course (not). — Конечно (нет).

Certainly (not). — Конечно (нет).

All right (I am afraid not). — Да (Боюсь, что нет).
I (don't) agree with you. — Я (не) согласен с вами.
I don't mind (I'd rather not). — Я не возражаю (Я против).
You are (not) right. — Вы (не)правы.
It's a go (No go)! — Пойдет! (Не пойдет!)
I am all for it (I am against it). — Я полностью за (Я против этого).
I (don't) think so. — Я так (не) думаю.
Naturally (Hardly). — Конечно (Вряд ли).
Far from it. — Далеко от этого.
You are welcome. — Всегда пожалуйста.
You are mistaken. — Вы ошибаетесь.
It's a great idea! — Это замечательная идея!
Nothing of the kind. — Ничего подобного.
It goes without saying. — Безусловно.
It's out of the question. — Об этом не может быть и речи.
I wish I could. — Если бы я мог.
On the contrary. — Наоборот.

* * *

— Are you going to visit your grandmother?
— Of course. It goes without saying.
— Could you help her? Some trees in her garden need cutting.
— I am afraid not. I have no time. I'll do it next time.
— And could you give me a lift?
— Naturally. You are welcome!

* * *

— Good afternoon, Richard! How are you?
— Good afternoon, James! Fine, thanks. And how are you getting on?
— Not too bad. But I don't know yet my exam results and...
— Sorry for interrupting you... But you were great at the exam. Well done!
Everything will be all right!
— Nothing of the kind. You are mistaken. It was pretty bad.
— I don't agree with you. Don't worry. Let's hope for the best.

7. EXPRESSING RAPTURE AND SURPRISE

Great! — Грандиозно!
Terrific! — Потрясающе!

Grand! — Здорово!
That's fine! — Это прекрасно!
Fantastic! — Фантастика!
How wonderful! — Как чудесно!
Really? Is that really so? — Неужели? Неужели это так?
You don't say so! — Не может быть!
That's surprise! — Это сюрприз!
That's news to me. — Это новость для меня.
How come? — Как это может быть?
Believe it or not! — Верьте или не верьте!
Just fancy! — Только представьте!

* * *

— What's the matter? You look so happy.
— I've won a four-week cruise for two.
— You don't say so. That is surprise!
— Just fancy! I've sent the answers to some questions to the travelling agency two months ago. And it is the prize for my correct answers.
— Fantastic! My congratulations!

* * *

— Hi! You look so happy.
— Hi! I've won the first prize at the conference!
— Is that really so? That's surprise! My congratulations on your excellent results!
— Thanks! I'd like to invite you to our party. Does 6 o'clock suit you?
— It's O.K. Are you going to invite your friends?
— Of course. It goes without saying.
— And could you give me a lift now?
— Sorry. I'm afraid not. I'm in a hurry now.
— No need to be sorry. We'll meet soon.
— See you soon.

8. EXPRESSING DOUBT. GIVING ADVICE

It can't be helped. — Этому нельзя помочь.
I don't know. — Я не знаю.
If I am not mistaken. — Если я не ошибаюсь.
As far as I remember. — Насколько я помню.

It seems to me. — Мне кажется.
I can't answer right now. — Я не могу ответить прямо сейчас.
I wish I knew. — Если бы я знал.
It's hard to say. — Трудно сказать.
I doubt it. — Я сомневаюсь в этом.
I am not sure of it. — Я не уверен в этом.
Look at. — Осторожно.
Mind the steps. — Осторожно, ступеньки.
Don't take chances. — Не рискуй.
Don't jump to conclusions. — Не торопись с выводами.
Come on, stop it. — Перестань, прекрати.
You'll wait and see. — Поживем — увидим.
Mark my words. — Помяни мои слова.
The sooner... the better. — Чем быстрее... тем лучше.
Hurry up! — Потопрапливайся!
Don't be long! — Не задерживайся!

* * *

— Hi! What's the matter with you?
— I can't find my wallet. Maybe I've lost it.
— As far as I remember it was a black one. It seems to me that you left it in the last shop.
— I doubt it. I am not sure of it.
— Don't jump to conclusions. Go back and make it clear.
— All right!

* * *

— Hello, Bob! How's life?
— Hello, Ted! So-so. I'm nervous about my test results. They could be pretty bad!
— Come on, stop it. Don't jump to conclusions. It seems to me everything will be all right.
— I doubt it.
— You are not right. Mark my words! We'll wait and see.
— The sooner... the better... And are you going to visit your cousin?
— It goes without saying. Let's go together.
— I wish I could. I am in a hurry now. Remember me to your cousin. Have a nice holiday.
— Bye! See you soon.

9. ASKING AND ANSWERING QUESTIONS

May I ask a question? — Yes, you may. — Можно задать вопрос? — Да.

Would you be so kind as to... — Не могли бы вы быть так любезны...

Could you tell me about... — Не могли бы вы рассказать мне о...

I'd like to ask you a question. — Мне бы хотелось задать вопрос.

Say again, please. — Скажите еще раз, пожалуйста.

I haven't quite got you. — Я не совсем понял вас.

Would you mind? — Вы не возражаете?

What do you mean? — Что вы имеете в виду?

This isn't exactly what I mean. — Это не совсем то, что я имею в виду.

Are you following me? — Вы следите за мной?

Let's make it clear. — Давайте выясним.

To my mind... In my opinion... — По моему мнению...

To tell the truth... — По правде говоря...

* * *

— Would you be so kind as to tell me about your job?

— What do you mean? I haven't quite got you.

— I'd like to ask you about all likes and dislikes of your job, because I want to join your company.

— To tell the truth I am going to leave this company soon. In my opinion I could find a better place to work.

10. WRITING LETTERS

НАПИСАНИЕ ПИСЬМА ЛИЧНОГО ХАРАКТЕРА

В правом верхнем углу помещается адрес отправителя письма, под адресом дата отправления.

Как начать и как закончить письмо:

— приветствие может быть выражено следующим образом

Dear John,

Dear Mary,

My dear Jane,

My dear Miss Brook;

— закончить письмо можно следующими словами

Best wishes,

Lee

*Wishing all the best,
John*

*Yours affectionately,
James*

*Affectionately,
Robert Green*

*Lovingly yours
(Miss) Barbara Jones*

*Always yours,
Jack*

*Love,
Andrew*

ОБРАЗЕЦ ПИСЬМА ЛИЧНОГО ХАРАКТЕРА

*186 Laring Avenue
Buffalo,
New York
June 16, 2009*

Dear Kate,

I am glad to receive your letter. We are all pleased that you are having a good time. It would be nice to be there together with you.

I am preparing now for my exams. It is so difficult to study languages at the university. I hope that everything will be all right, but I am a little bit nervous about coming exams.

Bob has told me today that he is going to write you a letter. He is going to join you there in a week.

Have a lot of fun.

*Love,
Tatiana.*

НАПИСАНИЕ ОФИЦИАЛЬНОГО ПИСЬМА

1. В правом верхнем углу помещается адрес отправителя, ниже дата отправления:

*13 Kensington Palace Gardens
London, S.W.
September 9th, 2009*

2. Слева ниже адрес, куда отправляется письмо:

*The Hilton Hotel
New Oxford Street
London, S.W.*

3. Как начать и как закончить письмо:

Вид письма	Приветствие может быть выражено следующим образом	Закончить письмо можно следующими словами
Должностным лицам	<i>Sir: Madam:</i>	<i>Yours respectfully, Respectfully yours, Yours very respectfully, Best regards Kind regards</i>
В фирму или компанию	<i>Gentlemen: Ladies:</i>	<i>Yours truly,</i>
Людям, которых автор письма не знает	<i>My dear Mr Richardson: Dear Mr Richardson: My dear Mrs Richardson: Dear Sir Dear Sir and Madam:</i>	<i>Yours truly, Sincerely yours, Yours very truly, Very truly yours, Best regards Kind regards</i>
Людям, которых автор письма хорошо знает	<i>Dear Mr Wilson, Dear Miss Wilson, Dear Mrs Wilson, Dear Professor Redhill, Dear Dr Rodsom,</i>	<i>Very sincerely yours, Cordially yours, Yours cordially, Very cordially yours, Best regards Kind regards</i>

ОБРАЗЕЦ ОФИЦИАЛЬНОГО ПИСЬМА

*13 Kensington Palace Gardens
London, S.W.
September 9th, 2009*

*The Hilton Hotel
New Oxford Street
London, S.W.*

Dear Sir,

*Will you reserve for me a bath for three weeks. I plan to move on September 15th
and leave on October 6th. Please, let me know your rates.*

*Yours truly,
Peter Volkov.*

ОТВЕТ НА ОФИЦИАЛЬНОЕ ПИСЬМО

*The Hilton Hotel
New Oxford Street
London, S.W.*

*September 11, 2009
13 Kensington Palace Gardens
London, S.W.*

Dear Mr Volkov,

We have reserved a single room with a bath in your name for the period of September 15th to October 6th. The rate is 60 pounds a day.

We look forward to your visit and hope your stay will be a very pleasant one.

Faithfully yours,

A. Woodford

Задания:

1. Write a letter to a friend of yours inviting him to a birthday party at your place.
2. Write a letter to your girlfriend asking her to spend a weekend at the seaside.
3. Write a letter to the British Airways Office, Dimple Rd. 10, London, England. Ask for a copy of the timetable of flights between London and Moscow.
4. Write a letter to a radio station about the programme you do not like and explain why. Express your thoughts how it can be improved.
5. Write a letter to Garden View Hotel in London at Cross Road Street. Ask for accommodation for you and your sister. Explain the kind of accommodation you desire, the approximate rates that you wish to pay, and the length of your stay. Tell when you expect to arrive.
6. Answer all letters mentioned above.

11. COMPLETING CURRICULUM VITAE / CV / RESUME

Name

Address

E-mail

DOB (date of birth)

Nationality:

Marital status: (single/married)

Siblings: (brothers/sisters)

Education:

Employment:

Previous Employment

Present position:

Skills:

Accomplishments: (awards)

Hobbies and Interests:

References:

ГРАММАТИЧЕСКИЕ ПОЯСНЕНИЯ К РАЗДЕЛАМ УЧЕБНОГО ПОСОБИЯ

МЕСТОИМЕНИЯ PRONOUNS

<i>I</i> — я;	<i>me</i> — меня, мне, мною;	<i>my, mine</i> — мой, моя, мое, мои;
<i>You</i> — ты, тебя, тебе, тобою вы, вас, вам, вами;		<i>your, yours</i> — твой, твоя, твое, твои; ваш, ваша, ваше, ваши;
<i>He</i> — он;	<i>him</i> — его, ему, им;	<i>his</i> — его;
<i>She</i> — она;	<i>her</i> — ее, ей, ею;	<i>her, hers</i> — ее;
<i>It</i> — он, она, оно;		<i>its</i> — его, ее;
<i>We</i> — мы;	<i>us</i> — нас, нам, нами;	<i>our, ours</i> — наш, наша, наше, наши;
<i>They</i> — они; <i>them</i> — их, им, ими;		<i>their, theirs</i> — их

Местоимения *mine, yours, hers, ours, theirs* употребляются без существительных.

Некоторые местоимения имеют множественное число: *this* (этот) — *these* (эти), *that* (тот) — *those* (те).

Местоимение *some* (несколько) употребляется в утвердительных предложениях, *any* (несколько) — в отрицательных и вопросительных: *She has some apples. She has not any apples. Has she any apples?*

ГЛАГОЛЫ BE, HAVE, DO VERBS *BE, HAVE, DO*

<i>I</i>	<i>am, have, do;</i>	<i>was, had, did;</i>
<i>He</i>	<i>is, has, does;</i>	<i>was, had, did;</i>
<i>She</i>	<i>is, has, does;</i>	<i>was, had, did;</i>
<i>It</i>	<i>is, has, does;</i>	<i>was, had, did;</i>
<i>We</i>	<i>are, have, do;</i>	<i>were, had, did;</i>
<i>You</i>	<i>are, have, do;</i>	<i>were, had, did;</i>
<i>They</i>	<i>are, have, do;</i>	<i>were, had, did;</i>

СУЩЕСТВИТЕЛЬНЫЕ NOUNS

Множественное число существительных:

-s: pens;

-(e)s: bushes;

y — i: sky — skies (boy — boys);

f, fe — ves: wife — wives;

um — a: datum — data;

non — na: phenomenon — phenomena;

is — es: analysis — analyses;

us — i: nucleus — nuclei;

a — ae: formula — formulae.

man — men

woman — women

child — children

ox — oxen

tooth — teeth

foot — feet

goose — geese

mouse — mice

louse — lice

sheep — sheep

swine — swine

deer — deer

Chinese — Chinese

Japanese — Japanese

Swiss — Swiss

trousers

scissors

Запомните, как образуется притяжательный падеж существительных:

Существительное с апострофом отвечает на вопрос: чей? (если 's не является сокращенной связкой). Такая форма указывает на принадлежность, обладание. Апостроф и «s» могут добавляться к существительным как в единственном, так и во множественном числе:

the girl's book — книга девочки

the girls' book — книга девочек

children's book — книга детей

ОБОРОТ THERE IS / THERE ARE

Запомните правила использования оборота *there is / there are*:

Данный оборот используется для обозначения нахождения, наличия, существования чего-то, кого-то в определенном месте:

There is + существительное (в единственном числе)

There are + существительное (во множественном числе)

Если русские предложения начинаются с обстоятельства места (где?) — в английском языке употребляют *there is/are*. На русский язык этот оборот, как правило, не переводится. Часто этот оборот соответствует русским глаголам: висеть, лежать, стоять:

There is a book on the table. — На столе лежит книга.

There is a picture on the wall. — На стене висит картина.

There is a bookcase in the corner. — В углу стоит книжный шкаф.

ПРИЛАГАТЕЛЬНЫЕ. НАРЕЧИЯ ADJECTIVES. ADVERBS

Степени сравнения прилагательных и наречий:

high — higher — (the) highest

big — bigger — (the) biggest

dangerous — more dangerous — (the most) dangerous

good — better — (the) best

bad — worse — (the) worst

little — less — (the) least

many, much — more — (the) most

При сравнении в английском языке также используются следующие обороты:

than — чем

as ... as ... , so... as... — как..., так и...; так же..., как и... такой же..., как и...

the more ... the better ... — чем больше..., тем лучше...

МОДАЛЬНЫЕ ГЛАГОЛЫ И ИХ ЭКВИВАЛЕНТЫ MODAL VERBS AND THEIR EQUIVALENTS

Can = to be able to:

I can speak English = I am able to speak English.

Я могу говорить по-английски.

I can run quickly = I am able to run quickly.

Я могу бегать быстро.

Could — форма прошедшего времени.

May = to be allowed to:

You may do it = You are allowed to do it.

Вам можно сделать это. Вам разрешается сделать это.

May I come in?

Am I allowed to come in?

Можно войти?

Might — форма прошедшего времени.

Must = to have to = to be to:

The student must do it = The student has to do it = The student is to do it.

Студент должен сделать это.

Should = to have to = to be to:

You should do it = You have to do it = You are to do it.

Вы должны сделать это.

ФОРМЫ ПРОСТОГО ВРЕМЕНИ (THE SIMPLE TENSES)

The Present Simple Tense употребляется со словами *always, usually, often, generally, sometimes, rarely, seldom, as a rule, every day (week, month, summer, year)* и т.п. для обозначения:

- регулярного действия (They usually write compositions);
- вечных истин, пословиц и поговорок (In winter it snows);
- фактов действительности, которые остаются неизменными долгое время (I study at the university);
- запрограммированного будущего действия (She meets him at 10 o'clock).

The Past Simple Tense употребляется со словами *yesterday, last year (week, Monday), ago* и т.п. для обозначения

- действий, происходящих в прошлом (She met him yesterday).

The Future Simple Tense употребляется со словами *tomorrow, tonight, in a week, next week, in future* и т.п. для обозначения

- обычного действия в будущем (He will go there with her).

ФОРМЫ ПРОДОЛЖЕННОГО ВРЕМЕНИ (THE CONTINUOUS TENSES)

The Present Continuous Tense употребляется со словами *now, at present, at the moment* и т.п. для обозначения

- действия в момент речи (They are writing a composition now);
- действия, которое длится некоторое время (I am working at the university at present);

— действия, запланированного на ближайшее будущее (*He is coming tonight*).

The Past Continuous Tense употребляется со словами *all evening yesterday, from...till the day before yesterday, all month last year* и т.п. для обозначения

— действия, происходившего в определенный момент или промежуток времени в прошлом (*She was having dinner at 6'clock yesterday*).

The Future Continuous Tense употребляется для обозначения

— будущего действия, когда указан момент или период времени (*They will be playing football at this time tomorrow*);

— запланированного действия, которое обязательно произойдет при нормальном развитии событий (*She will be arriving on Sunday*).

ФОРМЫ СОВЕРШЕННОГО ВРЕМЕНИ (THE PERFECT TENSES)

The Present Perfect Tense употребляется со словами *already, ever, just, recently, never, yet, lately, since* для обозначения:

— только что закончившегося действия (*He has just arrived*);

— действия, начавшегося в прошлом и продолжающегося до настоящего времени (*They have lived there since 1990*);

— действия, уже совершившегося, однако период времени еще не истек (*I have met him today*).

The Past Perfect Tense употребляется со словами *by 7 o'clock yesterday, when she came* и т.п. для обозначения:

— прошедшего действия, которое закончилось к какому-то моменту в прошлом (*He had read the article by 7 o'clock yesterday*);

— прошедшего действия, которое произошло раньше какого-то другого прошедшего действия (*He had read the article before she came*).

The Future Perfect Tense употребляется со словами *by 7 o'clock tomorrow, by the 9th of April* и т.п. для обозначения:

— действия, которое закончится до определенного момента в будущем (*He will have read the article by 7 o'clock tomorrow*).

ПАССИВНЫЙ ЗАЛОГ (THE PASSIVE VOICE)

В страдательном залоге, чтобы показать, кем или чем выполняется действие, употребляются предлоги:

by с одушевленными существительными (The article *was read* by him);
with с неодушевленными существительными (The letter *was written*
with the pen).

РАЗЛИЧНЫЕ ТИПЫ ВОПРОСОВ

а) *общие*

Is this a book? — Yes, it is.

Это книга? — Да.

Are you a teacher? — Yes, I am.

Вы учитель? — Да.

Was there a TV set in the room? — Yes, there was.

В комнате был телевизор? — Да.

Do you have any flowers? — Yes, I do. I have some.

У вас есть цветы? — Да.

Can you speak English? — Yes, I can.

Вы можете говорить по-английски? — Да, могу.

Do you speak English? — Yes, I do.

Вы говорите по-английски? — Да.

Does he work here? — Yes, he does.

Он работает здесь? — Да.

Did she work here? — Yes, she did.

Она работала здесь? — Да.

Will you work in the garden? — Yes, I will.

Вы будете работать в саду? — Да.

Will they answer the questions? — Yes, they will.

Они будут отвечать на вопросы? — Да.

б) *разделительные*

This is his new book, isn't it? — Yes, it is.

Это его новая книга, не так ли (не правда ли)? — Да.

You are a teacher, aren't you? — Yes, I am.

Вы учитель, не так ли (не правда ли)? — Да.

There was a TV set in the room, wasn't it? — Yes, there was.

В комнате был телевизор, не так ли (не правда ли)? — Да.

You have some flowers, haven't you? — Yes, I have some.

У вас есть цветы, не так ли (не правда ли)? — Да.

You don't speak German, do you? — No, I don't.

Вы не говорите по-английски, не так ли (не правда ли)? — Нет.

He works here, doesn't he? — Yes, he does.

Он работает здесь, не так ли (не правда ли)? — Да.

She wrote a letter, didn't she? — Yes, she did.

Она написала письмо, не так ли (не правда ли)? — Да.

You can't speak English, can you? — No, I cannot.

Вы не можете говорить по-английски, не так ли (не правда ли)? — Нет.

They will answer the questions, won't they? — Yes, they will.

Они будут отвечать на вопросы, не так ли (не правда ли)? — Да.

в) альтернативные

Is this a book or a notebook? — This is a book.

Это книга или тетрадь? — Это книга.

Are you a teacher or an engineer? — I am a teacher.

Вы учитель или инженер? — Я учитель.

Do you speak English or German? — English.

Вы говорите по-английски или по-немецки? — По-английски.

Does he work here or there? — Here.

Он работает здесь или там? — Здесь.

Will you rest or work in the garden? — I will rest.

Ты будешь отдыхать или работать в саду? — Я буду отдыхать.

г) специальные

Where do you live? — In Moscow.

Где вы живете? — В Москве.

When do you go to the theatre? — Tomorrow.

Когда вы идете в театр? — Завтра.

Why will you do it? — Because I like it.

Почему ты будешь делать это? — Потому что мне это нравится.

How can you run? — Quickly.

Как ты можешь бегать? — Быстро.

What is he? — He is a lawyer.

Кто он по профессии? — Он юрист.

Who is he? — He is Volkov.

Кто он? — Он Волков.

Whose book is this? — Mine.

Чья это книга? — Моя.

What book is this? — An interesting one.

Какая это книга? — Интересная.

How old are you? — I am 17.

Сколько тебе лет? — Мне 17.

How much money have you got? — Two dollars.

Сколько у тебя денег? — Два доллара.

What kind of book do you read? — A historical novel.

Какую книгу ты читаешь? — Исторический роман.

What colour is the sky? — Blue.

Какого цвета небо? — Голубое.

How often do you play football? — Every week.

Как часто ты играешь в футбол? — Каждую неделю.

д) вопросы к подлежащему

Who lives here? — My grandmother.

Кто живет здесь? — Моя бабушка.

Who can speak English? — My sister can.

Кто может говорить по-английски? — Моя сестра.

Who will go for a walk? — We will.

Кто пойдет на прогулку? — Мы.

What is there? — A shop.

Что там? — Магазин.

НЕЛИЧНЫЕ ФОРМЫ ГЛАГОЛА THE VERBALS

Синтаксические функции форм инфинитива (*the Infinitive*) и герундия (*the Gerund*); способы их перевода на русский язык:

а) подлежащее

To read is useful.

Чтение/читать — полезно.

Reading is useful.

Чтение/читать — полезно.

б) составная часть сказуемого

We began *to read* this book.

Мы начали *читать* эту книгу.

We began *reading* this book.
Мы начали *читать* эту книгу.

в) *дополнение*
I like *to read* this book.
Я люблю *читать* эту книгу.

I like *reading* this book.
Я люблю *читать* эту книгу.

г) *определение*
This is the book *to be read*.
Это — книга, *которую нужно прочитать*.

I have the wish of *reading* this book.
У меня есть желание *почитать* эту книгу.

д) *обстоятельство*
To know English well you should study hard.
Чтобы знать английский язык хорошо, вы должны усердно учиться.

After *reading* this book I returned it to the library.
После чтения этой книги / *После того как я прочитал* / *Прочитав* эту книгу, я вернул ее в библиотеку.

I can't explain it *without reading* this book.
Я не могу объяснить это, *не прочитав* этой книги.

Существуют трудности, связанные с выбором использования инфинитива и герундия после некоторых глаголов. Чтобы не делать ошибок, следует запомнить, что инфинитив (*the infinitive*) используется, как правило, после ряда глаголов, таких как:

to agree — соглашаться
to manage — успешно выполнять
to ask — просить, спрашивать
to offer — предлагать
to plan — планировать
to decide — решать
to promise — обещать
to refuse — отказывать
to forget — забывать
to hope — надеяться
to want — хотеть и др.

После следующего ряда глаголов, как правило, используется герундий (the Gerund):

to mention — упоминать

to avoid — избегать

to recommend — рекомендовать

to enjoy — наслаждаться, получать удовольствие

to finish — заканчивать

to keep — держать, продолжать

to discuss — обсуждать

to suggest — предлагать и др.

Формы **инфинитива** переводятся на русский язык следующим образом:

1. Неопределенно-личной формой глагола, которая отвечает на вопрос: «Что делать?»:

To read is useful.

Читать полезно.

2. Существительным:

To read is useful.

Чтение полезно.

3. Придаточным определительным с союзным словом «который»:

This is the book *to be read*.

Это — книга, *которую нужно прочитать*.

4. Придаточным цели с союзом «чтобы»:

To know English well you should study hard.

Чтобы знать английский язык хорошо, вы должны усердно учиться.

Формы **герундия** переводятся на русский язык следующим образом:

1. Существительным:

Reading is useful.

Чтение — полезно.

2. Неопределенной формой глагола:

Reading is useful.

Читать — полезно.

3. Деепричастием, отвечающим на вопросы: «Что делая?», «Что сделав?»:

After reading this book I returned it to the library.
Прочитав эту книгу, я вернул ее в библиотеку.

4. Придаточным предложением:

After reading this book I returned it to the library.
После того как я прочитал эту книгу, я вернул ее в библиотеку.

5. Существительным с предлогом:

After reading this book I returned it to the library.
После чтения этой книги я вернул ее в библиотеку.

Синтаксические функции форм причастия настоящего (*the Participle I*) и прошедшего (*the Participle II*) времени в предложении; способы их перевода на русский язык:

а) *составная часть сказуемого*

He is *translating* the text.

Он переводит текст.

He is *writing* a composition.

Он пишет сочинение.

The text is *translated* by him.

Текст переводится им.

The composition is *written* by him.

Сочинение пишется им.

б) *определение*

The boy *writing* a composition is my student.

Мальчик, *пишущий* сочинение, — мой студент.

The composition *written* by my student is nice.

Сочинение, *написанное* моим студентом, замечательное.

The *written* composition is nice.

Написанное сочинение замечательное.

в) *обстоятельство*

(When, while) *reading* this book I made some notes.

Читая эту книгу, я делал пометки.

Being asked to answer the questions I did it at once.

Когда меня попросили ответить на вопросы, я сделал это сразу же.

Having written a composition he went to bed.

Написав сочинение, он пошел спать.

Having been formed the council began to function.

Будучи сформированным, совет начал функционировать.

When *translated* into Russian, this book was read by my students.

Когда эту книгу *перевели* на русский язык, она была прочитана моими студентами.

Though not *prepared* very well, he could answer that question.

Хотя он был не очень хорошо *подготовлен*, он смог ответить на этот вопрос.

If *written* well, the composition will be read to the students.

Если сочинение будет написано хорошо, оно будет прочитано студентам.

Формы **причастия настоящего времени** (*the Participle I*) переводятся на русский язык следующим образом:

1. Причастием с суффиксами -ащ/ящ, -ущ/ющ:

The boy *writing* a composition is my student.

Мальчик, *пишущий* сочинение, — мой студент.

2. Деепричастием, отвечающим на вопросы: «Что делая?», «Что делав?»:

(When, while) *reading* this book I made some notes.

Читая эту книгу, я делал пометки.

3. Придаточным предложением:

(When, while) *reading* this book I made some notes.

Когда я читал эту книгу, я делал пометки.

4. Существительным с предлогом:

Having been formed the council began to function.

После создания совет начал функционировать.

Формы **причастия прошедшего времени** (*the Participle II*) переводятся на русский язык следующим образом:

1. Причастием с суффиксами -нн-/-енн-/-анн-/-т-/-вш-/-ш-/-м-/-ом-/-ем-/-им-:

The composition *written* by my student is nice.

Сочинение, *написанное* моим студентом, замечательное.

2. Придаточным предложением:

If written well the composition will be read to the students.

Если сочинение будет написано хорошо, оно будет прочитано студентам.

СЛОЖНОЕ ДОПОЛНЕНИЕ COMPLEX OBJECT

Инфинитивная конструкция «Сложное дополнение» является в предложении одним членом предложения (сложным дополнением) и представляет собой сочетание местоимения в объектном падеже или существительного в общем падеже с инфинитивом.

I want *them to come* to me.

Я хочу, чтобы они пришли ко мне.

The boy expected *the parents to come* at 7 o'clock.

Мальчик полагал, что родители придут в 7 часов.

Данная конструкция может употребляться в следующих случаях:

1. После глаголов умственного восприятия: *to expect, to suppose, to consider, to think, to believe, to know* и др. Вторым элементом является инфинитив с частицей *to*:

We know *him to study* here.

Мы знаем, что он учится здесь.

We know *him to have studied* here.

Мы знаем, что он учился здесь.

2. После глаголов *to want, to wish*. Второй элемент — инфинитив с частицей *to*:

I want *them to do* this.

Я хочу, чтобы они сделали это.

3. После глаголов физического восприятия: *to see, to hear, to feel, to watch, to notice* и др. Вторым элементом сложного дополнения в данном случае может быть выражен инфинитивом без частицы *to*:

I heard *him sing* a song.

Я слышал, как он пел песню.

4. После глаголов принуждения, разрешения: *to make, to have, to let*. Вторым элементом в этом случае также является инфинитив без частицы *to*:

She made *him do* it.

Она заставила его сделать это.

5. После глаголов принуждения, разрешения: *to order, to tell, to allow*. Вторым элементом — инфинитив с частицей *to* (в пассивном залоге):

She allowed *the book to be put* on the shelf.

Она разрешила, чтобы книгу поставили на полку.

СЛОЖНОЕ ПОДЛЕЖАЩЕЕ COMPLEX SUBJECT

Инфинитивная конструкция «Сложное подлежащее» состоит из личного местоимения в именительном падеже или существительного в общем падеже и инфинитива, которые вместе образуют сложное подлежащее:

He is expected to come back tonight.

Ожидают, что он вернется сегодня вечером.

Данная конструкция употребляется, когда сказуемое выражено:

1. Глаголами *to know, to believe, to consider, to expect, to think, to suppose, to say* и др. в форме Passive Voice:

He is said to study here.

Говорят, что он учится здесь.

2. Глаголами *to seem, to appear, to happen, to prove* и др. в форме Active Voice:

He seems to know her very well.

Кажется, что он знает ее очень хорошо.

3. Глаголом *to be* в сочетании с прилагательными *likely, unlikely, certain, sure*:

He is sure to come.

Он обязательно придет.

СЛОЖНОПОДЧИНЕННЫЕ ПРЕДЛОЖЕНИЯ COMPLEX SENTENCES

Существуют следующие типы придаточных предложений:

1. *Подлежащее придаточное:*

What he loved best of all to watch on TV was a sporting events programme.

То, что он любил больше всего смотреть по телевизору, была программа о спортивных новостях.

2. *Предикативное придаточное:*

The fact was *that he didn't like to watch TV.*

Дело было в том, что он не любил смотреть телевизор.

3. *Дополнительное придаточное:*

I listened to *how she travelled*.

Я слушал, как она путешествовала.

4. *Определительное придаточное:*

It was the best film *that he had ever seen*.

Это был лучший фильм, который он когда-либо видел.

5. *Обстоятельственные придаточные:*

He made some notes *while he was reading an article*.

Он сделал несколько пометок, в то время когда читал статью.

Wherever he was he was thinking about her.

Где бы он ни был, он думал о ней.

I switched on the TV set *because I wanted to watch a new feature film*.

Я включил телевизор, потому что я хотел посмотреть новый художественный фильм.

They were so disappointed *that they stopped watching that TV programme*.

Они были настолько разочарованы, что перестали смотреть ту телевизионную программу.

I will explain it once more *so that you can understand it better*.

Я объясню еще раз, чтобы ты понял лучше.

She did it exactly *as he told her*.

Она сделала точно так, как он сказал ей.

If it is late, we must stop our work.

Если поздно, мы должны остановить нашу работу.

I enjoyed that day *though it was cold and it rained*.

Мне понравился тот день, хотя было холодно и шел дождь.

НАКЛОНЕНИЕ.

УСЛОВНЫЕ ПРИДАТОЧНЫЕ ПРЕДЛОЖЕНИЯ MOOD. CONDITIONAL SENTENCES

В английском языке, так же как и в русском языке, существуют три наклонения:

1. *Повелительное наклонение (the Imperative Mood)*, которое выражает побуждение к действию (просьбу или приказание):

Answer the question, please.

Отвечайте на вопрос, пожалуйста.

Do it at once!

Сделай это немедленно!

2. *Исъявительное наклонение (the Indicative Mood)*, которое выражает реальность действия в настоящем, прошедшем или будущем:

We often *play* tennis.

Мы часто *играем* в теннис.

We *played* tennis yesterday.

Мы *играли* в теннис вчера.

We *have already played* tennis today.

Мы уже *сыграли* в теннис сегодня.

We *will play* tennis tomorrow.

Мы *будем играть* в теннис завтра.

Глагол в изъявительном наклонении в английском языке выступает в различных группах временных форм: Simple, Continuous, Perfect.

3. *Сослагательное наклонение (the Subjunctive Mood)*, которое выражает возможность, предположительность или нереальность действия:

Without the Sun, there *would be* no light, no heat.

Без солнца не было бы ни света, ни тепла.

В английском языке существуют две формы сослагательного наклонения: сослагательное I (the Subjunctive I), которое употребляется в простом предложении и в главном предложении сложноподчиненного предложения; и сослагательное II (the Subjunctive II), которое употребляется в придаточном предложении.

СОСЛАГАТЕЛЬНОЕ I (THE SUBJUNCTIVE I):

It <i>would be</i> useful	—	Было бы полезно
difficult	+ инфинитив	трудно
interesting	с частицей <i>to</i>	интересно
desirable		желательно
to the point		кстати

It *would be* interesting to read this book.

Было бы интересно прочитать эту книгу.

СОСЛАГАТЕЛЬНОЕ II (THE SUBJUNCTIVE II):

а) в придаточных предложениях, начинающихся с союза *that* после безличных главных предложений типа:

it is necessary — необходимо
it is important — важно
it is desirable — желательно
it is possible — возможно
it is required — требуется, необходимо
it is suggested — предлагается
it is useful — полезно

Сослагательное наклонение выражено сочетанием глагольных форм *should (would)* + *инфинитив* (без частицы *to*) или *инфинитивом* (без частицы *to*):

It is necessary that he *should visit* this picture gallery.
It is necessary that he *would visit* this picture gallery.
It is necessary that he *visit* this picture gallery.
(Необходимо, чтобы он посетил эту картинную галерею.)

б) в придаточных предложениях, начинающихся с союза *that* после главных предложений с глаголом-сказуемым, выражающим приказание, предложение, совет, рекомендацию и т. п., типа:

to suggest, to propose — предлагать
to recommend — рекомендовать
to advise — советовать
to insist — настаивать
to order — приказывать

Сослагательное наклонение выражено сочетанием глагольных форм *should (would)* + *инфинитив* (без частицы *to*):

He recommended that you *should read* this book.
Он порекомендовал, чтобы вы прочитали эту книгу.

в) в дополнительных придаточных предложениях, зависящих от глагола *to wish*, сослагательное наклонение выражено формами, совпадающими с *Past Simple*, *Past Continuous*, *Past Perfect*:

They wish you were there.
Они хотят, чтобы вы были там.
I wish it was not raining.
Я хочу, чтобы не было дождя.

г) в придаточных предложениях после союза *so that* сослагательное наклонение выражено сочетанием глагольных форм типа *might* + *инфинитив* (без частицы *to*):

He bought the disc so that you *might listen* to these songs.

Он купил диск, чтобы вы могли слушать эти песни.

д) в условных придаточных предложениях после союза *if* сослагательное наклонение выражено формами, совпадающими с *Past Simple*, *Past Perfect*, в главном предложении сослагательное наклонение выражено глагольными формами *should (would, could, might)* + *инфинитив* (без частицы *to*):

If I *had* time, I could visit this performance.

Если бы у меня было время, я бы *мог посетить* это представление.

If I *had had* time last week, I *could have visited* this performance.

Если бы у меня было время на прошлой неделе, я бы смог посетить это представление.

ПРЕДЛОГИ PREPOSITIONS

1. Некоторые английские предлоги выполняют чисто **грамматическую функцию**, передавая в сочетании с существительными (или местоимениями) те же отношения, какие в русском языке выражаются падежными окончаниями. К таким предлогам относятся:

а) предлог *of*, который в сочетании с существительным (или местоимением) соответствует русскому родительному падежу:

a new branch *of science* — новая отрасль *науки*;

б) предлог *to*, который в сочетании с существительным (или местоимением) соответствует русскому дательному падежу:

to the scientists — *ученым*;

в) предлог *by*, который в сочетании с существительным (или местоимением) соответствует русскому творительному падежу, обозначая действующее лицо или действующую силу после глаголов в страдательном залоге:

is written *by a journalist* — написан *журналистом*

is washed *by the sea* — оmyвается *морем*;

г) предлог *with*, который в сочетании с существительным (или местоимением) также соответствует русскому творительному падежу, обозначая предмет, при помощи которого производится действие:

is done *with their hands* — делается *их руками*

2. Предлоги употребляются не только для выражения грамматических отношений между словами, но имеют и самостоятельное значение, как и любое другое слово. Эти предлоги можно разделить на следующие группы:

а) пространственные предлоги (или предлоги места):

on the right bank of the river — *на* правом берегу реки

in the corner — *в* углу

within the territory — *в пределах* территории

under the table — *под* столом

below zero — *ниже* нуля

over (above) the bed — *над* кроватью

behind the wardrobe — *за (позади)* платяным шкафом

beyond the Earth — *за пределами* Земли

in front of the TV set — *перед* телевизором

at (near, by, beside) the college — *у (рядом, около)* колледжа

between two armchairs — *между* двумя креслами

among her friends — *среди* ее друзей

around the table — *вокруг* стола

б) предлоги направления

to go to the theatre — *идти в* театр

towards the window — *по направлению к* окну

to go into our room — *идти в* нашу комнату

from the college — *из* колледжа

out of the room — *из* комнаты

through the fog — *сквозь* туман

along the street — *вдоль* улицы

across the road — *через* дорогу

в) предлоги времени

on Monday — *в* понедельник

at 5 o'clock — *в* 5 часов

in 1998 — *в* 1998 году

in an hour — *через* час

after the war — *после* войны

before the war — *до* войны

till, until June — *до* июня

since 1998 — *с* 1998 года

during the same period — *в течение* того же периода

for two hours — *в течение* двух часов

3. Часто один и тот же предлог входит в несколько групп:

at the college — у колледжа

at 5 o'clock — в 5 часов

in the corner — в углу

in 1998 — в 1998 году

on the table — на столе

on Monday — в понедельник

4. Существуют предлоги, которые трудно отнести к какой-либо группе:

according to the purpose — в соответствии с целью

about 3 million people — около 3 миллионов людей

except him — кроме него

for her — для нее

with them — с ними

without me — без меня

against the war — против войны

5. Во многих случаях употребление того или другого предлога зависит от предшествующего глагола:

to consist of — состоять из

to depend on — зависит от

to divide into — делить на

to name after — называть в честь кого-либо

6. Некоторые глаголы в английском языке требуют после себя предлог, в то время как после соответствующих глаголов в русском языке предлог не употребляется:

to pay attention to — уделять внимание чему-либо

to supply with — снабжать чем-либо

to belong to — принадлежать кому-либо, чему-либо

to provide with — обеспечивать чем-либо

to listen to — слушать кого-либо

7. С другой стороны, в английском языке есть ряд глаголов, которые не требуют после себя предлога, тогда как соответствующие им русские глаголы требуют предлог:

to answer the question — отвечать на вопрос

to follow something — следовать за чем-либо

to play computer games — играть в компьютерные игры

to enter the college — поступить в колледж

8. Предлоги входят в состав большого числа сочетаний и выражений:

in vain — напрасно

at least — по крайней мере

at last — наконец

at once — сразу

for ever — навсегда

in turn — в свою очередь

by means of — посредством, при помощи

for the first time — в первый раз

a number of — несколько

for example — например

at present — в настоящее время

СПИСОК НЕПРАВИЛЬНЫХ ГЛАГОЛОВ

ГЛАГОЛЫ, У КОТОРЫХ ВСЕ ТРИ ФОРМЫ СОВПАДАЮТ:

to cost — cost — cost	стоять
to cut — cut — cut	резать, рубить
to hit — hit — hit	ударять
to hurt — hurt — hurt	причинять боль
to let — let — let	разрешать, позволять
to put — put — put	класть
to set — set — set	устанавливать
to shut — shut — shut	закрывать
to spread — spread — spread	распространяться
to knit — knit — knit	вязать

ГЛАГОЛЫ, У КОТОРЫХ СОВПАДАЮТ ПЕРВАЯ И ТРЕТЬЯ ФОРМЫ:

to become — became — become	становиться
to come — came — come	приходить
to run — ran — run	бежать
to overcome — overcame — overcome	преодолевать

ГЛАГОЛЫ, У КОТОРЫХ СОВПАДАЮТ ВТОРАЯ И ТРЕТЬЯ ФОРМЫ:

to bind — bound — bound	связывать
to bring — brought — brought	приносить
to build — built — built	строить
to burn — burnt — burnt	жечь, сжигать

to buy — bought — bought
to catch — caught — caught
to deal — dealt — dealt

to feed — fed — fed

to fight — fought — fought
to find — found — found
to get — got — got
to have — had — had
to hear — heard — heard
to hold — held — held
to keep — kept — kept
to lay — laid — laid
to lead — led — led
to leave — left — left
to learn — learnt — learnt
to lose — lost — lost
to make — made — made
to mean — meant — meant
to meet — met — met
to pay — paid — paid
to read — read — read
to say — said — said
to sell — sold — sold
to send — sent — sent
to sleep — slept — slept
to spend — spent — spent

to teach — taught — taught
to tell — told — told
to think — thought — thought
to understand — understood — understood
to win — won — won
to withstand — withstood — withstood

покупать
ловить, поймать
общаться, иметь дело
(с кем-л.)
кормить, вводить данные;
подавать; питать
сражаться, бороться
находить
получать
иметь
слышать
держать, проводить
держать, хранить
класть
вести, руководить
покидать, оставлять
учить, изучать (что-либо)
терять
делать
иметь в виду, значить
встречать(ся)
платить
читать
сказать, говорить
продавать
посылать
спать
проводить (время),
тратить (деньги)
учить (кого-либо)
говорить
думать
понимать
побеждать
противостоять,
выдерживать

ГЛАГОЛЫ, У КОТОРЫХ ВСЕ ТРИ ФОРМЫ НЕ СОВПАДАЮТ:

to be — was/were — been

быть, находиться,
являться

to bear — bore — born/borne

носить, переносить

to begin — began — begun	начинать
to bite — bit — bitten	кусать, откусить
to blow — blew — blown	дуть
to break — broke — broken	ломать, крушить
to choose — chose — chosen	выбирать
to do — did — done	делать
to drink — drank — drunk	пить
to drive — drove — driven	приводить в движение
to eat — ate — eaten	есть
to fall — fell — fallen	падать
to fly — flew — flown	летать
to forget — forgot — forgotten	забывать
to foresee — foresaw — foreseen	предвидеть, предусмотреть
to give — gave — given	давать
to go — went — gone	идти
to grow — grew — grown	расти
to know — knew — known	знать
to lie — lay — lain	лежать
to mistake — mistook — mistaken	ошибаться
to ride — rode — ridden	кататься, ездить верхом
to ring — rang — rung	звонить
to rise — rose — risen	подниматься
to see — saw — seen	видеть
to sing — sang — sung	петь
to speak — spoke — spoken	говорить
to strike — struck — struck	ударять, бить, чеканить
to swim — swam — swum	плавать
to take — took — taken	брать
to throw — threw — thrown	бросать
to undergo — underwent — undergone	испытывать, переносить
to wake — woke — woken	просыпаться
to wear — wore — worn	носить
to write — wrote — written	писать

СПИСОК НАИБОЛЕЕ УПОТРЕБИТЕЛЬНЫХ СУФФИКСОВ И ПРЕФИКСОВ

СУФФИКСЫ СУЩЕСТВИТЕЛЬНЫХ:

- er, -or*: worker, director, writer, visitor;
-ist: artist, scientist, physicist;

-ion (-ation, -tion, -sion, -ssion): dictation, expression, invitation, creation;

-ment: agreement, development, movement;

-ing: beginning, building, feeling;

-ness: kindness, darkness, happiness;

-ship: friendship, leadership;

-hood: childhood, neighbourhood;

-ance, -ence: importance, difference;

-age: language, heritage;

-ity: minority, nationality, university;

-ure: agriculture, architecture, pleasure;

-dom: freedom, kingdom.

СУФФИКСЫ И ПРЕФИКСЫ ПРИЛАГАТЕЛЬНЫХ:

-able: comfortable, changeable;

-al (-ical): cultural, central, historical, industrial;

-ful: beautiful, careful, useful, joyful, peaceful;

-less: hopeless, useless, helpless, fearless, homeless;

-ous: famous, glorious, dangerous, courageous;

-y: cloudy, frosty, sunny, rainy, windy, healthy;

-ent (-ant): different, abundant;

-ic: economic, climatic, historic;

-an: European, Russian, American;

-ive: legislative, executive;

un-: unhappy, unknown, unpleasant, unusual;

in-: indirect, incapable;

im-: impossible;

il-: illegal;

ir-: irregular.

СУФФИКСЫ НАРЕЧИЙ:

-ly: quickly

-ward: forward

АНГЛО-РУССКИЙ СЛОВАРЬ КОНТЕКСТУАЛЬНЫХ ЗНАЧЕНИЙ АКТИВНОЙ ЛЕКСИКИ

a — adjective — прилагательное

adv — adverb — наречие

conj — conjunction — союз

n — noun — существительное

pl — plural — множественное число

p.p. — past participle — причастие прошедшего времени

predic. — predicative — предикативное употребление

prep — preposition — предлог

pron — pronoun — местоимение

v — verb — глагол

~ — тильда — знак, заменяющий заглавное слово словарной статьи

А

abatement *n* — уменьшение, снижение

abbreviate *v* — сокращать

abbreviation *n* — сокращение, аббревиатура

ability *n* — способность

able *a* — способный

about *prep* — о, об, около

above *prep* — над

abrasive *a* — абразивный, шлифующий; ~ **wheel** абразивный круг

abroad *adv* — за границей

absent *a* — отсутствующий

academy *n* — академия

acceleration *n* — ускорение, разгон; набор скорости

accept *v* — принимать

access *n* — доступ, подход

accessible *a* — доступный, достижимый

accommodate *v* — размещать, разместить (*предмет*)

accomplish *v* — завершать

accomplishment *n* — завершение; выполнение

according to *prep* — согласно, в соответствии с

accordingly *adv* — соответственно, в соответствии; таким образом, поэтому

achieve *v* — достигать

acidizing *n* — кислотная обработка скважины или пласта

acquire *v* — приобретать, овладевать

across *prep* — через

activity *n* — деятельность

actuate *v* — приводить в действие

add *v* — прибавлять

addition: *in ~ to* — в добавок, в дополнение к, кроме того
adjust *v* — регулировать, настраивать
adjuster *n* — регулятор
adjustment *n* — регулировка, настройка, корректировка; подгонка; поправка
adopt *v* — принимать
adoption *n* — принятие; усвоение; выбор
adult *n* — взрослый человек
advanced *a* — передовой, продвинутый, повышенного типа
advancement *n* — продвижение вперед, прогресс, развитие
advantage *n* — преимущество
advice *n* — совет
aerospace *n* — аэрокосмическая промышленность
affect *v* — действовать, влиять
after *prep* — после
afternoon *n* — день
again *adv* — снова, опять
against *prep* — против, на
age *n* — возраст; век; период, эпоха
agility *n* — маневренная перестройка, быстрая реакция на новые требования, быстрая переналадка
agree *v* — соглашаться
agreement *n* — договор, соглашение
agricultural *a* — сельскохозяйственный
aid *v* — помогать; *n* — вспомогательное средство или прибор
aim *v* — целить(ся), прицеливать(ся); *n* — цель
aircraft *n* — самолет, воздушное судно, летательный аппарат
alcohol-ethyl *n* — этиловый спирт
allow *v* — позволять, разрешать
alloy *n* — сплав
almost *adv* — почти; едва не

alone *a* — сам, без посторонней помощи; *adv* — только, исключительно
along *prep* — вдоль
already *adv* — уже
alternately *adv* — чередуясь, поочередно, попеременно
although *cj* — хотя
altogether *adv* — в общем, всецело
ambulance *n* — машина «скорой помощи»
among *prep* — среди
amount *n* — количество
analog *a* — аналоговый
analog-digital *a* — аналого-цифровой
analysis (*pl* **analyses**) *n* — анализ; **structural** ~ структурный анализ
ancient *a* — древний
angle *n* — угол
annealing *n* — отжиг
anvil *n* — наковальня
apparatus *n* — прибор, приспособление, устройство (*механизм*); оборудование
appear *v* — появляться, оказываться
appliance *n* — устройство; прибор
application *n* — применение; приложение; употребление; прикладная программа
applied *p.p.* — прикладной
apply *n* — применять
appreciate *v* — (высоко) ценить; оценивать (*по достоинству*)
approximate *a* — приблизительный
area *n* — площадь, пространство
around *prep* — вокруг
arrange *v* — располагать, приводить в порядок
arrangement *n* — схема, расположение; технологическая подготовка производства, построение
article *n* — статья

ARTIFICIAL *a* — искусственный
as *adv* — как, как например; ~ **well**
 также
as... as... *cj* — как..., так и...
asphalt *n* — нефтяной битум
assemble *n* — собирать; монтировать
assembly *n* — монтаж, сборка;
 ~ **system** сборочная система
assist *v* — способствовать, помогать
association *n* — ассоциация
at *prep* — у, при, около; ~ **once** сразу
attach *v* — прикреплять, присоединять
attempt *v* — пытаться
attend *v* — посещать
automotive *a* — автомобильный
available *a* — доступный, имеющийся
 в наличии
average *a* — средний
axe *n* (*pl axes*) — топор
axis *n* (*pl axes*) — ось
axle *n* — ось

В

back *adv* — назад, обратно; ~ **and forth**
 взад и вперёд
bar *n* — пруток
bear *v* (**bore, borne**) — носить, пере-
 носить; ~ **in mind** помнить, иметь в
 виду
before *adv* — впереди, вперед;
prep — до
behaviour *n* — поведение; режим рабо-
 ты; протекание процесса
behind *prep* — за, позади
believe *v* — верить, полагать
below *adv* — ниже, внизу;
prep — ниже, под
bending *n* — гибка
benefit *v* — приносить пользу
besides *adv* — кроме того, сверх того
between *prep* — между

beyond *prep* — за, по ту сторону, вне
bicycle *n* — велосипед
billet *n* — заготовка
bind *v* (**bound**) — связывать
biobleaching *n* — отбеливание
 с помощью древоразрушающих
 грибов
biogradable *a* — (био)разлагаемый;
 разлагаемый микроорганизмами
bioleaching *n* — биовыщелачивание
 (*pyd*)
biopulping *n* — размягчение древесины
 с помощью лингин (*разрушающих*
грибов)
bioremediation *n* — биовосстановление;
 биологическая очистка нефтяных
 разливов
bit *n* — кусок
blade *n* — лезвие
blend *v* — смешивать, сочетать
block *n* — блочный агрегат, сборка,
 узел, модуль
blow *v* (**blew, blown**) — дуть
boat *n* — лодка, шлюпка, корабль,
 судно
body *n* — кузов
bolt *n* — болт
booklet *n* — брошюра, буклет
boom *n* — стрела (*экскаватора, ковши-*
вого погрузчика)
boot *n* — багажник, багажное отделе-
 ние
border *v* — граничить с
bore-hole bottom *n* — забой буровой
 скважины (*конечная глубина*)
boring *n* — расточка, растачивание
both *pron* — оба
both... and... *cj* — как ... , так и ...
bottom *n* — дно
boundary *n* — граница
bow *n* — дуга, изгиб
bowl *n* — ковш (*скрепера*)

brain *n* — мозг, рассудок, ум
branch *n* — ветвь, ветка, отрасль
brass *n* — латунь
brazing *n* — пайка с твердым припоем
break *v* (**broke**, **broken**) — ломать(ся), разбивать(ся)
brief *a* — короткий, недолгий
bring *v* (**brought**) — приносить
brittle *a* — хрупкий
broad *a* — широкий
bucket *n* — ковш
build *v* (**built**) — строить
bulging *a* — выпуклый; *n* — вздутие
bulk forming — объемное формование
bulk *n* — масса, большое количество, груда
bulky *a* — массивный, большой, громоздкий
burn *v* (**burnt**) — сжигать, жечь
burning *n* — газовая резка
busy *a* — занятый, оживленный
buzz *n* — оживленное обсуждение
by *prep* — у, при, около, к
byproduct *n* — побочный продукт

С

cab *n* — кабина, отделение водителя
call *v* — называть, звонить
capable *a* — способный (*of* — на что-либо)
capacitor *n* — конденсатор
capacity *n* — емкость, мощность
capillary *n* — капилляр
capture *v* — собирать и фиксировать данные; захватить, осваивать
carbon *n* — углерод: ~ *monoxides* монооксид углерода (*угарный газ*)
card *n* — плата; карта
carding *a* — ворсирование; прочесывание древесно-волокнутой массы
care *n* — забота; *v* — заботиться

careful *a* — внимательный, тщательный
carpentry *n* — плотничное дело, плотничные работы
carriage *n* — перевозка
carry *v* — нести
casing *n* — обсадка; обсадная колонна (*крепление, обсадка скважины трубами*)
cast iron *n* — чугун
casting *n* — литье
catch *v* (**caught**) — ловить
caterpillar *n* — гусеница (*металлическая цепь из звеньев-траков*)
cavity *n* — полость
ceiling *n* — потолок
cell *n* — клетка; ячейка, элемент; модуль; **flexible manufacturing** ~ гибкий автоматизированный модуль (*ячейка*)
century *n* — век
certain *a* — определенный
chain *n* — цепь, цепочка
chair *n* — стул
chamber *n* — камера
chamfering *n* — фаска, снятие фаски
change *v* — изменять, менять
changeable *a* — изменчивый, непостоянный, неустойчивый
change-over *n* — переключение, перенастройка; перестройка (*станка*)
charge *n* — ответственность, обязанность; *to be in ~ of* заведовать, отвечать за
charge *v* — заряжать
chart *n* — диаграмма, схема
chassis *n* — рама, к которой крепятся агрегаты силовой установки, ходовой части и кузов; рама с установленными агрегатами ходовой части; шасси, на котором смонтированы агрегаты силовой

установки и ходовой части (но без кузова)

cheap *a* — дешевый

chemicals *n* — химикалии, химические вещества органического синтеза; «тонкие химикаты»

chemistry *n* — химия

chief *a* — главный, руководящий

chip *n* — стружка

choice *n* — выбор

choose *v* (**chose, chosen**) — выбирать

circuit *n* — цепь; контур; микросхема; прибор; **integrated** ~ интегральная схема

circuitry *n* — электронная схема, компоновка схемы

circular *a* — круглый, округлый, круговой

circumstance *n* — обстоятельство

civil engineering *n* — гражданское строительство

claw *n* — клещи; клешня

clay *n* — глина

clean *a* — чистый; *v* — чистить

clear *a* — ясный, чистый

closely *adv* — тесно, близко

cloth *n* — ткань

clue *n* — ключ

clutch *n* — сцепление

coach *n* — туристский автобус

coal *n* — каменный уголь, древесный уголь

coalescence *n* — сращение, соединение

coextensive *a* — одинакового протяжения во времени или пространстве

cognizance *n* — понимание

coking *n* — коксование

collapsible *n* — сминающийся; убирающийся, складной, выдвижной

combine *v* — объединять(ся), сочетать(ся)

combustion *n* — горение, возгорание; сжигание, процесс окисления; **internal** ~ **engine** двигатель внутреннего сгорания; ~ **pocket** вырез в поверхности ротора роторно-поршневого двигателя (*двигателя Ванкеля*)

come *v* (**came, come**) — приходить; ~ **up to** — соответствовать (*чему-либо*), достигать уровня; ~ **up to with** при-думать, представить, предложить, добиться

commercially *adv* — в торговом отношении; с коммерческой точки зрения

common *a* — общепринятый, распространенный

commonplace *n* — обычная вещь, типичный случай

communicate *v* — сообщать(ся); свя-зывать

community *n* — местность, население, пункт, сообщество

comparatively *adv* — сравнительно; от-носительно

compare *v* — сравнивать

compete *v* — соревноваться

complete *v* — заканчивать, завершать; *a* — полный, заверченный

completely *adv* — полностью

complex *a* — сложный

complicated *a* — сложный

composite *n* — смесь, композицион-ный материал, композит

composition *n* — сочинение

compound *a* — составной, сложный; *n* — соединение

comprise *v* — охватывать

compulsory *a* — обязательный

computer *n* — компьютер; вычисли-тельная машина; **analog** ~ аналого-вый компьютер; **digital** ~ цифровой компьютер; **first generation** ~ ком-пьютер первого поколения

computer-aided engineering *n* — система автоматизированного проектирования; автоматизированная разработка

conceive *v* — постигать, понимать, задумывать

concentric *a* — концентрический

concept *n* — понятие, общее представление, концепция

concern *v* — касаться, иметь отношение

conclusion *n* — заключение, вывод

condition *n* — условие

conductivity *n* — проводимость

conductor *n* — проводник

configuration *n* — контур

confine *v* — ограничивать

connect *v* — соединять

connecting rod — соединительный шток, соединительная тяга, шатун

consider *v* — полагать, считать

considerable *a* — значительный; важный

consist of *v* — состоять из

consolidate *v* — объединять(ся)

constituent *n* — составная часть

consumer *n* — потребитель

consumption *n* — потребление, затрата, расход

contain *v* — содержать в себе, вмещать

continue *v* — продолжать

continuous *a* — непрерывный, длительный; ~ **profile** непрерывный профиль

contoured *a* — контурный, профильный

contribute *v* — делать вклад

control *n* — управление; **numerical** ~ числовое программное управление

control *v* — управлять

conventional *a* — обычный, нормальный, обычного типа

conversation *n* — разговор

conversion *n* — химическое превращение, переработка

convert *v* — преобразовывать, превращать

convertible *a* — обратимый, изменяемый; заменимый

convey *v* — перевозить; транспортировать

cool *a* — прохладный

cool *v* — охлаждать

copper *n* — медь

corduroy *n* — кордерой, вельвет

core *a* — основной, главный

core *n* — ядро, сердцевина

corner *n* — угол

correctly *adv* — правильно

correspondence *n* — корреспонденция; by ~ заочно

cost *v* (cost) — стоить; *n* — затраты

coupe *n* — закрытый двухдверный кузов

cracking *n* — крекинг нефти; расщепление

crankshaft *n* — коленчатый вал; ~ **balance** противовес коленчатого вала

create *v* — создавать, творить; производить

creation *n* — творение

credit-test *n* — зачет

cross section — поперечное сечение

crude oil *n* — неочищенная нефть; пластовая нефть; смесь углеводородов в жидком состоянии и неуглеводородов, добываемых с нефтью

current *a* — текущий

curve *n* — изгиб

custom *n* — обычай, привычка

customer *n* — клиент

customization *n* — изготовление по техническим условиям заказчика

cut *v* (**cut**) — резать, рубить
cutting *n* — обработка металла резанием; **slot** ~ нарезание шлицев; ~ **tool** режущий инструмент, резец
cycle *n* — цикл, цикличность, движение по кругу
cause *v* — послужить причиной, поводом (*для чего-л.*); мотивировать (*что-л.*)

D

daily *a* — ежедневный; повседневный
damping *n* — демпфирование; **internal** ~ внутреннее демпфирование, внутреннее звукопоглощение материала
dangerous *a* — опасный
data *n* — данные; информация
database *n* — база данных
datum *n* (*pl data*) — данные, информация
deal *v* (**dealt**) — общаться, иметь дело (*с кем-л.*)
deceleration *n* — замедление, спад, затухание
decide *v* — решать
decline *v* — приходить в упадок, ухудшаться
decode *v* — расшифровывать; декодировать
decrease *v* — уменьшать(ся)
deep *a* — глубокий; ~ **open treads** глубокие открытые протекторы
define *v* — определять
degree *n* — степень; **Bachelor** ~ степень бакалавра
deliver *v* — доставлять; снабжать; питать
demand *v* — требовать
densely *adv* — густо
depend *v* — зависеть (**on, upon** — от)
depending on *adv* — в зависимости от

depletion *n* — истощение и истощение нефтяных запасов (*ископаемого топлива*)
deposit *n* — залежь, месторождение
derive *v* — получать путем частичного замещения
derrick *n* — вышка
describe *v* — описывать
design *v* — создавать, задумывать; проектировать; конструировать
desirable *a* — желаемый
desire *n* — желание; *v* — желать, хотеть
destroy *v* — разрушать
desulfurization *n* — сероочистка, химическая десульфурация
determine *v* — определять
develop *v* — развивать(ся)
development *n* — развитие
device *n* — устройство; прибор; аппарат
devise *v* — разрабатывать; изобретать
devote *v* — посвящать
die *n* — матрица; штамп; боек молота; пресс-форма
diesel *n* — дизельный двигатель; транспортное средство на дизельной тяге (*автомобиль с дизельным двигателем, тепловоз*)
differ *v* — различать(ся)
differentiate — различать(ся), отличать(ся)
difficult *a* — трудный
dig *v* — копать; резко набирать скорость с места (*об автомобиле*)
digit *n* — цифра; знак
digital *a* — цифровой
dilute *v* — разбавлять, растворять
dip *v* — погружать(ся), окунать(ся)
direct *v* — направлять
directly *adv* — прямо, в прямом направлении

dirty *a* — грязный; *v* — загрязнять, пачкать
disadvantage *n* — недостаток
discharge *v* — выбрасывать, выпускать
discovery *n* — открытие
discuss *v* — обсуждать
disk *n* — диск; **hard** ~ жесткий диск
displacement *n* — перемещение, перестановка, сдвиг; объем двигателя
display *v* — выставить
distance *n* — расстояние
distillate *n* — продукт предварительной грубой разгонки нефти
distillation *n* — перегонка, разгонка
distinction *n* — отличие, различие
distribute *v* — распределять
diverse *a* — иной; разнообразный, разный
divide *v* — делить(ся), разделять(ся)
domestic *a* — внутренний, ~ **industry** отечественная промышленность
doubt *n* — сомнение
drawback *n* — недостаток
drawing *n* — волочение
drawing out — вытяжка
drill *v* — бурить
drilling *n* — сверление, просверливание; ~ **rig** буровая установка (*включая вышку*)
drive *v* (**drove, driven**) — приводить в движение; **four-wheel** ~ полный привод; **front-wheel** ~ передний привод; ~ **lines** ходовая часть; **rear-wheel** ~ задний привод
driver *n* — водитель
drop *v* — падать; опускаться
dual *a* — двойной, дублированный
ductile *a* — ковкий, тягучий
due to *prep* — благодаря
durability *n* — продолжительность срока службы
during *prep* — в течение

Е

e.g. (*exempli gratia*) *лат.* — например
each *pron* — каждый, всякий; ~ **other** друг друга
early *adv* — рано; на начальной стадии; *a* — ранний
earn *a* — зарабатывать
ease *v* — облегчить, регулировать с целью облегчения работы; *n* — удобство
easy *a* — легкий
eat *v* (**ate, eaten**) — есть, кушать
edge *n* — край
edition *n* — издание
education *n* — образование
efficient *a* — действенный, эффективный, результативный
either ... or ... *conj* — или... или...
either *adv* — также (*при отрицании*)
eject *v* — выбрасывать
elevator *n* — элеватор, подъемник, грузоподъемник
eliminate *v* — устранять, уничтожать
embed *v* — внедрять, вставлять
embedded *p.p.* — встроенный; внедренный
embrace *v* — включать, содержать, охватывать
emerge *v* — внезапно появляться
emission *a* — распространение; выпуск, эмиссия
emphasize *v* — придавать особое значение, подчеркивать, акцентировать
employee *n* — служащий
employment *n* — служба, занятие, работа
empowerment *n* — предоставление и расширение возможностей
enclose *n* — заключать
encompass *v* — содержать, включать, заключать (в себе)
endure *v* — выдерживать

engage *v*: to be ~d in smth — занимать-ся чем-л.

engine *n* — двигатель, мотор, механизм, машина; **air-cooled** ~ двигатель с воздушным охлаждением; **carburetted** ~ двигатель карбюраторного типа; **compression-ignition (CI)** ~ двигатель с воспламенением от сжатия; **direct injection** ~ двигатель с непосредственным впрыском топлива; **dual fuel diesel** ~ двухтопливный дизельный двигатель; **gasoline direct injection** ~ бензиновый двигатель с прямым впрыском топлива; **HOMOGENEOUS CHARGE COMPRESSION IGNITION** ~ двигатель с воспламенением от сжатия, использующий однородную топливную смесь; **indirect injection** ~ двигатель с непрямым впрыском; **in-line** ~ рядный двигатель; **internal combustion** ~ двигатель внутреннего сгорания; **L-head (flat head)** ~ нижнеклапанный двигатель; **liquid-cooled** ~ двигатель с жидкостным охлаждением; **multipoint port fuel injection** ~ двигатель с системой многоточечного впрыска топлива; **opposed-cylinder (flat)** ~ оппозитный двигатель, т.е. двигатель с цилиндрами, расположенными в одной плоскости по обе стороны общего коленчатого вала; **opposed-piston** ~ встречно-поршневой двигатель; **overhead valve** ~ верхнеклапанный двигатель; двигатель с верхним расположением клапанов; **petrol** ~ бензиновый двигатель; **radial** ~ двигатель с радиальным расположением цилиндров (звездообразный двигатель); **reciprocating** ~ поршневой двигатель (двигатель возвратно-поступательного действия); **rotary** ~ роторный двигатель; **single-cylinder** ~ одноцилиндровый двигатель;

spark-ignition (SI) ~ двигатель с искровым зажиганием; **throttle body fuel injection** ~ двигатель с впрыском топлива через корпус дроссельных заслонок; **turbocharged** ~ двигатель с турбонаддувом; **V Engine** V-образный двигатель; **Wankel** ~ двигатель Ванкеля; **W-type** ~ W-образный двигатель

engineering *n* — техника, инженерное дело, проектирование, машиностроение; **civil** ~ гражданское строительство; **computer-aided** ~ система автоматизированного проектирования, техника САПР; **electrical** ~ электротехника; **genetic** ~ генетическая (генная) техника; **mechanical** ~ машиностроение; **nuclear** ~ ядерная энергетика;

enhance *v* — улучшать, повышать, расширять функциональные возможности

enhancement *n* — усовершенствование

enlarge *v* — увеличивать(ся)

enough *a* — достаточный; *adv* — достаточно, довольно

enter *v* — поступать; входить; вносить

enterprise *n* — предприятие

environment *n* — окружающая среда

environmental *a* — относящийся к окружающей среде

epitrochoid *n* — эпитрохоида (удлиненная или укороченная эпициклоида)

epoxy *a* — эпоксидный

equipment *n* — оборудование

escalator *n* — эскалатор, движущаяся лестница

escape *n* — спастись, избавиться, отделиться

especially *adv* — особенно, главным образом

establish *v* — устанавливать, основывать

estate *n* — имущество; ~ **car** легковой автомобиль с кузовом «универсал»
etc. (et cetera) *lat. adv* — и так далее
etch *v* — травить на металле
even *a* — ровный
even *adv* — даже
event *n* — событие
eventually *adv* — в конечном счете, в конце концов
ever *adv* — когда-либо; ~ since с тех пор
every *pron* — каждый
everybody *pron* — каждый, всякий (человек), все
everything *pron* — все
everywhere *pron* — везде
exactly *adv* — точно
exam *n* — экзамен
examination *n* — осмотр
example *n* — пример; for ~ например
excellent *a* — отличный
except *pron* — кроме
excess *n* — избыток, излишек
exchange *v* — обменивать(ся)
exhaust *n* — выпуск, выхлоп (*процесс выхода газа в окружающую среду*); выхлопные газы; выхлопная труба, вытяжка; вытягивание, высасывание
exhaust *n* — выхлоп, выхлопные газы
exhibition *n* — выставка
exist *v* — существовать
expand *v* — растягиваться, расширяться, увеличиваться
expansion *n* — расширение, растяжение, экспансия
expect *v* — ожидать, предполагать
expenses *n pl* — затраты, расходы
expensive *a* — дорогой
experience *n* — опыт, мастерство

explain *v* — объяснять
exploit *v* — использовать в своих интересах, извлекать пользу
exploration *n* — инженерно-геологические исследования; разведка; изыскания
expose *a* — открытый, незащищенный
extend *v* — простираться(ся); вытягивать
extent *n* — степень, мера
external *a* — внешний
extremely *adv* — чрезвычайно, крайне
extrusion *n* — экструзия

F

fabric *n* — материал; структура
fabrication *n* — производство, изготовление
face *v* — быть обращенным
facilitate *v* — облегчать; способствовать; содействовать, помогать
facility *n* — отсутствие препятствий и помех; *pl* благоприятные условия; оборудование, аппаратура
fail *v* — потерпеть неудачу, не иметь успеха
fall *v (fell, fallen)* — падать
famous *a* — известный
far *adv* — далеко; *a* — далекий
fast *a* — быстрый
fasten *v* — прикреплять, укреплять, зажимать; застегивать(ся)
favourable *a* — благоприятный
favourite *a* — любимый, излюбленный
feature *n* — особенность, характерная черта, признак
feed *v (fed)* — вводить данные; подавать; питать
feedstock *n* — сырьевой материал, исходное сырье
fellow *n* — член совета колледжа, научного общества

ferrous *a* — железистый; ~ **metals** черные металлы
few *a* — немногие, немного, мало
fibre *n* — волокно
fibreglass *n* — стекловолокно
field *n* — область, сфера деятельности, поле
fill *v* — наполнять(ся)
filler — материал-наполнитель
find *v* (**found**) — находить; ~ **out** выяснять
finish *n* — отделка, чистовая обработка
fit *v* — приспособливать(ся); устанавливать, монтировать
fix *v* — укреплять, закреплять, значать
flank *n* — бок, боковая поверхность; торец
flash *n* — облой
flat *a* — плоский, ровный
flexible *n* — гибкий
flow *v* — течь, литься; ~ **by gravity** двигаться самотеком; ~ **naturally** фонтанировать естественным путем; ~ **off** стекать; *n* — поток, фонтанирование, добыча
fluid *n* — флюид, смесь жидкости и газа; газонефтяная система
fly *v* (**flew**, **flown**) — летать
follow *v* — следовать, идти за
following *a* — следующий
for *prep* — для, в течение
force *n* — сила; *v* — принуждать, заставлять
foreign *a* — иностранный
foremost *a* — передний, передовой
foresee *v* (**foresaw**, **foreseen**) — предвидеть, предусмотреть
forestry *n* — лесоводство, лесное хозяйство
forget *v* (**forgot**, **forgotten**) — забывать

forging *n* — ковка; **open die** ~ ковка в открытых или подкладных штампах; **impression die** ~ объемная штамповка; **closed die** ~ штамповка в закрытых штампах
form *v* — придавать форму, принимать форму (вид)
formal *a* — официальный
formation *n* — пласт (*газовый, нефтяной*)
forming *n* — формование; **sheet metal** ~ листовая штамповка
formula *n* (*pl formulae*) — формула
fossil fuel — ископаемое топливо
found *v* — основывать
foundry *n* — литейный цех
four-stroke cycle — четырехтактный цикл
frac, fracing *n* — образование трещин
fraction *n* — фракция
fractional distillation — фракционная перегонка
fracture *n* — трещина, излом; *v* — ломать(ся)
fracturing *n* — образование трещин; гидравлический разрыв пласта (*закачкой жидкости под большим давлением*)
frame *n* — рама; *v* — вставлять в рамку
free *a* — свободный; ~ **education** бесплатное образование
frequently *adv* — часто
fresh *a* — свежий
fridge *n* — холодильник
from *prep* — из, от
fuel *n* — топливо, горючее; **fossil** ~ ископаемое топливо; ~ **input** расход топлива; ~ **mixture** топливная смесь
fulfil *v* — выполнять
function *v* — функционировать
further *a* — дальнейший; добавочный

further *adv* — дальше, далее
future *n* — будущее; *a* — будущий

G

gain *v* — добиваться успеха, отстаивать свои позиции; получать, приобретать
gas cap — газовая шапка (*в коллекторе нефти*)
gaseous *a* — газообразный
gasoline *n* — бензин, газолин
gear *n* — привод, зубчатая передача
gearbox *n* — коробка передач
gene *n* — ген, фактор (*наследственный*)
generally *adv* — обычно, как правило
generic *a* — стандартный, типовой, исходный; самый обычный
genome *n* — геном (*совокупность генов*)
geometry *n* — геометрия
gifted *a* — одаренный, способный
go-kart *n* — карт
goods *n* — товары
gradually *adv* — постепенно
grain *n* — зерно
gravitation *n* — гравитация, сила тяжести
grease *n* — солидол; консистентный смазочный материал
grinding *n* — шлифование

H

half *n* — половина
halfway *adv* — на полпути; наполовину
hammer *n* — молот, молоток; *v* — ударять, бить
handicap *v* — быть помехой, ставить в невыгодное положение
handicapped *p. p.* — **to be** ~ испытывать затруднения; **physically** ~ страдающий каким-либо физическим недостатком

handling *n* — управление
happen *v* — оказываться, случаться
hard *a* — твердый, жесткий
hardware *n* — аппаратное обеспечение
harm *v* — вредить, наносить ущерб
hatchback *n* — легковой автомобиль с двухобъемным кузовом и задней дверью, открывающей доступ к багажному отделению
head *n* — голова, глава, руководитель; *v* — возглавлять
headlight *n* — фара
headquarters *n pl* — штаб, главное управление, центральный орган
healthy *a* — здоровый
hear *v* (**heard**) — слышать
heat *n* — нагрев, жар; *v* — нагревать
heat treating — термообработка
heavy *a* — тяжелый
height *n* — высота, рост
heritage *n* — наследство
hinder *v* — затруднять, мешать, препятствовать
hit *v* (**hit**) — ударять
hold *v* (**held**) — держать, проводить
hole *n* — отверстие; полость, канал
hollow *a* — полый, пустой
hopper *n* — воронка; грузовой бункер с разгрузкой через дно
horn *n* — гудок, звуковой сигнал
host *n* — материал-основа
hot *a* — горячий, жаркий
housing *n* — корпус, кожух; футляр; чехол
how *adv* — как
how many (much) — сколько
however *adv* — однако
huge *a* — огромный
human *a* — человеческий; ~ **being** человек
humanities *n* — гуманитарные дисциплины

humanity *n* — человечество
humid *a* — сырой, влажный
hurry *n* — торопливость, поспешность; **in a** ~ второпях, в спешке
hurt *v* (**hurt**) — причинять боль
hybrid *a* — гибридный, смешанный
hydrocarbon *n* — углеводород
hydrogen *n* — водород

I

ignition *n* — воспламенение, зажигание
impact *n* — удар, толчок, влияние
imply *v* — подразумевать
importance *n* — значение
important *a* — важный
impossible *a* — невозможный
impress *v* — производить впечатление
improve *v* — улучшать
improvement *n* — улучшение, усовершенствование
impure *a* — нечистый, грязный
impurities *n* — примесь, загрязняющее вещество
in accordance with — в соответствии с
inaccurate *a* — неточный
incidence *n* — степень, процент, доля
include *v* — включать, содержать в себе
incomplete *a* — неполный, несовершенный, неокончательный
incorporate *v* — встраивать, помещать; *a* — соединённый, объединённый; нераздельный, сгруппированный, совместный
increase *v* — увеличивать(ся)
incredibly *adv* — невероятно
independent *a* — независимый, самостоятельный
indirectly *a* — косвенно
indispensable *a* — необходимый, незаменимый, очень нужный

induce *v* — вызывать, приводить
inert *a* — инертный, неактивный
influence *v* — оказывать влияние, влиять
informal *a* — неофициальный
ingot *n* — слиток
inherent *a* — свойственный, присущий, неотделимый
injection *n* — нагнетание, закачивание
inland *n* — внутренняя часть страны
input-output *a* — устройство ввода-вывода
insert *v* — вводить; вставлять
inside *n* — внутренняя сторона, внутренняя часть
insist *on v* — настаивать на
install *v* — устанавливать; монтировать
installation *n* — установка; монтаж; настройка
instead *adv* — вместо, взамен
instead of *prep.* — вместо чего-л., взамен чего-л.
institute *n* — институт
institution *n* — учреждение, заведение
insulator *n* — изолятор, непроводник
intake *n* — впуск, заборник; ~ stroke ход впуска, ход всасывания
integrate *v* — объединять
intelligent *a* — умный, понятливый
intend *v* — намереваться
interchangeably *adv* — взаимозаменяемо
interconnect *v* — связывать(ся)
interior *v* — внутренняя часть, интерьер
intermediate *a* — промежуточный
internal *a* — внутренний
interpret *v* — объявлять, интерпретировать
interrupt *v* — прерывать, вмешиваться (*в разговор*)

introduce *v* — представлять, знакомить
intrude *v* — вторгаться
intrusion *n* — вторжение
invention *n* — изобретение
inventory management *n* — управление
товарными запасами
inverted *a* — опрокинутый, перевер-
нутый
investigate *v* — исследовать
involve *v* — включать в себя (**in**)
iron *n* — железо
irreplaceable *a* — незаменимый
isolate *v* — изолировать, отделять
issue *v* — выдавать, издавать
item *n* — элемент, составная часть;
каждый отдельный предмет

J

job *n* — работа; ~ **security** гарантия
занятости
join *v* — соединять(ся)
joining — присоединение; permanent ~
неразъемное соединение; **temporary**
~ разъемное соединение
journey *n* — поездка, путешествие
junior *a* — младший

K

key *n* — ключ, клавиша; основной
принцип
keyboard *n* — клавиатура
kinematics *n* — кинематика
knight *n* — рыцарь
knurl *v* — делать насечку, накатывать

L

lack *v* — недоставать чего-либо,
не иметь в нужном количестве
language *n* — язык
last *a* — последний, прошлый; *n* —
конец; **at** ~ наконец; *v* — продол-
жаться, длиться

late *a* — поздний
lately *adv* — давно, в последнее время
lathe *n* — токарный станок
latter *a* — последний (*из двух назван-
ных*)
launch *v* — запускать (*программу*);
вводить в действие
law *n* — закон
lay *v* (**laid**) — класть
layer *n* — слой
layout *n* — расположение, план
lead *v* (**led**) — руководить, вести; *n* —
первое место
leadership *n* — руководство
lean *a* — без излишеств, экономный
learn *v* (**learnt**) — учить, изучать
least *adv* — меньше всего; **at** ~
по крайней мере
leave *v* (**left**) — покидать, оставлять
lecture *n* — лекция
left *a* — левый
leisure *a* — досуг, свободное время
length *n* — длина, расстояние
less *adv* — меньше
lessen *v* — уменьшать
let *v* (**let**) — позволять, разрешать
level *n* — уровень
license *v* — разрешать, давать разреше-
ние (*на что-л.*), давать право
lie *v* (**lay, lain**) — лежать
lift *n* — добыча; **artificial** ~ механиз-
рованная добыча; насосно-ком-
прессорная добыча
lift *n* — подъем, лифт
light *n* — свет; *a* — светлый, легкий
likely *a* — вероятный
line *n* — линия, строка
link *v* — соединять
linkage *n* — рычажный механизм;
связь, соединение
liquid *n* — жидкость

list *n* — список
listen *v* — слушать (to)
little *adv* — мало
load *v* — загружать
locate *v* — помещать, располагать в определенном месте
locomotive *n* — локомотив, тепловоз, электровоз
logic *n* — логическая последовательность; логический блок
loosen *v* — разрыхлять
lorry *n* — грузовик
lose (lost) *v* — терять, пропустить, упустить
loss *n* — потеря
lot *n*: а ~ of — много
loud *a* — громкий
low *a* — низкий
lower *v* — снижать(ся)
lubricant *n* — смазочно-охлаждающая жидкость (СОЖ)
lubrication — смазка
luck *n* — удача
luggage *n* — багаж

М

machine *n* — машина, станок, устройство механической обработки детали; **direct-numerically-controlled** ~ централизованное управление станками от ЭВМ; **numerically-controlled** ~ с числовым программным управлением (ЧПУ); ~ **part** деталь машины; **power-producing** ~ энергогенерирующая установка; **power-using** ~ энергопотребляющая установка; ~ **tool** станок, металлорежущий станок, станочная система
machinery *n* — машинное оборудование; машины; механизм;
earthmoving ~ землеройно-транспортные машины; **non-road mobile** ~ внедорожная подвижная техника

machining *n* — механическая обработка; обработка резанием
main *a* — главный; основной
mainly *adv* — главным образом
maintain *v* — обслуживать, поддерживать; эксплуатировать
maintenance *n* — эксплуатация; техническое обслуживание; поддержка
major *a* — главный, основной
majority *n* — большинство
make *v* (**made**) — делать, совершать; ~ up составлять, комплектовать
malleable *a* — ковкий, тягучий
manage *v* — руководить, управлять
management *n* — управление, организация производства; **product-life cycle** ~ управление жизненным циклом товара, период эксплуатации изделий
manganese *n* — марганец
mankind *n* — человечество
manner *n* — манера
manufacture *v* — производить, изготавливать
marine engineering *n* — кораблестроение
marked *a* — заметный, явный; замеченный, отмеченный
master rod — главный шатун
masterpiece *n* — шедевр
materials *n pl* — материалы; ~ **science** материаловедение; **responsive and smart** ~ наноматериалы (*умные или интеллектуальные материалы, по своей природе свойств чувствительные к внешнему воздействию*)
matrix *n* — матрица, форма
mean *v* (**meant**) — иметь в виду, значить
means *n pl* — средство, способ; **by all** ~ любой ценой, любым способом; **by** ~ с помощью; посредством
measure *v* — измерять

mechanical *a* — механический, машиностроительный

mechatronics *n* — мехатроника (*отрасль промышленности, образовавшаяся в результате слияния общего и электротехнического машиностроения*); совершенствование эксплуатации автоматизированных производственных линий

medium *n* — среда

meet *v* (**met**) — встречать(ся); ~ **the demand** отвечать требованиям

melt *v* — плавить

memorize *v* — запоминать

memory *n* — память; запоминающее устройство; **external** ~ внешняя память; **internal** ~ внутренняя память; **main** ~ основная память; **random-access** ~ (RAM) оперативное запоминающее устройство (ОЗУ); **read-only** ~ (ROM) постоянное запоминающее устройство (ПЗУ); **secondary** ~ вторичная память

mention *v* — упоминать

metalworking *n* — металлообработка

methane *n* — метан, болотный газ

methyI *n* — метил

micromechanics *n* — микромеханика

mill *n* — фрезерный станок

milling *n* — фрезерование; **chemical** ~ химическое фрезерование (контурное травление); ~ **cutter** фреза

mistake *n* — ошибка; *v* (**mistook**, **mistaken**) — ошибаться

mix *v* — мешать; ~ **up with** смешивать(ся), перепутать с

mixture *n* — смесь

mold *n* — литейная форма, пресс-форма, мульда

molten *a* — расплавленный; **pool of** ~ material расплав

moreover *adv* — сверх того, кроме того

motherboard *n* — материнская плата

motion *n* — движение, передвижение, изменение месторасположения

motor caravan — караван, фургон или небольшой автобус, оборудованный под жилье

motorcycle *n* — мотоцикл

mould *n* — (литейная) форма, изложница, мульда; *v* — отливать в форму, формовать

mount *v* — монтировать, устанавливать

mouse *n* — мышь

movement *n* — движение, ход; передвижение, перемещение

multiple *a* — множественный

multiple *v* — умножать; усиливать

multiplication *n* — умножение; усиление

multipoint *a* — многопозиционный

N

name *v* — называть, давать имя; **to** ~ **after** называть в честь кого-л.

narrow *a* — узкий

natural gas liquids — газоконденсатные жидкости

near *prep* — около, близко, поблизости, недалеко

necessary *a* — необходимый

need *n* — надобность, нужда; *v* — нуждаться

negate *v* — отвергать, отрицать, противоречить

neither... nor... *ej* — ни... ни ...

net *n* — сеть

network *n* — сеть

next *a* — следующий

nitrogen oxide *n* — оксид азота

note *v* — замечать, упоминать

nowadays *adv* — в наше время, в наши дни, теперь

nuclear *a* — ядерный

number *n* — число, цифра; **a ~ of** не-
которое количество

numerous *a* — многочисленный

О

objective *n* — цель, целевая функция;
требование

obsolete *a* — устаревший, неактуаль-
ный, рудиментарный; выведенный
из эксплуатации

obstacle *n* — препятствие

obtain *v* — получать

occur *v* — случаться, происходить

octane *n* — октан

offer *v* — предлагать

offset *n* — смещение, сдвиг, отклоне-
ние

oil *n* — нефть

omnibus — автобус

once *adv* — (один) раз; **at ~** сразу

only *adv* — только, исключительно

operate *v* — работать; действовать,
функционировать, управлять

operation *n* — действие; операция;
процесс, ход; работа, функциони-
рование; срабатывание; управле-
ние; эксплуатация

opinion *n* — мнение

opposite *a* — расположенный, находя-
щийся напротив

order *n* — команда; последователь-
ность; порядок

order *v* — приказывать, приводить
в порядок

ore *n* — руда; **iron** ~ железная руда

origin *n* — источник, начало; проис-
хождение

out *adv* — вне, снаружи, наружу

outer *a* — внешний

outfit *n* — оснащение; установка, обо-
рудование

output *n* — продукция, выпуск; мощ-
ность, производительность; выход;
вывод, устройство вывода; про-
пускная способность

output *v* — выводить

output shaft — вторичный (ведомый)
вал

outsourcing *n* — передача выполнения
функций сторонней организации

over *prep* — над; *adv* — выше

overcome *v* (**overcame**, **overcome**) —
преодолевать

overlap *v* — частично совпадать;
перекрывать(ся); накладывать(ся);
совмещаться, заходить один
за другой

overseer *n* — мастер, контролер, де-
журный оператор

own *a* — собственный

oxy-fuel cutting torch — кислородный
резак

oxygen *n* — кислород

Р

package *n* — пакет; блок; модуль;
application ~ прикладной пакет; ~
software готовое программное обе-
спечение

page *n* — страница

paragraph *n* — абзац

particle *n* — частица

particular *a* — особый, исключитель-
ный, заслуживающий особого
внимания

partly *adv* — частично

pass *v* — проходить; **to ~ an exam** сда-
вать экзамен

passage *n* — отрывок

passenger *n* — пассажир

past *n* — прошлое; *a* — прошлый,
минувший

pay *v* (**paid**) — платить; ~ **attention (to)** уделять внимание кому-л.

peptide *n* — пептид

per cent *n* — процент

percentage *n* — процентное содержание, процентное отношение

perceptive *a* — воспринимающий, ощущающий

perfect *a* — совершенный

perform *v* — выполнять

performance *n* — (*рабочая*) характеристика; производительность; режим работы; ~ **maximization** максимизация рабочих характеристик

perhaps *adv* — может быть, возможно

permanent *a* — постоянный

petroleum *n* — нефть

phenomenon (*pl phenomena*) *n* — явление

physicist *n* — физик

piece *n* — кусок, часть

piston *n* — поршень, плунжер

placement *n* — размещение

plane *v* — строгать; выравнивать; *a* — плоский

plant *n* — завод, установка

plastic *a* — пластичный, гибкий

plasticity *n* — пластичность

plastics *n* — пластмасса

plate *n* — полоса металла

plug *v* — закрыть

pollute *v* — загрязнять

polymer *n* — полимер

porcelain *n* — фарфор

pore *n* — пора

porous *a* — пористый; ~ rocks пористая порода

position *n* — положение, позиция

possible *a* — возможный

possibly *adv* — возможно

post-graduate *n* — аспирант; ~ courses аспирантура

potential tests *n* — определение потенциального дебита скважины

pour *v* — лить, заливать

powder metallurgy — порошковая металлургия

power *n* — власть; мощность; энергия; **pulling** ~ тяговая сила

power-driven *a* — с механическим приводом

powerful *a* — мощный

power-operated *a* — с сервоприводом

precise *a* — точный, определенный

predecessor *n* — предшественник; прототип (*машины*)

pre dominant *a* — преобладающий, доминирующий

prefer *v* — предпочитать

preignition *n* — преждевременное зажигание

prepare *v* — готовить

present *n* — настоящее время; *a* — те-перешний, настоящий; *v* — дарить

pressure *n* — давление

prevent *v* — мешать, препятствовать

previous *a* — предыдущий

primary *a* — первоначальный; ~ **school** общая начальная школа

prior *adv* — раньше, прежде, до

private *a* — частный, личный

probably *adv* — вероятно

process *v* — обрабатывать

processing *n* — обработка (*данных*); переработка; **chemical** ~ химическая обработка; **mineral** ~ обогащение полезных ископаемых

processor *n* — процессор; программа обработки

produce *v* — производить

producing equipment *n* — промышленное оборудование

production *n* — производство; добыча; извлечение нефти; **small and**

medium-lot size ~ мелкосерийное и среднесерийное производство; ~ **rig** эксплуатационная установка; ~ промысловая установка; ~ **tubing** эксплуатационная насосно-компрессорная колонна

product-life management *n* — управление жизненным циклом товара, период эксплуатации изделий

profit *n* — прибыль

profound *a* — абсолютный, полный, совершенный

proper *a* — правильный, должный, надлежащий

properly *adv* — должным образом, как следует, правильно

property *n* — имущество, собственность

protect *v* — защищать

protein *n* — протеин, белковое вещество, белок

prove *v* — доказывать, оказываться

provide *v* — снабжать, обеспечивать (with)

public *a* — общественный

publish *v* — опубликовать

pull *v* — тянуть, тащить

punching — штамповка, пробивание (*штампом*)

pure *a* — чистый

purpose *n* — цель

pursue *v* — придерживаться намеченного плана; неотступно следовать

push *v* — толкать; ~ away отталкивать; ~ to подкатывать

put *v* (put) — класть

Q

quality *n* — качество

quantity *n* — количество, величина; physical ~ физическая величина

quarter *n* — четверть

quench *v* — закаливать (*сталь*)

R

rabbeting — прорезание пазов

racing — разгон; ~ **car** гоночный автомобиль

radical *a* — природный, основной

raise *v* — поднимать

random *a* — случайный; произвольный; ~-**access** с произвольным доступом

range *n* — диапазон, сфера; *v* — простираться

rapidly *adv* — быстро

rare *a* — редкий

rarely *adv* — редко

rate *n* — темп, скорость

rather *adv* — довольно

raw *a* — сырой

reach *v* — достигать

reader *n* — устройство считывания

rear *n* — задняя сторона

reason *n* — причина, разум, рассудок; *v* — рассуждать, аргументировать, доказывать

receive *v* — получать

recently *adv* — недавно

reciprocate *v* — двигаться взад и вперед; совершать возвратно-поступательные движения

recover *v* — извлекать

recovery factor — коэффициент извлечения

reduce *v* — уменьшать

refer *v* — относиться

reference *n* — рекомендация, сноска

refinery *n* — нефтеперерабатывающий завод (НПЗ)

reflect *v* — отражать(ся)

refuse *v* — отказывать(ся)

reinforce *v* — усиливать, укреплять

relatively *adv* — относительно, сравнительно

relevant *a* — уместный, относящийся к делу

reliability *n* — надежность; прочность

remote *a* — удаленный, отдаленный

remove *v* — удалять; убирать

renewable *a* — возобновляемый (*о природных ресурсах*); восполняемый

repair *v* — ремонтировать, чинить

replace *v* — заменять

report *n* — доклад; *v* — докладывать

represent *v* — представлять, излагать

representative *n* — представитель

reproductive *a* — репродуктивный, воспроизводительный

require *v* — требовать

requirement *n* — требование

research *v* — исследовать

resemble *v* — походить, иметь сходство

reservoir *n* — пласт-коллектор; нефтеносный слой; месторождение (*нефти и газа*); пластовый резервуар (*нефти и газа*)

resin *n* — смола

resist *v* — сопротивляться, противостоять

resources *n* — ресурсы

respectively *adv* — соответственно, в указанном порядке

respond *v* — отвечать

responsible *a* — ответственный

rest *n* — опора, стойка; the ~ остаток; *v* — отдыхать

restore *v* — восстанавливать

restrict *v* — ограничивать

retrieve *v* — извлекать (хранимую) информацию; восстанавливать файл; отыскивать введенную в систему информацию или детали в конфигурации ГАП (*гибкое автоматизированное производство*)

return *v* — возвращать(ся)

reveal *v* — обнаруживать, открывать

revise *v* — пересматривать, проверять

revolution *n* — круговое движение, вращение; кругооборот, цикл; оборот

revolve *v* — вращать

ride *v* (**rode, ridden**) — кататься, ездить верхом

right *n* — право; *a* — правый

rigid *a* — жесткий, негнущийся

ring *v* (**rang, rung**) — звонить

ripper *n* — рыхлитель (*орудие, навешиваемое на трактор, грейдер*)

rise *v* (**rose, risen**) — подниматься

rivet *v* — клепать, заклепывать

road *n* — дорога, путь, шоссе

robotics *n* — робототехника

rod pump — штанговый глубинный насос

roll *v* — вращать, катать, прокатывать, вальцевать

rolling *n* — прокатка

roof *n* — крыша

rotate *v* — вращать(ся)

rough *a* — неровный; ухабистый (*о дороге*)

roughly *adv* — приблизительно, примерно

round *a* — круглый

routine *a* — стандартный, повседневный

routing *n* — установление технологической последовательности; маршрутизация; составление маршрута обработки

row *n* — ряд

rubber *n* — резина, каучук

run *v* — управлять транспортным средством; работать, функционировать;

rust *v* — ржаветь

S

sacrifice *v* — жертвовать

safe *a* — безопасный

safely *adv* — безопасно

safety *n* — безопасность

saloon *n* — легковой автомобиль
с кузовом седан

satisfy *v* — удовлетворять, соответ-
ствовать

save *v* — беречь, экономить; спасать

scanner *n* — сканер; устройство опти-
ческого считывания

scanning *n* — просмотр; считывание

scheme *n* — схема, чертеж

scholarship *n* — стипендия

science *n* — наука

scientific *a* — научный

scientist *n* — ученый

scissors *n pl* — ножницы

screw *n* — винт, болт

seal *n* — манжетное уплотнение; саль-
ник; уплотняющая прокладка

sealing *n* — уплотнение; закупорка;
изоляция

search *v* — искать (*for*)

secondary *a* — средний (*об образова-
нии*)

secure *v* — обеспечивать безопасность

sedimentary *a* — осадочный; ~ **rocks** —
осадочные породы; ~ **basin** осадоч-
ный бассейн

see *v* (**saw**, **seen**) — видеть, смотреть

seem *v* — казаться

seldom *adv* — редко

sell *v* (**sold**) — продавать

send *v* (**sent**) — посылать

senior *a* — старший

sense *n* — смысл; *in broad* ~ в широком
смысле

separate *v* — отделять(ся),
разделять(ся)

separate *a* — отдельный; обособлен-
ный; разрозненный, разъединён-
ный

serve *v* — служить

service *n* — служба, сервис

set *n* — набор, комплект; ~ **up** на-
стройка, регулировка; *v* — установ-
ливать, **to** ~ **aside** откладывать, **to** ~
up воздвигать, сооружать; ~ **the stage**
установить этап

setting *n* — установка; режим; на-
стройка

settle *in trays* — собираться в тарелках

several *pron* — несколько

shaft *n* — вал, ось; **propeller** ~ кардан-
ный вал; **drive** ~ ведущий вал; **half** ~
полуось

shape *n* — форма, очертание; *v* — при-
дать форму

share *v* — делить(ся)

sharp *a* — острый, остроконечный

sheet *n* — простыня, лист

shelter *n* — приют; пристанище

shift *n* — сдвиг; смена; замена

shock *n* — удар, толчок; ~ **absorber**
амортизатор

should *v* (**should**) — должен (*вспомога-
тельный глагол, служит для образо-
вания сослагательного наклонения*)

shovel *n* — одноковшовый экскаватор

show *v* — показывать

shut *v* (**shut**) — закрывать

sidelight *n* — габаритный фонарь

sign *n* — знак

significance *n* — значение

significant *a* — значительный, важный,
существенный, знаменательный

similar *a* — подобный, сходный, по-
хожий

simple *a* — простой

simplicity *n* — простота, несложность,
упрощенность

simplify *v* — упрощать, облегчать, рационализировать
simulate *v* — имитировать
simulation *n* — моделирование; имитация
simultaneously *adv* — одновременно
since *prep* — с; *conj* — с тех пор как, так как
single *a* — единственный
sintering *n* — спекание
site abandonment — ликвидация, закрытие объекта (*скважины*)
skilful *a* — искусный, умелый
skill *n* — умение, навык; искусство, мастерство
sliding *a* — выдвигной, скользящий
slightly *adv* — слегка, едва
slow *a* — медленный; *v* ~ **down** замедлять
small-lot (small-scale) *a* — мелкосерийное
smart *a* — изящный, умный
smith *n* — кузнец
smooth *a* — однородный; гладкий
so *adv* — так, итак
society *n* — общество
soft *a* — мягкий, слабый; программный; программируемый
software *n* — программное обеспечение; программные средства
soil *n* — почва, земля
soldering *n* — пайка с мягким припоем
solid *a* — твердый; *n* — твердое тело
solidify *v* — затвердевать
solve *v* — решать
some *pron* — несколько
someone *pron* — кто-то
something *pron* — что-то
sometimes *adv* — иногда
somewhere *adv* — где-то, где-нибудь
soon *adv* — вскоре, скоро; **as** ~ **as** как только, не позже

sophisticated *a* — сложный
source *n* — источник
space *n* — космос, космическое пространство; пространство, расстояние, интервал; *v* ~ **out** расставлять с промежутками
specification *n* — спецификация, детализация
speed *n* — скорость
spend *v* (**spent**) — проводить (*время*), тратить, расходовать
spread *v* (**spread**) — распространяться
spring *n* — пружина
square *a* — квадратный
squeeze *v* — сжимать; сдавливать
stainless *a* — устойчивый против коррозии; ~ steel нержавеющая сталь
STAMPING — штамповка; ковка в штампе
stator *n* — реактор (*гидродинамического трансформатора*); статор (*электромотора, генератора*)
steam *n* — пар
steel *n* — сталь
steering *n* — управление; wheel ~ рулевое управление; ~ linkage система рычагов, тяг и шарнирных соединений рулевого привода
step *n* — ступень, ступенька
stick *v* — приклеивать
stiff *a* — негибкий; жесткий
still *adv* — все еще
stock *n* — запас; сырье
stone *n* — камень
storage *n* — запоминающее устройство, память; хранение
store *v* — снабжать, наполнять, вмещать; хранить; запоминать; заносить в память, размещать в памяти
stove *n* — печь
straight *a* — прямой, ровный
stream *n* — поток

streamlined *a* — модернизированный, организованный в соответствии с современными требованиями

strength of materials — сопротивление материалов, сопромат

stretch *v* — растягивать(ся), вытягивать(ся); простираться, тянуться

strike *v* (**struck**) — ударять, бить, чеканить

striking *a* — поразительный, удивительный, потрясающий

string *n* — веревка

stripe *n* — полоса

strong *a* — сильный

structural *a* — структурный; ~ analysis структурный анализ, расчет прочности конструкций

stud *n* — штифт

subject *n* — тема, предмет разговора, дисциплина

subsequent *a* — последующий

subside *v* — ослабевать, понижаться

substance *n* — вещество

substantial *a* — существенный, значительный

substitute *v* — заменять, замещать

substitution *n* — замена; подстановка

subtraction *n* — вычитание

succeed *v* — достигать цели, преуспевать

success *n* — успех

successful *a* — успешный

such *a* — такой

sufficient *a* — достаточный

suggest *v* — предлагать, предполагать

suit *v* — годиться; соответствовать, подходить

suitable *a* — подходящий, соответствующий

supersede *v* — вытеснять; заменять

supervision *n* — наблюдение; заведение

supervisory *a* — контролирующий, наблюдающий, супервизорный; ~ computer ЭВМ-диспетчер

supply *n* — подача; питание; ввод данных; снабжение; *v* — снабжать, поставлять (*with*)

support *n* — поддержка; *v* — поддерживать

suppose *v* — полагать, предполагать

sure *a* — уверенный

surface *n* — поверхность; *paved* ~ мощеная поверхность; *gravel* ~ покрытие из гравия

surge *v* — нарастать; резко возрастать

surround *v* — окружать, обступать

survey *n* — обзор

suspend *v* — вешать, подвешивать

suspension *n* — подвеска

sustainable *a* — экологичный, не наносящий ущерба окружающей среде; энергоэффективный

swarf *n* — мелкая металлическая стружка

swift *a* — скорый, быстрый

switch *v* — переключать; ~ *on* включать

synthesis *n* — синтез

system *n* — система; установка; устройство; способ; принцип; *flexible manufacturing* ~ гибкое автоматизированное производство; *heating and cooling* ~ нагревательно-охладительная система; *material-handling* ~ автоматизированная сервисная система (*перемещения и складирования деталей, инструментов, отходов, охлаждающей жидкости и т.д.*); *mechanical* ~ механическая система; *streamlined* ~ рациональная система (*организации процессов*)

Т

take *v* (**took**, **taken**) — брать, занимать, отнимать; to ~ care of заботиться; to ~ part (in) принимать участие; to ~ place случаться, происходить; to ~ up принимать, браться за что-л.

tall *a* — высокий

tap *n* — кран

tapping *n* — освоение, начало эксплуатации; тщательное изучение

target *n* — цель; *v* — нацеливаться; ориентироваться

task *n* — задача, задание

technique *n* — метод; способ; технические проемы

technology *n* — технология; методика

tell *v* (**told**) — рассказывать

tempering *n* — отпуск (*стали*)

temporary *a* — временный

tend *v* — иметь тенденцию; вести в определенном направлении

tensile — растяжимый, растягивающий, прочный на растяжение

term *n* — термин; период

test *n* — испытание; bottom-hole pressure ~ испытание забойного давления (*измерение давления залежи на определенной глубине зоны, где была закончена скважина*)

than *conj* — чем

that *pron* — тот; *conj* — что

there *adv* — там

thereby *adv* — таким образом, посредством этого, в связи с этим

therefore *adv* — поэтому, следовательно

thermal *a* — термический, тепловой

thermodynamics *n* — термодинамика

thermoplastics *n* — термопласт (материал)

thermoset *n* — термореактивная пластмасса

these *pron* — эти

thick *a* — толстый, густой

thickness *n* — толщина; ~ and depth нефтенасыщенность

thin *a* — тонкий

thing *n* — вещь, предмет

think *v* (**thought**) — думать

this *pron* — этот

those *pron* — те

though *adv* — хотя, несмотря на, все же

thought *n* — мысль

threading *n* — нарезание резьбы

through *prep* — через, сквозь

throughout *prep* — через, по всему; в продолжение

throw *v* (**threw**, **thrown**) — бросать

thus *adv* — таким образом, итак

till *prep* — до

timetable *n* — расписание

tin *n* — олово

tire *n* — шина

tired *a* — уставший

tissue *n* — ткань; ~ culture эксплантация; метод сохранения жизнеспособности тканей, отдельных клеток вне организма; выращивание живых тканей

titanic *a* — колоссальный, титанический

title *n* — заглавие, название

to *prep* — к, в, на

tool *n* — инструмент; machine ~ станок, металлорежущий станок; numerically controlled machine ~ станок с числовым программным управлением

tool *n* — рабочий инструмент, орудие

top *n* — вершина

torque *n* — вращающий момент

total *a* — весь, целый

touch *v* — касаться

tough *a* — жесткий; трудный, нелегкий для исполнения; вязкий (*о нефти*)

tow *v* — буксировать; тащить за собой
towards *prep* — к, по направлению к
track *v* — прокладывать путь; следить
trailer *n* — прицеп
transmission *n* — передача; трансмиссия
transmit *v* — передавать, отправлять
transport *n* — транспорт, средство сообщения; перевозка, транспортировка
trap *n* — ловушка (*для отделения нефти от воды*)
traverse *v* — пересекать
tray *n* — тарелка
treatment *n* — технологическая обработка, утилизация отходов
tremendous *a* — огромный
triangular *a* — треугольный, трехсторонний, трехгранный
trigger *n* — повод, побудительная причина; пусковая кнопка; *v* — иницировать, приводить в действие
truck *n* — грузовик
trunk *n* — багажник
tube *n* — труба
tubing *n* — насосно-компрессорная труба (НКТ) (*предназначена для нагнетания и подъема продукции*)
tubular *a* — трубчатый, полый
tungsten *n* — вольфрам
turn *v* — поворачивать(ся); ~ away отворачиваться, ~ into превращаться
turning *n* — обточка
twice *adv* — дважды
twitter *n* — щебет; чирикание
two-stroke cycle — двухтактный цикл
tyre *n* — шина

U

ubiquitous *a* — вездесущий, повсеместно распространенный

ultimately *adv* — в конечном итоге, в конечном счете

under *prep* — под

undergo *v* (**underwent**, **undergone**) — испытывать, переносить

underline *v* — подчеркивать

understand *v* (**understood**) — понимать

unify *v* — объединять

unique *a* — единственный в своем роде, уникальный

unit *n* — устройство; узел; блок; элемент; arithmetic ~ арифметическое устройство; arithmetic and logical ~ арифметико-логическое устройство; central processing ~ центральный процессор; control ~ устройство управления; power (supply) ~ блок питания; storage ~ запоминающее устройство

unitary *a* — единственный

unite *v* — соединять(ся)

universe *n* — мир, вселенная

unlikely *a* — маловероятный

until *prep* — до; *conj* — (до тех пор) пока (не)

up-front *a* — стартовый, начальный

upsetting *n* — осадка

uptake *n* — внедрение, освоение

usage *n* — использование

use *v* — использовать, применять, употреблять

useful *a* — полезный

useless *a* — бесполезный

usual *a* — обычный

usually *adv* — обычно

utilize *v* — использовать, применять

V

value *n* — ценность; *v* — оценивать, дорожить, ценить

valve *n* — клапан, вентиль, затвор

van *n* — фургон; автомобиль с вагонной (однообъемной) компоновкой кузова
variety *n* — разнообразие, множество
various *a* — различный, разный
vary *v* — менять(ся), поменять(ся); разниться
vast *a* — обширный, громадный
vehicle *n* — средство передвижения, перевозочное средство; armoured ~ броневедомоцикл; light goods ~ транспортное средство для перевозки легких грузов; light commercial ~ легкое грузовое транспортное средство; heavy goods ~ транспортное средство для перевозки тяжелых грузов; non-self propelled ~ несамостоятельное транспортное средство; off-road ~ транспортное средство повышенной проходимости
versatile *a* — многосторонний; гибкий
via *prep* — через
visibility *n* — видимость
vocational *a* — профессиональный

W

waist *n* — перехват; сужение; шейка; шкафут
warm *a* — теплый
waste *n* — отбросы, отходы
watch *v* — наблюдать, смотреть
water *n* — вода
watercraft *n* — плавучие средства
waxes *n pl* — парафины
way *n* — метод, средство; by the ~ между прочим
weak *a* — слабый
wear resistance — износостойкость
weight *n* — вес
weld *n* — сварной шов; сварное соединение
welding *n* — сварка

welfare *n* — социальное обеспечение; здоровье
well *adv* — хорошо; as ~ также
well *n* — скважина; ~ development разведочная скважина
wellbore *n* — ствол скважины
well-known *a* — известный, популярный
wet *a* — мокрый, влажный
what *pron* — что
whatever *a* — какой бы ни
wheel *n* — колесо; ~ spin буксование колес; ~ steering рулевое колесо; wheeled — имеющий колеса, колесный
when *adv, cj* — когда, в то время как
where *adv, cj* — где, куда
wherein *adv* — там, где
wherever *adv* — где бы ни, куда бы ни
whether *cj* — ли
while *cj* — в то время как
who *pron* — кто
whole *a* — весь, целый
whom *pron* — кого, кому
whose *pron, cj* — чей
why *adv* — почему
wide *a* — широкий
widespread *a* — широко распространенный
win *v (won)* — выигрывать, побеждать
windscreen wiper and washer — очиститель ветрового стекла
wire *n* — проволока, провод
with *prep* — с
within *prep* — в, в пределах
without *prep* — без
withstand *v (withstood)* — противостоять, выдерживать
wood *n* — лес, дерево, древесина
work station — автоматизированное рабочее место
workpiece *n* — заготовка
worktable *n* — рабочий стол

worse *adv* — хуже

worst *a* — худший

worth *a predic.* — стоящий, заслуживающий внимания

would *v* — вспомогательный глагол, служит для образования сослагательного наклонения

write *v* (wrote, written) — писать

wrong *a* — неправильный

Y

yeast *n* — дрожжи, дрожжевые грибки

СОКРАЩЕНИЯ, ВСТРЕЧАЮЩИЕСЯ В УЧЕБНОМ ПОСОБИИ

- ABS (acrylonitrile butadiene styrene) — бутадиен-стирол
A-level (advanced level) — продвинутый уровень
ALU (arithmetic-logical unit) — арифметико-логическое устройство
CAM (computer-aided manufacturing) — система автоматизированного управления технологическим процессом (АСУТП)
CD (compact disk) — компакт-диск
CD-ROM (compact disk) — неперезаписываемый компакт-диск
CNC (computer numerical control) — числовое программное управление
CP (central processor) — центральный процессор
CPU (central processing unit) — центральный процессор (ЦП)
CU (control unit) — устройство управления
DNC (direct numerical control) — централизованное управление от ЭВМ
DVD (digital video disk) — цифровой видеодиск
ECPD (The American Engineers' Council for Professional Development) — Американский совет инженеров по профессиональному развитию
EU (European Union) — Европейское Сообщество
FMS (flexible manufacturing system) — гибкое автоматизированное производство
FWD (front-wheel drive) — передний привод
GCSE (General Certificate of Secondary Education) — Свидетельство о среднем образовании
GRP (glass-reinforced plastics) — стеклопластик
HDD (hard-disk drive) — дисковод для жесткого диска
HGV (heavy goods vehicle) — большие грузовые транспортные средства
K/B, KBD, kbd (keyboard) — клавиатура
LGV (large goods vehicle) — большие грузовые транспортные средства
MP (microprocessor) — микропроцессор
NC (numerical control) — числовое управление (*одним или несколькими модулями прямым вводом числовой программы*)
PVC (polyvinylchloride) — поливинилхлорид
RAM (random-access memory) — оперативное запоминающее устройство
RPM (revolutions per minute) — число оборотов коленвала в минуту
RWD (rear-wheel drive) — задний привод
4WD (four-wheel drive) — полный привод

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