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АНГЛИЙСКИЙ ЯЗЫК ДЛЯ ТЕХНИЧЕСКИХ ВУЗОВ

Учебное пособие

4-е издание, стереотипное

*Рекомендовано УМО по образованию в области лингвистики
Министерства образования и науки РФ в качестве
учебного пособия для студентов младших курсов,
обучающихся по техническим специальностям*

Москва
Издательство «ФЛИНТА»
2013

УДК 811.111(075.8)
ББК 81.2Англ-923
ШЗ7

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ШЗ7 Английский язык для технических вузов [Электронный ресурс]: учеб. пособие / Г.В. Шевцова, Л.Е. Москалец. – 4-е изд., стер. – М. : ФЛИНТА, 2013. – 392 с.

ISBN 978-5-9765-0713-5

Учебное пособие написано в соответствии с программой по иностранным языкам для неязыковых вузов. Пособие содержит аутентичные тексты общепрофессиональной и научно-специальной направленности, разнообразные тренировочные упражнения, дополнительные тексты для чтения, грамматический справочник.

Предназначается для студентов технических вузов.

УДК 811.111(075.8)
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ISBN 978-5-9765-0713-5

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ПРЕДИСЛОВИЕ

Данное учебное пособие предназначено для студентов технических университетов и институтов всех специальностей, изучавших английский язык в средней школе, и составлено в соответствии с требованиями программы по иностранным языкам для неязыковых вузов. Учебное пособие рассчитано на 270–280 часов аудиторных занятий и внеаудиторной самостоятельной работы.

Цель учебного пособия – подготовить студентов к чтению страноведческой и профориентированной научно-технической литературы для извлечения информации, а также привить им навыки устной речи по специальной и неспециальной тематике. Для достижения этой цели авторами предлагается методика работы, основанная на использовании разнообразных способов подачи материала, систематическом повторении лексики по темам, активном применении различных коммуникативных приемов.

Учебное пособие состоит из двух частей (12 уроков), текстов для дополнительного чтения (Texts for Supplementary Reading), грамматического приложения (Grammar Reference), справочника по английскому словообразованию (Word-Building Reference).

Первая часть пособия (Part 1), состоящая из шести уроков, рекомендуется для изучения студентами на первом курсе. Тематика общеобразовательных и страноведческих текстов этой части пособия носит обучающий, развивающий и познавательный характер. Языковой материал подобран с учетом функционально-коммуникативного подхода и рассматривается как средство реализации речевого общения.

Вторая часть пособия (Part 2), состоящая также из шести уроков, рекомендуется для изучения студентами на втором курсе. Тематика текстов этой части пособия носит общенаучный и общепрофессиональный характер. Целенаправленный подбор текстов, основанный на принципе максимальной доступности в смысловом и языковом отношении, призван формировать у обучаемых систему образов и понятий, относящихся к базовым профессиональным знаниям, которые активизируют познавательную деятельность студентов и способствуют приобщению к профессиональной концептуальной системе и адаптации к контексту профессионального сотрудничества на иностранном языке.

Каждый урок начинается с раздела «Active Vocabulary», содержащего наиболее употребительную общенаучную, общепрофессиональную или специализированную лексику, овладение

которой повышает способность реализации речевого общения в рамках заданной компетенции.

В предтекстовых упражнениях (Pre-Text Exercises) каждого урока особое внимание уделяется расширению потенциального словаря. В связи с этим в уроках имеются упражнения на узнавание и верную интерпретацию интернациональных слов. Цель подобных упражнений — развить у студентов навыки использования фоновых языковых знаний и работы без словаря.

Эффективным средством расширения вокабуляра в английском языке служит знание способов словообразования. Умея расчлнить производное слово на корень, суффикс и префикс, легче определить значение неизвестного слова. Поэтому в каждом уроке имеется ряд упражнений, направленных на развитие навыков работы с производными словами. При выполнении данных упражнений авторы рекомендуют использовать справочник по английскому словообразованию, данный в приложении к настоящему учебному пособию.

Необходимо также отметить, что помимо лексической направленности, предтекстовые упражнения дают возможность ввести тему всего урока в общей дискуссии (Brainstorming), что стимулирует интерес студентов, а также, основываясь на ключевых понятиях текста, может сделать его легче для последующего восприятия. Помимо направленности на окончательный результат, предварительная дискуссия используется для того, чтобы, оставаясь в рамках конкретной версии смысла целого текста, делать логические выводы по ходу чтения.

Разнообразный познавательный и информативный материал учебного пособия ориентирован как на аудиторную, так и самостоятельную работу студентов с иноязычными текстами.

Работа с текстами предполагает развитие четырех видов чтения — изучающего, ознакомительного, поискового и просмотрового, широко представленных в каждом уроке, выбор которых определяется задачей, поставленной при работе с учебной литературой: общеобразовательными, страноведческими, общенаучными, общепрофессиональными текстами, научно-популярной информацией, а также информацией, определяющей наше поведение в повседневной жизни.

Послетекстовые упражнения (Text and Vocabulary Exercises) представлены широко и разнообразно (вопросно-ответные упражнения; обобщение прочитанного текста по ключевым словам, речевым клише, по плану; упражнения на извлечение информации из текста и др.). Подобные упражнения направлены на усвоение лексики, данной в текстах, на развитие навыков устной речи в

пределах изученной тематики, что постепенно готовит студентов к аннотированию и реферированию текстов.

Все уроки завершаются заданиями творческого характера (Conversational Practice), в которых основной акцент переносится на развитие неподготовленной речи, свободной беседы. Подобные упражнения требуют от студентов участия в обсуждении определенной проблемы.

Помимо этого, учебник готовит студентов к письменному общению (Writing Practice) на английском языке. Разработанные упражнения развивают умение фиксации информации, извлеченной из прочитанных текстов. Каждый урок второй части содержит материалы, формирующие и развивающие навыки ведения деловой переписки, умения составлять резюме и служебные записки на английском языке.

Самостоятельная работа студентов заключается в повторении некоторых разделов грамматики, известных студентам из школьного курса обучения. В этом, как предполагают авторы, большую помощь студентам окажет грамматическое приложение (Grammar Reference). Однако повторение грамматического материала происходит на новом языковом материале с учетом особенностей общеобразовательного, научного стилей и общепрофессиональной лексики. Кроме того, для самостоятельной работы студентов предназначен информативный раздел для дополнительного чтения (Texts for Supplementary Reading), содержащий интересный учебный материал научного и профессионального характера.

Авторы выражают глубокую благодарность за ценные указания, советы, помощь и замечания рецензентам: доктору социологических наук, профессору Е.Ю. Литвиненко и доценту Л.О. Ереминой.

PART I

UNIT 1

Pre-Text Exercises

Word Building

Active Vocabulary

Text 1 A. *Higher Education in Russia*

Text 1 B. *The 300th Anniversary of Technical Education in Russia*

Text 1 C. *Russia's Top Universities*

Text 1 D. *Moscow State University*

Text and Vocabulary Exercises

Conversational Practice

Writing Practice

PRE-TEXT EXERCISES

1. Look at the following international words, guess their meaning and check the pronunciation:

System, foundation, university, population, prestigious, contribution, federation, grant, academic, programme, gymnasium, organization, equivalent, regulate, standard, professional, humanities, social-economic, discipline, project, final, practice, period

2. Here are some expressions with the preposition *in*. Translate and learn them:

- | | | |
|--------------------------------|-----------------------|--------------------------|
| ▪ to have (an) interest in | ▪ to be interested in | ▪ to be in love with |
| ▪ to be rich in | ▪ in the way | ▪ to be in need of |
| ▪ in the rain (sun, snow) | ▪ in the cold (heat) | ▪ in fact |
| ▪ in general | ▪ in the open air | ▪ in one's opinion |
| ▪ in pencil (ink, coal) | ▪ in smb's place | ▪ in the south (west...) |
| ▪ in (under) the circumstances | ▪ in short | ▪ in the sky |
| ▪ in time | ▪ in vain | ▪ in a way |
| ▪ in spring (winter...) | ▪ in the street | ▪ in the direction of |

3. Fill in the gaps with the preposition *in* or the expressions above in the appropriate form:

1. The portrait was painted ___ oil.
2. Yesterday Ann was dressed ___ white.
3. He felt at that moment he was ___ love with the whole world.
4. They searched everywhere, but it was ___ vain.
5. ___ his ___ it was too late to publish this article.
6. The doctor advised her not to sit ___ the sun so long.
7. Everybody knew that Helen was ___ love with Bob.
8. He liked to run ___ the open air every spring.
9. She is interested ___ some collections of minerals.
10. They always keep everything ___ secret from the others.
11. He is ___ need of money. Can you lend him some?
12. ___ their opinion I am a fool to help you.
13. He tried to lift the heavy log, but it was ___ vain.
14. Ann did not know what to do ___ these circumstances.
15. They are interested ___ these problems.
16. He has no interest ___ music.
17. ___ fact we did this work ourselves.
18. They stood ___ the sun too long. The sun was pitiless ___ the heat.

4. Find the English equivalents for the following Russian words:

- | | | | |
|-----------------|----------------|---------------|---------------|
| 1. изучение | a. study | b. steady | c. student |
| 2. обязательный | a. complete | b. compulsory | c. compound |
| 3. включать | a. compose | b. complete | c. comprise |
| 4. развитие | a. development | b. discovery | c. developer |
| 5. менять | a. to change | b. chance | c. choice |
| 6. включать | a. to conclude | b. to exclude | c. to include |
| 7. почти | a. always | b. almost | c. already |
| 8. предлагать | a. office | b. officer | c. to offer |
| 9. исследование | a. search | b. research | c. reach |
| 10. получить | a. to obey | b. to obtain | c. to object |
| 11. уровень | a. lever | b. level | c. liver |

5. Fill in the gaps with the correct word to complete the sentences:

1. Every year students ___ a specialty that includes several main disciplines: the humanities, social and physical sciences, engineering.

- *acquired* ▪ *acquires* ▪ *are acquiring* ▪ *acquire*

2. Students ___ to work out new decisions in the area of engineering.

- *are trained* ▪ *is trained* ▪ *was trained* ▪ *train*

3. He insisted ____ visiting his parents.

- *of* ▪ *–* ▪ *on* ▪ *to*

4. Your face seems familiar to me. We ____ have met somewhere.

- *ought* ▪ *must* ▪ *need* ▪ *should*

5. Using modern information technologies the students ____ many different problems.

- *solve* ▪ *solves* ▪ *had solved* ▪ *is solving*

6. BRAINSTORMING: Explain the meaning of the following words and phrases in English:

Constitution; right to education; higher education; extramural and evening courses; Bachelor's degree; Master's degree; a thesis; the system of state scholarship and grants

WORD BUILDING

7. Translate the following derivative words:

noun + -ic → adjective

Academy – academic, economy – economic, science – scientific, energy – energetic, hero – heroic, poet – poetic, drama – dramatic

adjective + -ty → noun

Curious – curiosity, anxious – anxiety, gay – gaiety, brief – brevity, vain – vanity, simple – simplicity, similar – similarity

adjective + -ly → adverb

Similar – similarly, popular – popularly, gradual – gradually, simple – simply, international – internationally, educational – educationally, natural – naturally, historical – historically

verb + -able → adjective

To read – readable, to accept – acceptable, to agree – agreeable, to change – changeable, to enjoy – enjoyable, to apply – applicable

8. Form adjectives using suffixes -ic, -ous, -able:

Photography, sympathy, climate, democracy, humour, fame, industry, to depend, to break, to enjoy

9. Guess the meaning of the words in bold type:

Noble – **nobility**; change – **unchangeable**; to suit – **suitable**; artist – **artistic**; symptom – **symptomatic**; definitely – **indefinitely**; respectively – **irrespectively**; cheap – **cheaply**; individual – **individuality**; simple – **simplicity**; certain – **uncertainty**; security – **insecurity**

ACTIVE VOCABULARY

10. Read and memorize the following words and word combinations:

applicant – абитуриент
at least – по крайней мере
to be awarded – награждаться
to carry out – завершить, выполнить
completion – завершение, окончание
compulsory – обязательный
core curriculum – основная программа
to defend a thesis – защитить дипломную работу (диссертацию)
demand – требование
due to – благодаря, вследствие
education – образование; (**higher education** – высшее образование; **secondary education** – среднее образование)
to elaborate – тщательно разрабатывать
to ensure – обеспечивать, гарантировать
evening course – вечернее обучение

extramural course – заочное обучение
final – последний, заключительный
finals – выпускные экзамены
frame – рама, рамка;
in the framework of – в рамках, пределах
to go on – продолжать
higher education establishment – вуз
humanities – гуманитарные науки
to pass exams – сдать экзамены
primary – начальный
research paper – исследовательская работа
scholarship – стипендия
science – наука; **sciences** – *соб.* естественные науки
similar – похожий, подобный
to state – излагать, формулировать
to take competitive exams – сдавать конкурсные экзамены
vocational school – профессиональное училище

11. Read and translate the following text:

Text 1 A Higher Education in Russia

Russia's higher education system started with the foundation of the universities in Moscow and St. Petersburg in the middle of the 18th century. The system was constructed similar to that of Germany. In Soviet times all of the population in Russia had at least a secondary education. The pursuit of higher education was and still is considered to be very prestigious. More than 50% of people have a higher education.

Russians have always shown a great concern for education. The right to education is stated in the Constitution of the Russian Federation. It's ensured by compulsory secondary schools, vocational schools and higher education establishments. It is also ensured by the development of

extramural and evening courses and the system of state scholarships and grants. Education in Russia is compulsory up to the 9th form inclusive. If a pupil of secondary school wishes to go on with education, he or she must stay at school for two more years.

Primary and secondary schools together comprise 11 years of study. Every school has a “core curriculum” of academic subjects. After finishing the 9th form one can go on to a vocational school which offers programmes of academic subjects and a programme of training in a technical field, or a profession. After finishing the 11th form of a secondary school, a lyceum or a gymnasium, one can go into higher education. All applicants must take competitive exams. Higher education institutions, that is institutes or universities, offer a 5-years’ programme of academic subjects for undergraduates in a variety of fields.

Due to great demands of the international educational organizations, the system of education in Russia began to change over the past years. Universities began transitioning to a system similar to that of Britain and the USA: 4 years for the Bachelor’s degree (the first university level degree which is equivalent to the B.Sc. degree in the US or Western Europe) and 2 years for a Master’s degree (postgraduate higher education which is equivalent to a Master’s Degree (M.Sc, M.A.)) in the US or Western Europe. The Bachelor’s degree programmes last for at least 4 years of full-time university-level study.

The programmes are elaborated in accordance with the State Educational Standards which regulate almost 80% of their content. The other 20% are elaborated by the university itself. The programmes include professional and special courses in Science, the Humanities and Social-economic disciplines, professional training, completion of a research paper/project and passing of State final exams. Having obtained the Bachelor’s degree, students may apply to enter the Master’s programme or continue their studies in the framework of the Specialist Diploma programmes. The Bachelor’s degree is awarded after defending a Diploma project prepared under the guidance of a supervisor and passing the final exams. Holders of the Bachelor’s degree are admitted to enter the Specialist Diploma and Master’s degree programmes. Access to these programmes is competitive. The Master’s degree is awarded after successful completion of two-years’ full-time study. Students must carry out a one-year research including practice and prepare and defend a thesis which constitutes an original contribution and sit for final examinations. Nowadays, as the system of higher education in Russia is going through a transitional period, the universities are still in the process of these changes; some of them offer the new system of education while others still work according to the prior 5-year system.

TEXT AND VOCABULARY EXERCISES



12. Find in the text the words or phrases which mean the same as:

- | | |
|--------------------------------------|--|
| ▪ система высшего образования | ▪ среднее образование |
| ▪ защитить диплом (дипломную работу) | ▪ заочная и вечерняя формы образования |
| ▪ гуманитарные дисциплины | ▪ обязательный |
| ▪ государственные экзамены | ▪ степень |
| ▪ профессиональные курсы | ▪ точные (естественные) науки |
| ▪ выпускные экзамены | ▪ завершение, окончание |
| ▪ специальные курсы | ▪ академические предметы |
| ▪ считаться престижным | ▪ практика |

13. Find in the text the synonyms to the following words:

- | | | |
|--------------------|---------------|------------------|
| ▪ to begin | ▪ to continue | ▪ disciplines |
| ▪ basis | ▪ thanks to | ▪ to be the same |
| ▪ research project | ▪ guidance | ▪ to suggest |

14. Find in the text the antonyms to the following words:

- | | | |
|-------------------|---------------|---------------|
| ▪ to start | ▪ exclusive | ▪ equivalent |
| ▪ to fail an exam | ▪ to graduate | ▪ to unchange |

15. Choose among the words in parentheses the one that corresponds to the text above to complete the sentences:

1. Russia's higher education system started with the foundation of the universities in Moscow and St. Petersburg ____ of the 18th century.
(a. *at the beginning*; b. *in the middle*; c. *at the end*)
2. The pursuit of higher education was and still is considered to be very ____.
(a. *modern*; b. *fashionable*; c. *prestigious*)
3. The right to education is stated in the ____ of the Russian Federation.
(a. *regulations*; b. *laws*; c. *constitution*)
4. Education in Russia is ____ up to the 9th form inclusive.
(a. *free of charge*; b. *recommended*; c. *compulsory*)
5. Institutes or universities offer 5-years ____ of academic subjects for undergraduates in a variety of fields.
(a. *course*; b. *programme*; c. *plan*)
6. The system of education in Russia began ____ over the past years.
(a. *to change*; b. *to make experiments*; c. *to research*)
7. The Bachelor's degree is ____ after defending a Diploma project.
(a. *presided*; b. *given*; c. *awarded*)

8. The Master's degree is awarded after completion of ____ years' full-time study.
(a. *three*; b. *two*; c. *four*)
9. Nowadays the universities are still in the ____ of these changes.
(a. process; b. state; c. system)

16. Give Russian equivalents to the following word combinations:

Continuing/further education; university education; all-round education; compulsory education; classical education; vocational training/education; technical education; many-sided education; school education; to educate, to provide an education; free education; special education; secondary education; general education; liberal education; elementary education, primary education

17. Give English equivalents to the following word combinations:

Забота об образовании; право на образование; система государственных стипендий и грантов; программа подготовки; профессиональные и специальные курсы; доступ к программам; присуждать степень; успешное окончание; переходный период; работать в соответствии с чем-либо

18. Read Text 1A once more. In pairs, discuss the statements below. Say what you think about them and ask your partner if he/she agrees or disagrees with you. Use the following phrases to help you:

<i>Agreeing</i>	<i>Disagreeing politely</i>
I agree with you.	Yes, but don't you think...?
Yes, that is what I think too.	True, but I think...
You are right!	I see what you mean, but...

1. Russia's higher education system started in the middle of the 18th century and it was similar to that of Germany and England.
2. Nowadays higher education is still considered to be not very prestigious.
3. The right to education should be stated in the Constitution of the Russian Federation.
4. Primary and secondary schools together comprise 11 years of study.
5. After finishing the 11th form of a secondary school, a lyceum or a gymnasium, one can go into higher education without competitive exams.
6. The system of education in Russia has already changed due to demands of the international educational organizations.
7. The Bachelor's degree programmes last at least 5 years of full-time university-level study.

8. The Bachelor's degree is awarded after defending a Diploma project under the guidance of a supervisor and passing the final exam.

9. The Master's degree is awarded after successful completion of two years' full-time study.

10. Nowadays the universities are still in the process of change: some of them offer the new system while others still work according to the prior 5-year system.

19. Give a short summary of the following text:

Unified State Exam

This type of examination was adopted recently. It is a test which is passed at the end of 9th and 11th form. It consists of three parts: part A contains tasks where the student has to pick out the correct answer out of several, in part B the correct answer should be written in one word, and no variants are given, and in Part C the student has to write the full solution (as in mathematics) or a composition (as in literature). The answers are written on special blanks, digitally scanned, with parts A and B being checked automatically by the computer software. An excellent score ranges, depending on the subject, from 65 (mathematics) to 90 (foreign language) out of 100. What's good for students of 11th form is that now they do not have to pass both their final school exams and entrance exams at a university. The score of several subjects is summed up, this total score is the basis of accepting a student at a university. Students now also have a chance to apply at several universities and choose one after they get to know if their score is enough to enter this or that university.

20. Fill in the gaps with the words from the box:

institutions	finishing	comprise	to go on	compulsory
ensured	to concern	at least	similar	

The system of higher education in Russia was constructed **1** ___ to that of Germany. In Soviet times all the population in Russia had **2** ___ a secondary education. Russians have always shown a great **3** ___ for education. The right **4** ___ education is stated in the Constitution of the Russian Federation. It is **5** ___ by compulsory secondary schools, vocational schools and higher education establishments. Education in Russia is **6** ___ up to the 9th form inclusive. If a pupil of secondary school wishes **7** ___ higher education, he or she must stay at school for two more years. Primary and secondary schools together **8** ___ 11 years of study. After **9** ___ the 11th form of a secondary school, a lyceum or a gymnasium

one can go into higher education. Higher education **10** ____, that is institutes or universities, offer a 5-years' programme of academic subjects for undergraduates in a variety of fields.

Check your answers on p. 279.

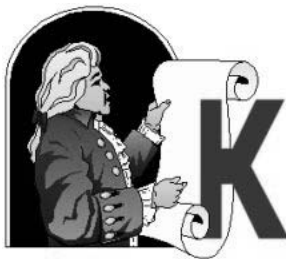
21. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about the system of Russian higher education (Text 1) and about the impact of education on society (Text 2). Be ready to discuss the information you have read.

22. Read the following text to learn about the history of technical education in Russia:

Text 1 B

The 300th Anniversary of Technical Education in Russia

Engineering education in Russia started with organization in Moscow of School for Mathematical and Navigational Crafts. The date of the School foundation should be fixed by the Highest Decree of Emperor Peter the First on January 14th, 1701 (old style) or January 27th (by the new style). In fact, the School started a few months earlier and was housed in Kadashevskaya Sloboda.



From the very beginning one of the teachers was Andrei Danilovich (Henry) Farwhurson, a well-known mathematician and astronomer, professor of the Aberdeen University (Scotland). Farwhurson stayed in Russia for the rest of his life and mastered the Russian language. In this language he wrote books on mathematics, geodesy, cartography, astronomy. He may be lawfully named as the first Russian professor of mathematics. Five months later, in June of 1701 the School was relocated into the building of the Sukharev Tower where classrooms and an observatory had been specially set up.

Soon among the teachers appeared Leonti Magnitzky, son of a peasant from Tver Gubernia, who had himself mastered reading and writing and later graduated from the Slavonic-Greek-and-Latin Academy. In 1703 Magnitzky wrote the famous textbook on "Arithmetics" which covered arithmetic, application of arithmetic and algebra to geometry and trigonometric calculations and tables. The third part of the textbook contained information on sea astronomy, geodesy and navigation. The

textbook was in wide use for over 50 years and all Russian sea officers of the epoch were studying with it.

It is known that mathematics, and later physics, were taught at the Slavonic-Greek-and-Latin Academy founded in 1687 in Zaikonnospassky Monastery, situated in Moscow on Nikolskaya Street. The first institution of higher learning in Russia, Kiev Seminary, dates back to the early XVII century. The entire student body of the School was planned to contain 500 people but at certain periods the number reached 700. Children of all social levels were allowed to be enrolled, with the exception of serfs. The study programme went through 3 stages: primary school taught reading, writing and some grammar, secondary classes taught arithmetic, geometry and trigonometry, and the higher (specialized) classes taught geography, astronomy, navigation and other subjects. The School thus comprised elements of both secondary and higher education. Navigators practised their craft on sea ships. As a means of cultural cultivation, the School had its own theatre where a group of actors invited from Danzig staged and performed plays with students.

The School did not have a fixed term of study. Some students managed to finish the programme in 4 years, while for some it took 13. There were no end-of-the-year exams and students moved from class to class according to their personal performance. The age of the students varied from 15 to 33. The students were stimulated by money allowances. The most affluent or talented were sent to internships abroad. Upon their arrival back home they were subjected to strict examination, sometimes by Peter the Great himself. As early as 1715 the School had trained about 1200 specialists. Its graduates put up an honorable performance in the sea battle of Gangut (1714) where the Russian fleet won its first victory, and were part of the Bering expedition which discovered the straits separating Asia and America. Among the graduates of the School were A. Chirikov who explored the north-western edge of North America, A. Nagaev, S. Malygin, D. Laptev, Admiral N. Senyavin, historian and public figure V. Tatishchev, architect I. Michurin, who invented with A. Nartov the wood processing machine, and many others.

Materials collected by the School graduates were used to make the first atlas of the Russian Empire in 1745. In 1715 a part of the higher-programme students and faculty was transferred to Saint Petersburg to become a nucleus of the Maritime Academy founded by Peter the Great. Students of the higher classes took practical training in the fleet and were publicly known as the Sea Guards. Upon completion of the training programme the students were awarded the rank of officers.

The School for Mathematical and Navigational Crafts was liquidated in 1752. Its higher classes were joined with the Maritime Academy which

was transformed into Gentry Sea Corps that existed in Saint Petersburg up to 1917. Its graduates contributed many brilliant lines into the history of the Russian Fleet. Among them are outstanding scholars – engineers A. Krylov, I. Bubnov and many others. After the October Revolution the M. Frunze Higher Naval School, still functioning today was founded on its basis and in the same building. Soon following the Navigational School, Artillery and Engineering School, and later, in 1703, Moscow Engineering School for 100–150 students were founded. Sometimes students from this latter school were directed to the School for Mathematical and Navigational Crafts for instruction in arithmetic and geometry.

In 1713 Petersburg Engineering School was organized which in 1723 was combined with the Moscow school. Creation of these schools was the beginning of an all-Russian network of institutions for general education of the first and second levels. The significance of the School for Mathematical and Navigational Crafts for the history of engineering education in Russia is great. It has educated not only naval specialists but also civil engineers, mechanics, architects, as well as specialists of many other professions. It has a full right to be regarded as the first higher technical education institution in Russia, and the date of its foundation – January 14 (or January 24th by new style), 1701 – as the starting date of technical education in Russia.



TEXT AND VOCABULARY EXERCISES

23. Answer the following questions:

1. What did engineering education in Russia start with?
2. Who was one of the teachers in the School for Mathematical and Navigational Crafts?
3. What books did he write?
4. Was Leonti Magnitzky a teacher or a student of the Slavonic-Greek-and-Latin Academy?
5. When did Leonti Magnitzky write the famous textbook on arithmetic?
6. What materials were used to make the first atlas of the Russian Empire in 1745?
7. Did students of the higher classes take any practical training?
8. What happened to the School for Mathematical and Navigational Crafts in 1752?
9. What is the significance of the School for Mathematical and Navigational Crafts for the history of engineering education in Russia?

24. Find in the text the words or phrases which mean the same as:

- | | |
|---|--------------------------|
| ▪ с самого начала | ▪ писать учебники по... |
| ▪ по-праву | ▪ широко использоваться |
| ▪ элементы среднего и высшего образования | ▪ культурное развитие |
| ▪ ремесло, умение | ▪ семестр |
| ▪ известно, что... | ▪ инженерное образование |
| ▪ гражданские инженеры | ▪ основание |

25. Match each word in A with the Russian equivalent in B:

- | A | B |
|---------------------|-----------------------------|
| 1. anniversary | a. известный, знаменитый |
| 2. well-known | b. закрепленный |
| 3. to be housed | c. полный, целый |
| 4. to master | d. основание, фундамент |
| 5. to graduate from | e. охватывать |
| 6. to cover | f. оканчивать вуз |
| 7. foundation | g. овладевать (знаниями...) |
| 8. entire | h. размещаться |
| 9. fixed | i. годовщина |

26. Complete the sentences according to Text 1B:

1. Engineering education in Russia ____.
2. The school started a few months earlier and ____ in Kadashevskaya Sloboda.
3. Farwhurson stayed in Russia and ____ language.
4. In 1703 Magnitzky wrote ____.
5. The textbook was ____ for over 50 years.
6. The study programme went through 3 stages: ____.
7. The school did not have ____ of study.
8. As early as 1715 the school had trained about ____.

27. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about the great Russian scientist M.V. Lomonosov and his contribution to the development of engineering education in Russia (Text 3). Be ready to discuss the information you have read.

28. Read the text below to find answers to the given questions:

Text 1 C Russia's Top Universities

1. *What requirements do Russia's top universities have?*
2. *How is higher education provided?*
3. *Where are most of Russia's universities located?*
4. *What can you say about the foundation and reputation of the best universities?*
5. *What is known about a new tendency in the sphere of higher education?*

Russia's top universities have very competitive entry requirements, and special entry exams are held each year. Students must apply for studies according to the standard competitive system. Higher education is provided by public and non-public (non-State) accredited higher education institutions. The academic year lasts from September 1 to the middle of June everywhere, with long summer vacations from July 1st to August 31.

Most of Russia's universities are located in large cities. Moscow State University, which was founded in 1755 and has about 28,000 students and 8,000 teachers, enjoys the highest reputation. The Russian People's Friendship University in Moscow has about 6,500 students and 1,500 teachers, and St. Petersburg State University has about 21,000 students and 2,100 teachers.

Many Russian universities also offer distance education and provide courses for specific professional needs. However, such systems are usually less developed than in the US and other Western European countries.



TEXT AND VOCABULARY EXERCISES

29. Find in the text the words or phrases which mean the same as:

- | | |
|----------------------------------|--|
| ▪ требования | ▪ проводить экзамен |
| ▪ привлекательность | ▪ качество |
| ▪ учебный год | ▪ иметь самую высокую репутацию |
| ▪ дистанционное образование | ▪ вступительные экзамены |
| ▪ учреждение высшего образования | ▪ согласно стандарту |
| ▪ летние каникулы | ▪ курсы для определенных профессиональных потребностей |

30. Make up situations using the English equivalents of the words given above.

31. Explain the meaning of the following words and word combinations in English:

Top universities; competitive entry requirements; highest reputation; distance education; public higher education institutions

32. Work in pairs and decide whether these statements are true or false:

1. Russia's top universities do not have any entry requirements.
2. Special entry exams are not held every year.
3. Higher education is provided only by non-public accredited higher education institutions.
4. The academic year lasts from October 1 to the middle of June everywhere.
5. Most of Russia's universities are located in large cities. Give some examples.
6. The system of distance education in Russia is more developed than in the US and other Western European countries.

33. Find in the text the situations in which the following word combinations are used:

Russia's top universities; the academic year; highest reputation; distance education; specific professional needs.

34. Read and translate the following text about Bauman Moscow State Technical University:

Bauman Moscow State Technical University is a public university located in Moscow, Russia. Bauman MSTU is one of the oldest and biggest Russian educational institutions offering the M.S. and Ph.D. degrees in various engineering fields and applied sciences.

The university was established in 1830 as Imperial Vocational School by a decree of Emperor Nicholas I. It was renamed in 1868 as Imperial Moscow Technical School, then after the 1917 revolution to Moscow Highest Technical School (MHTS).

A number of research institutes were created from laboratories and departments of MHTS in 1930. The remaining school was named Bauman Moscow Mechanical and Machine Construction Institute. The name MHTS was revived in 1943. The current name was given in 1989.

Departments of the University:

- Radioelectronics and Laser Technology

- Fundamental Sciences
- Machine Construction Technologies
- Special Machines
- Power Machines
- Robotic Technology and Automation
- Computer Science and Control Systems
- Biomedical Technology
- Social and Human Sciences
- Engineering Business and Management
- Radiotechnology
- Rocket and Space Technology
- Optico-electronic Equipment
- Equipment Construction
- Air and Space

35. Use the plan below to compose your own story about the University in which you study:

- | | |
|--|-----------------------------------|
| 1. State/non-state University; | 2. Old/new University; |
| 3. Big/small University; | 4. Date of the foundation; |
| 5. A brief history of the University; | 6. Departments of the University; |
| 7. The teaching staff of the University; | |
| 8. Number of students; | 9. Achievements of the University |

36. Read the text about one of Russia's top universities and give its brief summary:

Text 1 D
Moscow State University

Lomonosov Moscow State University is the oldest and the most prestigious university of Russia. Moscow University was founded in 1755



on Saint Tatiana's Day at the decree of the Empress Elizaveta and on the initiative of the great Russian scientist Mikhail Lomonosov. The day of Moscow University's foundation is celebrated as the Student's Day in Russia. Started with three faculties in 1755, Moscow State University nowadays offers education in 27 faculties and

research training in a number of institutes. Moscow State University has a long-standing tradition of academic excellence. At this oldest and most famous Russian university, scientific and educational schools of international reputation have been formed. A number of its graduates and professors had become Nobel Prize winners and are considered world famous scientists. According to all private and governmental surveys, Lomonosov Moscow State University is the leading national educational establishment. It is internationally recognized and ranked among the top ten in the world. The University has been providing a means for the people from all over the world to learn about the latest advances in sciences, humanities and medicine for about 250 years.

The total number of university students including post-graduates exceeds 30,000. The university employs 8,500 professors, teachers and researchers. About 6,900 of them hold Doctor of Science Degrees. The number of foreign students is growing constantly. Currently the university hosts about 3,000 students from about 100 countries. The university teachers and professors are highly qualified and world recognized for their achievements in modern sciences. Further, the application of the latest techniques in teaching provides the necessary background for an excellent education. The Diploma of Moscow University has won universal prestige and is recognized worldwide. Many educational programmes are carried out in close co-operation with research institutes of the university and the Russian Academy of Sciences.

The main building of the university is world famous for its exceptional architecture and size – it is the largest and highest university building throughout the world. The university campus located in one of the most beautiful parts of Moscow supplies the students with all necessary facilities: lecture halls, laboratories, libraries, dining halls, dormitories, movie theatre, conference hall, post office, clinics, pharmacy, and various shops. The university campus includes 12 training halls, 2 swimming pools, baseball and football stadiums, tennis courts and other sport facilities. The university closely cooperates with the leading international organizations including UNESCO and The World Bank.

The University is a member of various international associations and has concluded more than 350 exchange, research and cooperation agreements with universities on all continents. Moscow State University is also the centre of cooperation between the universities of the former USSR. The Rector, Prof. V.A. Sadovnichy, is the President of the Eurasian Association of Universities. Many outstanding scholars, public and state leaders of the world have been elected Honourary Professors and Doctors of the University. Among them are J. Goethe, the beloved German thinker

and novelist, the first prime-minister of India Jawaharlal Nehru, Margarete Thatcher, Bill Clinton.

Moscow State University provides a wide range of educational services and educational programmes. It has established modern educational programmes in all basic areas of research and education. The educational system of the University is designed to give a student deep understanding of fundamental disciplines combined with specialization in the applied and concrete scientific problems.

Almost all programmes at the University are delivered in the Russian language. However, some graduate and training programmes are conducted in foreign languages. Courses of different type and duration, pre-university programmes, various specialized courses including teachers' and researchers' qualification advancement studies as well as courses of the Russian language, history and culture are open for international students.

Notes on the text

to host – зѡ. принимать

alumnus (pl. *alumni*) – (лат.) бывший питомец, выпускник университета или колледжа



TEXT AND VOCABULARY EXERCISES

37. Find in the text the words or phrases which mean the same as:

- | | |
|-------------------------|-----------------------------|
| ▪ по инициативе | ▪ день студента |
| ▪ достижения | ▪ аспирантура |
| ▪ всемирное признание | ▪ сотрудничество |
| ▪ благоприятные условия | ▪ международные организации |

38. Choose the correct word from text 1D to complete the sentences:

1. Moscow State University is the oldest and the most ___ university of Russia.
2. Moscow University was founded on ___ of January.
3. Moscow State University nowadays offers ___ in 27 faculties.
4. A number of its graduates and professors became ___ winners.
5. The University is the ___ national educational establishment.
6. The University teachers and professors are highly ___ and world recognized for their achievements in modern science.
7. The main building of the University is world famous for its exceptional ___ and size.

8. The University closely ____ with the leading international organizations including UNESCO and the World Bank.

9. Moscow State University provides a wide range of ____ services and programmes.

39. Fill in the gaps with the words from the box:

recognized	long-standing	offers	celebrated	decree
------------	---------------	--------	------------	--------

Moscow University was founded on 12 (25)th of January 1755 on Saint Tatiana's Day at the **1** ____ of the Empress Elizaveta and on the initiative of the great Russian scientist Mikhail Lomonosov. The day of Moscow University's foundation is **2** ____ as the Student's Day in Russia. Started with three faculties in 1755, Moscow State University nowadays **3** ____ education in 27 faculties and research training in a number of institutes. The University has a **4** ____ tradition of academic excellence. Moscow State University is internationally **5** ____ and ranked among the top-ten in the world.

Check your answers on p. 279.

40. Match each word in A with the Russian equivalent in B:

- | A | B |
|------------------|--------------------------|
| 1. initiative | a. исследование |
| 2. to celebrate | b. бывшие выпускники |
| 3. excellence | c. мыслитель |
| 4. establishment | d. обеспечивать |
| 5. to supply | e. учреждение |
| 6. thinker | f. выдающееся мастерство |
| 7. alumni | g. праздновать |
| 8. research | h. инициатива |

41. Read the following text and give it a suitable title to it:

Since 1953, most of the faculties have been situated on Sparrow Hills, in the southwest of Moscow. The Main building was designed by architect Lev Vladimirovich Rudnev. In the post-war era, Stalin ordered seven huge tiered neoclassic towers built around the city.

The MSU Main building is by far the largest of these. It was also the tallest building in the world outside of New York City at the time of its construction, and it remained the tallest building in Europe until 1988. The central tower is 240 m tall, 36-stories high, and flanked by four huge wings

of student and faculty accommodations. It is said to contain a total of 33 kilometers of corridors and 5,000 rooms.

Facilities available inside the building include a concert hall, a theatre, a museum, various administration services, a library, a swimming pool, a police station, a post office, a laundry, a hairdresser's salon, a canteen, bank offices, shops, cafeterias, a bomb shelter, etc. Along with the university administration, four of the main faculties – the Faculty of Mechanics and Mathematics, the Faculty of Geology, the Faculty of Geography, and the Faculty of Fine and Performing Arts – now remain in the Main building. The star on the top of the tower is large enough to include a small room and a viewing platform; it weighs 12 tons.

The building's facades are ornamented with giant clocks, barometers, and thermometers, statues, carved wheat sheaves, and Soviet crests (recently renovated). It stands before a terrace featuring statues of male and female students gazing optimistically and confidently into the future.

While the Sparrow Hills were on the outskirts of the city at the time of the construction of the Main building, they are now about halfway from the Kremlin to the city limits. Several other buildings and sports facilities were later added to the city campus, including the only baseball stadium in Russia.

Currently, a new building is under construction for the social sciences faculties, and a vast new facility has just been built for the library, which is the second largest in Russia by volume (number of books). The university also has several dormitory buildings in the southwest of Moscow outside the campus.

42. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about Russian universities – Tomsk State University (Text 4) and South-Russia State Technical University (Text 5). Be ready to discuss the information you have read.

CONVERSATIONAL PRACTICE

43. Speak about the education in Russia using Active Vocabulary and the expressions below:

- | | |
|--|---|
| ▪ I think we should ... | ▪ It would be better to ... |
| ▪ I (don't) agree | ▪ I like .../ I quite like .../ I really like ... |
| ▪ I (don't) think it's a good idea to ... | ▪ It is important to ... |
| ... | |
| ▪ A good way to ... is to ... /The best way to ... is to ... | ▪ I don't mind ... |

WRITING PRACTICE



44. Read the following text carefully in order to discover the main line of thought and make a plan for writing a summary:

Higher educational establishments are headed by rectors. Prorectors are in charge of academic and scientific work. An institute or a university has a number of faculties, each specializing in a certain field of study. Faculties have specialized councils which confer candidate and doctoral degrees.

The system of secondary and higher education in Russia is going through a transitional period now. The main objectives of the reform are: to decentralize the higher education system, to develop a new financial mechanism, to give more academic freedoms to faculties and students. All secondary schools, institutes, universities and academies until recently have been funded by the state. Now there is quite a number of private – fee-paying primary and secondary schools, nearly all universities have fee-paying departments.

UNIT 2

Pre-Text Exercises

Word Building

Active Vocabulary

Text 2 A. *Higher Education in Great Britain*

Text 2 B. *Entrance Procedures*

Text 2 C. *Higher Education in the USA*

Text 2 D. *Post-Secondary Education in the United States*

Text and Vocabulary Exercises

Conversational Practice

Writing Practice

PRE-TEXT EXERCISES

1. Look at the following international words, guess their meaning and check the pronunciation:

College, music, autonomous, act, Parliament, result, separate, polytechnics, status, academic, faculty, department, qualification, historical, style, business, administration, combination, modern.

2. Fill in the gaps with these prepositions: *at, for, of, to*:

1. Sheryl is brilliant ___ history but she's hopeless ___ geography.
2. Bill is tired ___ people complaining all the time.
3. Olivia is allergic ___ milk and shellfish.
4. Derek is partly responsible ___ the collapse of the company.
5. Most people are aware ___ the risks of smoking.
6. Victoria is married ___ a hugely successful football player.
7. Barcelona is famous, among other things, ___ its outstanding architecture.
8. Polly is terrified ___ mice.
9. Ashley is extremely proud ___ her students' rapid progress.
10. Steve's not very good ___ remembering people's names.
11. Some newspapers are highly critical ___ the country's new prime minister.
12. The locals are opposed ___ the building of a new terminal at the airport.

3. Here are some expressions with the preposition *at*. Translate and learn them:

- | | | |
|-----------------|----------------|--------------------|
| ▪ at the age of | ▪ at all | ▪ at the beginning |
| ▪ at the end | ▪ at all costs | ▪ at work |

- | | | |
|-----------------|------------------|----------------------|
| ▪ at first | ▪ at home | ▪ at last |
| ▪ at least | ▪ at a loss | ▪ to shout at |
| ▪ to be good at | ▪ to knock at | ▪ to laugh at |
| ▪ to throw at | ▪ to work at | ▪ to be surprised at |
| ▪ at night | ▪ at once | ▪ at will |
| ▪ at war | ▪ at first sight | |

4. Fill in the gaps with the preposition *at* or the expressions given above in the appropriate form:

- Howard started ____ and reached the mountains late
- They had the same books ____ that is why they refused to buy them.
- The boy ____ a stone ____ the crow and it flew away.
- They have been ____ this problem for a year.
- She understood it ____ and frowned.
- Larry never ____ his children and they respect him very much.
- I did not recognize you ____
- We need ____ three more days to finish this work.
- My uncle said they had to do it ____
- They always ____ his jokes.
- Mankind is ____ the size of Egyptian pyramids.
- Liz is ____ geography and ____ physics.
- Pakistan was ____ with India some decades ago.
- My mother always gets up ____ and does a lot of house work.
- Hilbert was driving his Mercedes ____ 160 kilometers and we were scared.
- Thomas was ____ in Russia for three years.
- Sonia is a very naughty girl but ____ she is very kind-hearted.
- At this time of the day dad is ____ .

5. Fill in the gaps with the correct word to complete the sentences:

- American technical education ____ well known for its wide relevance to employment.
 ▪ *is* ▪ *are* ▪ *were* ▪ *had been*
- It was a good idea of ____ to go swimming this afternoon.
 ▪ *you* ▪ *yours* ▪ *your* ▪ *yourself*
- This building was built ____ people who lived a long time ago.
 ▪ *of* ▪ *after* ▪ *by* ▪ *with*
- Begin with a minute ____ two of small talk.
 ▪ *and* ▪ *or* ▪ *if* ▪ *but*

6. Explain the meaning of the following words and phrases in English:

Autonomous institutions; postgraduate qualifications; entry requirements; government support of education; professional work experience.

7. BRAINSTORMING: What is your understanding of the words below? Give examples.

- a Royal Charter
- non-university higher education institutions
- university status
- Oxford, Cambridge

WORD BUILDING

8. Translate the following derivative words:

noun + -ous, -ious, -eous → adjective

autonomy – autonomous; prestige – prestigious; right – righteous; religion – religious; glory – glorious; ambition – ambitious; fame – famous; industry – industrious; victory – victorious.

verb + -er/-or → noun

to provide – provider; to educate – educator; to separate – separator; to examine – examiner; to teach – teacher; to demonstrate – demonstrator; to administrate – administrator; to write – writer; to investigate – investigator; to govern – governor.

verb + -tion, -ion, -ation → noun

to educate – education, to compete – competition, to combine – combination, to separate – separation, to administer – administration.

9. Form verbs using prefixes *-re;* *-dis*:

Example: to write – to rewrite; to appear – to disappear

A. to build, to train, to paint, to tell, to use, to construct, to act

B. to approve, to like, to trust, to cover, to agree, to believe

10. Translate the following words analyzing their word-formation model:

Purify, metabolize, maximize, minimize, optimize, sanitize

Now form verbs from the following words using suffixes *-ify,* *-ize*. Translate them into Russian:

Simple, special, real, synthesis, solid

ACTIVE VOCABULARY

11. Read and memorize the following words and word combinations:

to abolish – отменять, упразднить	to examine – рассматривать
as a result – в результате	local university – местный университет
authorities – власть, администрация	merger – объединение
autonomous – автономный	obvious – явный, очевидный
to award – присуждать что-л.; награждать чем-л.	postgraduate course – аспирантура
to be available – быть доступным	to provide – обеспечивать
to validate – придавать юридическую силу, подтверждать	qualification – квалификация
binary – двойной	to subdivide – подразделить
to confer a degree – присуждать степень	university status – университетский статус
to empower – уполномочивать, разрешать	

12. Read and translate the text below to learn about the system of higher education in Great Britain:

Text 2 A

Higher Education in Great Britain

Higher education in Great Britain is provided by three main types of institutions: universities, colleges and institutions of higher education, and art and music colleges. All universities are autonomous institutions, particularly in matters relating to courses. They are empowered by a Royal Charter or an Act of Parliament. As a result of the Further and Higher Education Act of 1992, the binary line separating universities and polytechnics was abolished and polytechnics were given university status (i.e., the right to award their own degrees) and took university titles. The Council for National Academic Awards was abolished, leaving most institutions to confer their own degrees. Most universities are divided into faculties which may be subdivided into departments. Universities in the UK examine matters of concern to all universities. Many colleges and institutions of higher education are the result of mergers of teacher training colleges and other colleges.

Non-university higher education institutions also provide degree courses, various non-degree courses and postgraduate qualifications. Some may offer Higher Degrees and other qualifications offered by most non-university higher education institutions which are validated by external bodies such as a local university or the Open University. An institution can

also apply for the authority to award its own degrees but it must be able to demonstrate a good record of running degree courses validated by other universities. A degree from any one British university or institution of higher education is considered to be academically equivalent to a degree from any other British university or institution of higher education. However, certain British universities carry, for historical reasons, extra prestige. Oxford and Cambridge are obvious examples, and competition for entry to these universities is great. Some British degrees are one-subject in style, e.g. BSc in Chemistry, but many dual-subject degrees and, increasingly, special combinations such as sciences or business administration with a modern language are offered. An increasing number of degrees involving study in Britain and another EU country are now available.



TEXT AND VOCABULARY EXERCISES

13. Find in the text the words or phrases which mean the same as:

- | | |
|-------------------------------|--|
| ▪ высшее образование | ▪ степень по одному предмету |
| ▪ политехническое образование | ▪ придавать юридическую силу, подтверждать |
| ▪ квалификация | ▪ получить статус университета |
| ▪ степень | ▪ конкурс при поступлении |
| ▪ автономный | ▪ считаться |

14. Find in the text the synonyms to the following words:

- | | | | |
|--------------|--------------|---------------|-----------|
| ▪ kinds | ▪ associated | ▪ to classify | ▪ confirm |
| ▪ to show | ▪ contest | ▪ pattern | ▪ plain |
| ▪ accessible | ▪ to satisfy | ▪ consequence | ▪ growing |

15. Find in the text the antonyms to the following words:

- | | | | |
|--------------|-------------|----------------|----------------|
| ▪ to combine | ▪ to adopt | ▪ to take away | ▪ old |
| ▪ bad | ▪ uncertain | ▪ small | ▪ decreasingly |

16. Find the equivalents to the words in *italics* on the left:

- | | | | |
|-----------------------|---------------|-----------------|-----------------|
| 1. <i>to abolish</i> | a. to destroy | b. to arise | c. to originate |
| 2. <i>to award</i> | a. to collect | b. give | c. to take |
| 3. <i>to empower</i> | a. to order | b. to authorize | c. to command |
| 4. <i>to confer</i> | a. to grant | b. to select | c. to choose |
| 5. <i>obvious</i> | a. implicit | b. evident | c. obscure |
| 6. <i>competition</i> | a. course | b. conformation | c. contest |

17. Choose among the words in parentheses the one that corresponds to the text above to complete the sentences:

1. All universities are ____ institutions.
(a. *autonomous*, b. *state*, c. *private*)
2. According to the Act of 1992 the binary line was abolished and polytechnics were given university ____.
(a. *agreement*, b. *status*, c. *recommendation*)
3. Most Universities ____ into faculties which may be subdivided into departments.
(a. *are divided*, b. *are called*, c. *are interested*)
4. Non-university higher education institutions also provide degree ____, various non-degree courses and postgraduate qualifications.
(a. *programmes*, b. *curriculum*, c. *courses*)
5. A degree from any British university or institution of ____ is considered to be academically equivalent to a degree from any other British university or institution of higher education.
(a. *primary school*, b. *higher education*, c. *postgraduate course*)
6. Competition for entry to Oxford and Cambridge is ____.
(a. *great*, b. *big*, c. *large*)
7. An increasing number of degrees involving study in Britain and another EU country ____ now ____.
(a. *are*, b. *have*, c. *is available*)

18. Read Text 2A once more. In pairs, discuss the statements below. Say what you think about them and ask your partner if he/she agrees or disagrees with you. Use the following phrases to help you:

<i>Agreeing</i>	<i>Disagreeing politely</i>
I agree with you.	Yes, but don't you think...?
Yes, that is what I think too.	True, but I think...
You are right!	I see what you mean, but...

1. Higher education in Great Britain is provided by many types of institutions.
2. All the universities are autonomous institutions and they are empowered by a Royal Charter or an Act of Parliament.
3. As a result of the Further and Higher Education Act of 1892, the binary line separating universities and polytechnics was abolished and polytechnics were given university status.
4. Many colleges and institutions of higher education are the result of mergers of teacher training colleges and other colleges.
5. Non-university higher education institutions can not provide degree courses and postgraduate qualifications.

6. Higher Degrees and other qualifications are validated only by internal bodies of universities.

7. A degree from any one British university or institution of higher education is considered to be academically equivalent to a degree from any British university or institution of higher education.

8. Oxford and Cambridge are obvious examples of extra prestige and competition for entry to these universities is great.

9. All British degrees are one-subject in style, e.g. BSc in Chemistry.

19. Fill in the gaps with the words from the box:

colleges	competitive	term time	pay for	receive grants
degree courses	Bachelor of Arts or Sciences	University status		
graduating from	polytechnics	are divided		

Britain's Universities

There are about 90 universities in Britain which **1** ____ into three types: the old universities (Oxford, Cambridge and Edinburgh Universities), the 19th century universities such as London and Manchester Universities and the new ones. Some years ago there were also **2** ____.

After **3** ____ a polytechnics a student got a degree, but this was not a university degree. Thirty one former polytechnics were given **4** ____ in 1992. Full courses of study offer the degree of **5** _____. Most **6** ____ at universities last three years, language courses 4 years (including a year spent abroad), medicine and dentistry courses are longer (5–7 years).

Students may **7** ____ from their Local Education Authority. These grants will help the students **8** ____ their books, accommodation, transport and food. Students do not usually have a job during **9** ____, but now they have to work in the evenings. The exams are highly **10** _____. There are not only universities in Britain but also **11** _____.

Check your answers on p. 279.

20. Work in pairs, think of some questions to review the contents of Text 2A and ask each other. Use the word combinations below:

- | | |
|-------------------------------|--|
| ▪ education is provided | ▪ to be academically equivalent to a degree from ... |
| ▪ to be available | ▪ competition for entry |
| ▪ to confer degrees | ▪ universities and polytechnics |
| ▪ postgraduate qualifications | ▪ running degree courses |

21. Read the following text to find answers to the given questions:

Text 2 B Entrance Procedures

1. *How and where can a bachelor's degree (BA, BSc, etc.) be obtained?*
2. *How long do degree courses last?*
3. *What are typical entry requirements for university courses and for other institutions of higher education?*
4. *What are the functions of Universities and College Admissions Service?*
5. *How many institutions of higher education can students apply for?*
6. *Why is an academic/character reference from schools very important?*
7. *When will a university or institution send an offer of a place?*
8. *How many offers are applicants allowed to accept?*
9. *When will the final decision concerning a student and university be taken?*

A bachelor's degree (BA, BSc, etc.) can be obtained by a minimum of three year's study at one of the more than 200 universities or institutions of higher education in the UK offering degree courses. Some degree courses last four years, the extra year being spent in practical training, as in many 'sandwich' degrees such as engineering, or as a year abroad if studying a modern language.

Only about the top 7% of the age cohort in the UK studies for a degree; consequently entry to universities or similar institutions is highly competitive. Typical entry requirements would be at least 3 C grades at A Level for university courses and perhaps three D grades for entry to other institutions of higher education. In the third term of Year 12 students prepare their applications to university. Applications are then made in the first term of the Year 13 through one centralized organization known as UCAS*.

The applications are made on a UCAS form, electronically through the EAS*. Students can apply to a maximum of six universities/institutions. As well as the student's personal details and a paragraph on their extra-curricular interests, the UCAS form will carry details of their (I)GCSE grades so far and an academic/character reference from the school which will include a prediction of the grades that the applicant is likely to obtain at A Level. It is therefore vital that students impress upon their teachers the quality of their work throughout the entire sixth form course and that they do not think of Year 12 as an 'easy' year.

If a university or institution is impressed by the student's UCAS form, they will send an offer of a place conditional upon obtaining certain stated A Level grades. Applicants are allowed to provisionally accept and hold a maximum of two offers.

The final decision on which institution the student will actually attend will be taken when the A Level results are published in mid-August. Degree courses start in late September or early October.

Notes on the text

*UCAS – Universities and Colleges Admissions Service

*EAS – Electronic Applications Systems.



TEXT AND VOCABULARY EXERCISES

22. Find in the text the words or phrases which mean the same as:

- | | |
|----------------------------|----------------------------|
| ▪ степень бакалавра | ▪ получить степень |
| ▪ трехлетний срок обучения | ▪ политехнический институт |
| ▪ сдавать экзамены | ▪ курс, заканчивающийся |
| продвинутого уровня | присвоением степени |
| ▪ продолжаться, длиться | ▪ конкурсный (об экзамене) |

23. Make up situations using the English equivalents of the words given above.

24. Translate into Russian the following words and word combinations:

A bachelor's degree, to be obtained, practical training, to be highly competitive, entry requirements, applications, extra-curricular interests, the quality of their work.

25. Work in pairs and decide whether these statements are true or false:

1. A Bachelor's degree (BA, BSc, etc.) can be obtained by a minimum of two year's study.

2. Some degree courses last four years, the extra year being spent in practical training.

3. Only about the top 17 per cent of the age-cohort in the UK studies for a degree.

4. Entry to universities or similar institutions is not competitive at all.

5. Typical entry requirements would be at least 3 C grades at A level for university courses and perhaps three D grades for entry to other institutions of higher education.

6. Students can apply to a maximum of 2 universities.

7. It is vital to think of year 12 as an 'easy' year.

8. Degree courses start in late September or early October.

26. Find in the text situations in which the following word combinations are used:

A bachelor's degree; three year's study; degree courses; to study for a degree; highly competitive; one centralized organization known as UCAS; the final decision.

27. Read the text and give its brief summary:

Text 2 C
Higher Education in the USA

Education in the United States is provided mainly by the government, with control and funding coming from all three levels: federal, state, and local. Curricula, funding, teaching, and other policies are set through locally elected boards with jurisdiction over university districts. University districts can be coextensive with counties or municipalities. Educational standards and standardized testing decisions are usually made by the U.S. states through acts of the state legislature and governor, and decisions of the state departments of education.

In the United States, students begin higher education after completing 12 years of primary and secondary school. Institutions of higher education include two-year colleges (known as community or junior colleges), four-year colleges, universities, institutes of technology, vocational and technical schools, and professional schools such as law and medical schools. Higher education is available in public (government support) and private (no government support) institutions, institutions affiliated with religious groups, and profit-making institutions. Some excellent colleges enroll fewer than a thousand students; some large universities enroll 50,000 or more students.

Generally, at the high school level, the students take a broad variety of classes without special emphasis. The curriculum varies widely in quality and rigidity; for example, some states consider 70 (on a 100 point scale) to be a passing grade while others consider it to be 75 and others 60. The following are the typical minimum course sequences that one must take in order to obtain a high school diploma; they are not indicative of the necessary minimum courses or course rigor required for attending college in the United States: 1. Science (biology, chemistry, and physics); 2. Mathematics; 3. English (four years); 4. Social Science (various history, government, and economics courses, always including American history); 5. Physical education (at least one year).

High schools offer a wide variety of elective courses, although the availability of such courses depends upon each particular school's financial situation. Common types of electives include: 1. Visual arts (drawing,

sculpture, painting, photography); 2. Performing Arts (drama, band, orchestra, dance); 3. Shop (woodworking, metalworking, automobile repair); 4. Computers (word processing, programming, graphic design); 5. Athletics; 6. Publishing (journalism, yearbook); 7. Foreign Languages (French, German, and Spanish are common; Chinese, Latin, Greek and Japanese are less common).

Many students in high schools participate in extracurricular activities. These activities can extend to large amounts of time outside the normal school day; home schooled students, however, are not normally allowed to participate. Student participation in sports programmes, drill teams, bands, and spirit groups can amount to hours of practices and performances.

Most states have organizations which develop rules for competition between groups. These organizations are usually forced to implement time limits on hours practised as a prerequisite for participation.



TEXT AND VOCABULARY EXERCISES

28. Find in the text the words or phrases which mean the same as:

- | | |
|--|-----------------------------------|
| ■ фонды; денежные средства | ■ избранное правление; совет |
| ■ округ | ■ училище |
| ■ техническое училище | ■ принимать (вносить в списки) |
| ■ факультативная дисциплина в колледже | ■ профессиональные интересы; дела |

29. Find in the text the right word to complete the sentences:

1. Education in the United States is provided mainly by the ____, with control and funding coming from federal, state, and local levels.

2. Educational standards and standardized testing decisions are ____ by the US states.

3. Institutions of higher education ____ two-year colleges, four-year colleges, universities, institutes of technology, vocational and technical schools and other schools.

4. Generally, at the high school level, the students take ____ variety of classes.

5. Some states consider ____ to be a passing grade.

6. High schools offer a wide variety of ____ courses.

7. Many students in high schools ____ in extracurricular activities.

8. These activities can be ____ to large amounts of time outside the normal school day.

30. Fill in the gaps with the words from the box:

provide	size	universities	college	educational
---------	------	--------------	---------	-------------

The university in the United States is an **1** ____ institution comprising a college of liberal arts and sciences, a professional school leading to a professional degree and a graduate college (school). A graduate **2** ____ provides programmes for study and research beyond the levels of the bachelor's and first professional degree. In addition to colleges and **3** ____ there is in the United States a large number of professional schools. They **4** ____ preparation in one or more professional fields. The colleges in the United States differ greatly in **5** ____.

Check your answers on p. 279.

31. Match each word in A with the Russian equivalent in B:

- | A | B |
|-----------------------------|------------------------------|
| 1. higher education | a. строгость, жесткость |
| 2. an educational programme | b. качество |
| 3. a professional school | c. издательское дело |
| 4. elective courses | d. принимать участие |
| 5. to participate | e. факультативы |
| 6. publishing | f. профессиональный колледж |
| 7. quality | g. образовательная программа |
| 8. rigidity | h. высшее образование |

32. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about Harvard – the most famous American university (Text 6). Be ready to discuss the information you have read.

33. Read and translate the text below to learn about education in the United States:

Text 2 D

Post-Secondary Education in the United States

Post-secondary education in the United States is known as college or university and commonly consists of four years of study at an institution of higher learning. Students traditionally apply to receive admission into college, with varying difficulties of entrance. Schools differ in their competitiveness and reputation; generally, public schools are viewed as more lenient and less prestigious than the more expensive private schools. Admissions criteria involve test scores (like the SAT and ACT) and class ranking as well as extracurricular activities performed prior to the application date. Also, many colleges consider the rigor of previous

courses taken along with the grades earned. Certain test scores, class rank, or other numerical factors hardly ever have absolute, required levels, but often have a threshold below which admission is unlikely.

Once admitted, students engage in undergraduate study, which consists of satisfying university and class requirements to achieve a bachelor's degree. The most common method consists of four years of study leading to a Bachelor of Arts (BA), a Bachelor of Science (BS) degree, or sometimes (but very rarely) another bachelor's degree such as Bachelor of Fine Arts (BFA). Some students choose to attend a "community college" for two years prior to further study at another college or university. A community college is run by the local municipality, usually the county. Though rarely handing out actual degrees, community colleges may award an Associate of Arts (AA) degree after two years. Those seeking to continue their education may transfer to a four-year college or university. Some community colleges have automatic enrollment agreements with a local four-year college, where the community college provides the first two years of study and the university provides the remaining years of study, sometimes all on one campus. The community college awards the associate's degree and the university awards the bachelor's and master's degrees.

Graduate study, conducted after obtaining an initial degree and sometimes after several years of professional work, leads to a more advanced degree such as a Master's Degree (MA), Master of Science (MS), or other less common master's degrees such as Master of Business Administration (MBA), Master of Education (MEd), and Master of Fine Arts (MFA). After additional years of study and sometimes in conjunction with the completion of a master's degree, students may earn a Doctor of Philosophy (Ph.D.) or other doctoral degree, such as Doctor of Arts, Doctor of Education or Doctor of Theology. Some programmes, such as medicine, have formal apprenticeship procedures like residency and internship which must be completed after graduation and before one is considered to be fully trained. Other professional programmes like law and business have no formal apprenticeship requirements after graduation (although law school graduates must take the bar exam in order to legally practice law). Entrance into graduate programmes usually depends upon a student's undergraduate academic performance or professional experience as well as their score on a standardized entrance exam like the GRE (graduate schools in general), the LSAT (law), the GMAT (business), or the MCAT (medicine). Many graduate and law schools do not require experience after earning a bachelor's degree to enter their programmes; however, business school candidates may be considered deficient without several years of professional work experience. Only 8.9% of students ever receive postgraduate degrees and most, after obtaining their bachelor's degree, proceed directly into the work force.

TEXT AND VOCABULARY EXERCISES



34. Find in the text the words or phrases which mean the same as:

- | | |
|---------------------------|----------------------|
| ▪ высшее образование | ▪ приводить к... |
| ▪ мягкий, снисходительный | ▪ порог |
| ▪ соответствовать | ▪ присуждать степень |
- требованиям
- | | |
|-------------------------------|--------------------------|
| ▪ подавать заявление о приеме | ▪ программы для обучения |
|-------------------------------|--------------------------|
- в учебное заведение аспирантов

35. Match each word in A with the Russian equivalent in B:

- | A | B |
|-----------------------------------|---------------------------------------|
| 1. admission | a. аспирант |
| 2. competitiveness | b. продвинутый, успевающий |
| 3. expensive | c. учение, прохождение обучения |
| 4. test scores | d. привести к ... |
| 5. a programme for undergraduates | e. муниципалитет (местное управление) |
| 6. local municipality | f. количество набранных баллов |
| 7. to lead to | g. программа для студентов |
| 8. advanced | h. дорогой |
| 9. apprenticeship | i. конкурентность |
| 10. postgraduate | j. прием, допуск |

36. Find in the text the right word to complete the sentences:

1. ____ education in the United States is known as college or university.
2. Schools ____ in their competitiveness and reputation.
3. Once admitted, students engage in undergraduate study, which consists of satisfying university and class requirements to achieve a ____ degree.
4. The ____ college awards the associate's degree.
5. Graduate ____ leads to a more advanced degree such as a Master Degree (MD).

CONVERSATIONAL PRACTICE

37. Speak about English and American systems of education using the Active Vocabulary and the expressions below:

- | | |
|--|--------------------------------|
| ▪ I think we should ... | ▪ It would be better to ... |
| ▪ I (don't) agree | ▪ I like .../ I quite like ... |
| ▪ I (don't) think it's a good idea to ... | ▪ It is important to ... |
| ▪ A good way to ... is to ... /The best way to ... is to ... | ▪ I don't mind ... |

38. Read and act out the conversation:

Talking about Classes

Ann: What is the matter, Bob? You look worried and upset.

Bob: I am worried. I have an exam next period in my mathematics class, and I am afraid it is going to be hard.

Ann: Who is your professor?

Bob: Mr. Smith.

Ann: That is too bad. I had him last year and he failed one third of the class. I'd be worried too, if I were you.

Bob: Thanks for the good news. Say, did he have you write any papers?

Ann: And how! I had to write a term paper and two reports.

Bob: Well, we have to write two papers and three book reports.

Ann: In that case, I am glad I took the class last year.

Bob: Oh, oh! There goes the bell, and I am late.

39. Answer the following questions:

1. What is the matter with Bob?
2. Did Ann write any term papers?
3. Did her professor make her work hard?
4. Do you think Ann and Bob are going to be mathematicians? Why?

Let's talk about you:

1. Are you thinking about your English test or have you already taken it?
2. Are you working on your paper or have you already written it?
3. Does your professor make you work hard?
4. Would you like to be an engineer (teacher, economist, etc.)?

WRITING PRACTICE



40. Read the article below about distance education; decide what the missing word might be in each case. None of the missing words are more than four letters long. Most of them are articles (a, an, the) or prepositions (in, at, on, etc.).

Distance Education: University Level

Not so long ago, getting ___ college degree meant enrolling in a three or four year programme and heading off ___ campus every day. Now, with the proliferation ___ correspondence and on-line courses, getting a degree might appear to be easier than ever.

Distance learning or education is completing a curriculum of studies without being present ___ a class room. The quality of education ___ often equal ___ or better than that ___ a class room since most individuals who choose distance learning to obtain their education are more self motivated and every bit as conscientious about their education as their counterpart ___ the class room.

Due to today's technology, made ___ part ___ the internet, more people than ever before are choosing distance learning over traditional class room settings as ___ vehicle of choice to obtain their education. Convenience, cost of travel and other costs associated with a more traditional setting and busy schedules are just some of ___ reasons more students are studying for ___ degree through distance education institutions. After all, consider the commuting time to and ___ a campus and the delays between classes. Wouldn't your time be better spent ___ studies or leisure time.

Distance degree programmes are delivered using videotape, DVD's or VCD's, others are delivered entirely online, and some use ___ combination of media. Some degree programmes require you to attend ___ few classes a year ___ the university ___ question. Despite the obvious advantages ___ studying for a degree online, it is important to choose ___ University to study at ___ great care.

UNIT 3

Pre-Text Exercises

Word Building

Active Vocabulary

Text 3 A. *The History of Russia*

Text 3 B. *Geography of Russia*

Text 3 C. *Modern Russia's Economy and Industries*

Text 3 D. *Moscow*

Text and Vocabulary Exercises

Conversational Practice

Writing Practice

PRE-TEXT EXERCISES

1. Look at the following international words, guess their meaning and check the pronunciation:

Civilization, territory, monarch, economic, political, system, social, geographic, modern, nationality, continental, zone, climate, nation, industry, electric, medical, instrument, financial, crisis, international, natural, problem, investor, corruption, administrative, federation, president, vandalism, association, elegant.

2. Here are some expressions with the preposition *by*. Translate and learn them:

to divide by

to increase by

to judge by

day by day

one by one

by chance (accident)

to mean by

by heart

by mistake

by name

by profession

by surprise

by the way

by train (plane, bus...)

step by step

3. Fill in the gaps with the preposition *by* or the expressions above in the appropriate form:

1. They arrived in time and entered the ball room ____ .
2. We met ____ yesterday and went to the concert.
3. I do not like to learn ____ but I must learn a lot.
4. He called the boy ____ and gave him his documents.
5. What is she ____? Oh, she is an engineer.
6. We went there ____ and saw a lot out of the window of the carriage.
7. He led her slowly ____ and looked into her eyes.

8. Ann took somebody's umbrella ____.
9. He had to visit the police ____.
10. She took her daughter ____ and led her to the car.
11. Can you ____ nine ____ three?
12. The rain caught her ____.
13. What do you ____ that?
14. We took their copy books ____.
15. Walter appeared in this town ____.
16. I prefer to travel ____ because I like to watch dolphins and sea-gulls.
17. Kevin tamed his lion cub quietly, slowly, ____.
18. What did he ____ that?
19. We never ____ people ____ appearances.
20. Mona is an architect ____.
21. ____ can you give me your umbrella? I have left mine.

4. Fill in the gaps with the prepositions of place: *at, in or on*:

1. What did you learn ____ the institute today?
2. We wanted to live and work ____ a farm.
3. We stopped ____ the traffic lights.
4. They built a new factory ____ the west of England.
5. There is nothing ____ my pocket.
6. There is nothing interesting ____ TV tonight.
7. There is an interesting picture ____ page seven.
8. There is a large black cloud ____ the sky.
9. Someone stopped ____ front of the house.
10. Someone stood ____ the door.
11. Peter sent me to buy some pills ____ the chemist's.
12. My sister does not like city life. She wants to go to live ____ the country.
13. My father was working ____ home when I got home.
14. Mount Everest is the highest mountain ____ the world.
15. He lived ____ the third floor.
16. He is not in the office. He is ____ a business trip.

5. Choose the correct word and fill in the gaps:

1. We were caught ____ the storm.
a) *in*; b) *on*; c) *by*; d) *at*; e) *with*.
2. We arrived ____ the station too early.
a) *in*; b) *on*; c) *by*; d) *at*; e) *with*.
3. The sofa is very convenient ____ me.
a) *in*; b) *on*; c) *by*; d) *for*; e) *to*.

4. It makes no difference ____ me.
a) *in*; b) *on*; c) *to*; d) *for*; e) *with*.
5. Game was always very cruel ____ his family.
a) *in*; b) *on*; c) *to*; d) *for*; e) *with*.
6. It is necessary ____ him to take this exam.
a) *to*; b) *in*; c) *on*; d) *for*; e) *with*.
7. Daniel was always laughing ____ me when we were children.
a) *on*; b) *at*; c) *in*; d) *with*; e) *for*.

6. Arrange the words to make affirmative sentences:

Example: like / I / you = I like you

1. English / I / speak
2. hates / pigeons / he
3. they / song / a / sing
4. sell / flowers / we
5. you / see / me / can
6. buy / milk / he / wants to
7. feed / you / my / cat / can
8. sister / has / my / got / a dog
9. must / the book / read / you

7. BRAINSTORMING: Read the paragraph below and then choose the main idea for it:

It was a backward day at school. The students had to do things backward. Some of them wore their T-shirts backward. They took a test before they studied the lesson! Dessert was served first instead of last. They tried to walk home backward, but they bumped into each other and fell down.

The main idea in this passage is:

- Dessert is supposed to come last.
- The students had a backward day.
- It is hard to do things backward.
- Students failed their tests.

8. Explain the meaning of the following phrases in English:

- racial group
- dominant position
- to exist as a state

WORD BUILDING

9. For each question choose one correct answer:

1. Which word doesn't make a derivative with *-able*? e.g. countable
a. *help* b. *understand* c. *rely* d. *respect*
2. Which of the following adjectives ending in *-ful* doesn't exist?
a. *painful* b. *beautiful* c. *funful* d. *fruitful*
3. The following are all negative adjectives with *un-*. Which should be *dis-*?
a. *untidy* b. *unhonest* c. *unsociable* d. *unreliable*
4. What is the opposite of contented?
a. *uncontented* b. *incontented* c. *imcontented* d. *discontented*

10. Find the derivatives to the words in italics on the left:

- | | | | | |
|--------------------|---------------|---------------|-----------------|------------|
| 1. <i>cruelty</i> | a) crew | b) raw | c) cruel | d) cry |
| 2. <i>safe</i> | a) save | b) sure | c) insure | d) safety |
| 3. <i>happy</i> | a) have | b) happen | c) happiness | d) certain |
| 4. <i>adopt</i> | a) adaptation | b) adoptive | c) alone | d) advance |
| 5. <i>read</i> | a) readings | b) law | c) remark | d) order |
| 6. <i>dense</i> | a) design | b) dependence | c) dependent | d) density |
| 7. <i>backward</i> | a) density | b) building | c) backwardness | d) break |

11. Think of more words with negative prefixes *mis-* and *dis-* to continue the list below:

behave – *mis*behave
count – *mis*count
agree – *dis*agree
like – *dis*like

calculate – *mis*calculate
handle – *mis*handle
approve – *dis*approve
please – *dis*please

Work in pairs to compose some phrases with your examples.

ACTIVE VOCABULARY

12. Read and memorize the following words:

to abolish – отменить

autocratic rule – диктаторское правление

backwardness – отсталость

challenge – (n) вызов, (v) бросать вызов

characteristic – характеристика

claim – требование; притязание

collapse – крушение, крах; провал

to come to rule – прийти к власти

consecutive – последовательный

continuity – непрерывность, неразрывность

cultivation – развитие, улучшение, культивация почв

to defend – защищать

to devastate – истощать, опустошать

direction – направление

elimination – устранение, удаление

establishment – образование, учреждение, создание

extractive industry – добывающая промышленность

to gain the independence – добиться независимости

government – правительство

to improve – улучшать

to inhabit – населять, обитать

to manufacture – производить

movement – движение

notable – известный; значительный, замечательный

to prevent – предотвращать

to sharpen – обострять, усиливать

unfavorable – неблагоприятный

vegetation – растительность

vulnerable – уязвимый; ранимый

to yield – уступать, приводить к чему-либо

13. Read the text to learn a brief history of Russia:

Text 3 A

The History of Russia



The history of Russia is a long and complex story. It all begins with that of the East Slavs, the racial group that eventually split into the Russians, Ukrainians, and Belarussians. The first East Slavic state, Kievan Rus, adopted Christianity from the Byzantine Empire in the 10th century, beginning the synthesis of Byzantine and Slavic cultures that defined Russian culture for the next seven centuries.

Kievan Rus ultimately collapsed as a state, leaving a number of states challenging for claims to be the heirs to its civilization and dominant position. After the 13th century, Muscovy gradually came to rule the former cultural center. In the 18th century, the principality of Muscovy became the huge Russian Empire, stretching from Poland eastward to the Pacific Ocean.

Development in the western direction sharpened Russia's alertness of its backwardness and devastated the isolation in which the initial stages of development had occurred. Consecutive establishments of the 19th century reacted to such pressures with a mixture of halfhearted improvement and domination. Russian serfdom was abolished in 1861, but its elimination was achieved on terms unfavorable to the peasants and served to increase revolutionary pressures. Between the elimination of serfdom and beginning of World War I in 1914, the Stolypin reforms, the constitution of 1906 and State Duma introduced notable changes in economy and politics of Russia, but the tsars were still not willing to yield autocratic rule.

Military defeat and food shortages triggered the Russian Revolution in 1917, bringing the Communist Bolsheviks to power. Between 1922 and 1991, the history of Russia is essentially the history of the Soviet Union, efficiently and ideologically based territory which was roughly coterminous with the Russian Empire, whose last monarch, Tsar Nicholas II, ruled until 1917.

From its first years, regime in the Soviet Union was based on the one-party rule of the communists, as the Bolsheviks called themselves beginning in March 1918. However, by the late 1980s, with the weaknesses of its economic and political structures becoming prominent, noteworthy changes in the economy and the party leaderships spelled the end of the Soviet Union.

The history of the Russian Federation is brief, dating back only to the collapse of the Soviet Union in late 1991. But Russia has existed as a state for over a thousand years, and during most of the 20th century Russia was the core of the Soviet Union. Since gaining its independence, Russia claimed to be the legal heir to the Soviet Union on the international stage. However, Russia lost its superpower status as it faced serious challenges in its efforts to forge a new post-Soviet political and economic system. Scrapping the socialist central planning and state ownership of property of the Soviet era, Russia attempted to build an economy with elements of market capitalism, with often painful results. Russia today shares much continuity of political culture and social structure with its tsarist and Soviet past.

Notes to the text

noteworthy – примечательный
serfdom – крепостное право

principality – княжество
halfhearted – равнодушный,
незаинтересованный



TEXT AND VOCABULARY EXERCISES

14. Find in the text the words or phrases which mean the same as:

- | | |
|----------------------------|---------------------------|
| ▪ долгая и сложная история | ▪ быть наследниками |
| ▪ доминирующая позиция | ▪ значительные изменения |
| ▪ военное поражение | ▪ нехватка продовольствия |
| ▪ базироваться на | ▪ статус супердержавы |
| ▪ рыночный капитализм | ▪ болезненные результаты |

15. Find in the text the synonyms to the following words:

- | | | |
|-------------------|---------------|---------------|
| ▪ difficult, hard | ▪ outstanding | ▪ intensify |
| ▪ solitude | ▪ to enlarge | ▪ sovereignty |
| ▪ lawful | ▪ to reach | ▪ remarkable |

16. Find in the text the antonyms to the following words:

- | | | |
|----------------|-----------------|---------------|
| ▪ finish, stop | ▪ deterioration | ▪ to decrease |
| ▪ strength | ▪ dependence | ▪ old |

17. Find the English equivalent for the following Russian words:

- | | | | |
|-------------------|---------------|-----------------|----------------|
| 1. защищать | a. to detect | b. to defend | c. to direct |
| 2. обострять | a. to shorten | b. to sharpen | c. to shelve |
| 3. улучшать | a. to improve | b. to impugn | c. to imprint |
| 4. устранение | a. elongation | b. illumination | c. elimination |
| 5. господствующий | a. dominant | b. domestic | c. domiciled |
| 6. существовать | a. to expose | b. to exist | c. to exile |

18. Read the above text once more. In pairs, discuss the statements below. Say what you think about them and ask your partner if he/she agrees or disagrees with you. Use the following phrases to help you:

<i>Agreeing</i>	<i>Disagreeing politely</i>
I agree with you.	Yes, but don't you think...?
Yes, that is what I think too.	True, but I think...
You are right!	I see what you mean, but...

1. The history of Russia is a long and complex story.
2. The first East Slavic state was Russian Federation.
3. Kievan Rus adopted Christianity from the Byzantine Empire in the 10th century.
4. Russian culture was the synthesis of Byzantine and Islamic cultures.

5. After the 20th century, Muscovy gradually came to rule the former cultural center.

6. Between the elimination of serfdom and beginning of World War I in 1914, the Stolypin reforms introduced notable changes in economy and politics of Russia.

7. By the late 1980s, with the weaknesses of its economic and political structures becoming prominent, noteworthy changes in the economy and the party leaderships spelled the end of the Soviet Union.

8. Russia lost its superpower status as it faced serious challenges in its efforts to forge a new post-Soviet political and economic system.

19. Choose among the words in parentheses the one that corresponds to Text 3A to complete the sentences:

1. The history of Russia is a long and ____ story.
(a. *complex*, b. *easy*, c. *ordinary*)
2. The first East Slavic state, Kievan Rus, adopted ____ from the Byzantine Empire in the 10th century.
(a. *heathenism*, b. *Christianity*, c. *Islam*)
3. Kievan Rus collapsed as a ____, leaving a number of states challenging for claims to be the heirs to its civilization and dominant position.
(a. *organization*, b. *city*, c. *state*)
4. In the 18th century, the principality of Muscovy became the huge Russian ____, stretching from Poland eastward to the Pacific Ocean.
(a. *Empire*, b. *Federation*, c. *Kingdom*)
5. Russian serfdom was ____ in 1861.
(a. *taken*, b. *abolished*, c. *adopted*)
6. Military defeat and food ____ triggered the Russian Revolution in 1917, bringing the Communist Bolsheviks to power.
(a. *plenty*, b. *shortages*, c. *sufficiency*)
7. Soviet Union was based on the ____ rule of the communists, as the Bolsheviks called themselves beginning in March 1918.
(a. *one-party*, b. *two-party*, c. *multi-party*)
8. The history of the Russian Federation is brief, dating back only to the ____ of the Soviet Union in late 1991.
(a. *destruction*, b. *collapse*, c. *failure*)

20. Retell the text according to the plan given below:

- 1) The ancient history of Russia.
- 2) The history of Russian Empire.
- 3) The history of Russian Revolution of 1917.
- 4) The modern history of the Russian Federation.

21. Work in pairs. Share your knowledge of Russian history using the plan above:

22. Translate into English:

1. Россия – страна с огромной территорией и многовековой сложной историей.
2. История современной России началась с распада Советского Союза.
3. Столица нашей страны – Москва, большой город с красивой старинной и современной архитектурой.
4. Каждый год множество туристов посещают Россию.

23. Read the text and give its brief summary:

Text 3 B
Geography of Russia

The modern Russian state is geographically isolated. It is enclosed, except in the West, by landlocked seas, deserts and mountains. The most impressive thing about the country is its tremendous size. It is the largest self-contained state in the world. It has the characteristics of a continent rather than a country with its nearly nine million square miles, covering almost a sixth of the earth surface. Some 230 million people live here, divided into 170 different nationalities.

There are 38,000 miles of land frontier, nine times that of the United States, bringing many different neighbors close to Russia. Starting in the Northwest there are the Finns, Poles, Czech, Hungarians, Rumanians, Turks, Iranians, Afghanistanis, Chinese, Mongolians and Koreans.

If we include narrow straits, then the Japanese and Americans are also Russia's neighbors. Russia is larger than all of North America, three times the size of the continental US, forty times the size of France and seventy times larger than the British Isles. It stretches halfway across the globe.

Except at the Polish border, mountains and seas guard the Russian segment of the plain. Inside this perimeter the monotony of the plain is broken only slightly by the Ural Mountains, a chain of low worn-down hills that do not prevent movement across. Most of the rivers in European Russia flow south, their western banks have steep hills. But these hills are nowhere more than 1000 feet high and therefore do not present a barrier. These geographic facts have made for easy movement of the population in this great basin, but they have also made the area extremely difficult to defend in time of war.

The Russian coastline is the longest in the world but it has limited utility since the coastal waters are frozen much of the year. No nation has been as bountifully supplied with rivers as Russia. They may provide a leisurely system of transportation but it is expensive, using boats and barges in the summer and skis and seas in the winter.

Four fifths of Russia lies in the temperate zone but much further north than any other great power. Russia's climate is continental, distinguished by extremes of heat and cold. Temperatures are generally lower and winters longer in Russia than in other places on the same latitudes because of the distance from the Atlantic and because the Scandinavian mountains deflect the warm air of the Gulf Stream.

The growing season is short in Russia: only two months of the year are free of frost in Northern Siberia, about 100 days in the northern half of European Russia and between four and six months in South Russia. The Russian farmer has to work hard to beat the autumn frost. There is little work outside in low temperatures because of the icy winds, and the few hours of daylight.

In a country where the climate varies from subtropical to arctic, there is a great variety of vegetation. Nearly 15% of Russia is tundra most of which is uninhabitable. Farther south you will find heather, blackberries, cranberries and a profusion of wild flowers. All few stunted birches, fir and willow grow in the southern tundra. Below the tundra is the taiga covered with spruce, pine, cedar and fir. These forests stretch from Arkhangelsk to the Sea of Okhotsk. Much of the taiga is marshy. South of the taiga is the zone of mixed forests, where coniferous and deciduous trees appear interspersed – oak, fir, elm, maple, ash, linden, lime, birch and hornbeam. Much of this forest has been cleared west of the Urals and is low under cultivation. Flax and rye are the staple crops here. A huge territory of two forest zones covers over half of all Russia.

Russia is one of the most richly endowed nations in the world in mineral wealth. But only recently has much of this been exploited or even discovered. Siberia is still a largely untapped reservoir of potential mineral riches. One fifth of the world's known coal deposits lies inside Russia which ranks second only to the US in the size of its reserves.

Over half of the world's oil reserves lies within the borders of the Soviet Union. There are also immense deposits of iron, copper, nickel, bauxite, zinc, lead, manganese, platinum, tin, mercury, antimony, radium, molybdenum, graphite, boron and other elements indispensable to modern industry.



TEXT AND VOCABULARY EXERCISES

24. Find in the text the words or phrases which mean the same as:

- | | |
|--|-------------------------------|
| ▪ впечатляющий | ▪ изолированный, отдельный |
| ▪ (сущ.) сосед, (гл.) граничить | ▪ защищать |
| ▪ обильно снабженный | ▪ система транспортировки |
| ▪ без препятствия | ▪ разнообразие растительности |
| ▪ непригодный для жилья | ▪ лиственные деревья |
| ▪ нефтяные запасы | ▪ огромные залежи, запасы |
| ▪ необходимый, важный для современной промышленности | |

25. Make up situations using the English equivalents of the words given above.

26. Work in pairs and decide whether these statements are true or false:

1. Russia is enclosed, except in the West, by landlocked seas, deserts and mountains.
2. The most impressive thing about the country is its tiny size.
3. Russia is smaller than North America which stretches halfway across the globe.
4. The Russian coastline is the longest in the world.
5. Four fifths of Russia lies in the temperate zone but much further north than any other great power.
6. Russia's climate is very mild and always warm.
7. In Russia, where the climate is very mild and always warm, there is no great variety of vegetation.
8. Russia is one of the most richly endowed nations in the world in mineral wealth.
9. Siberia is still a largely untapped reservoir of potential mineral riches.
10. There are no deposits of iron, copper or other elements indispensable to modern industry in Russia.

27. Find in the text the situations in which the following word combinations are used:

Geographically isolated state; the largest self-contained state in the world; different neighbors of Russia; bountifully supplied with rivers; variety of Russia's climate; a great variety of vegetation; mineral wealth; richly endowed nation

28. Read the text below to learn about the modern state of Russia's economy and industry:

Text 3 C

Modern Russia's Economy and Industries

Russia has a complete range of mining and extractive industries producing coal, oil, gas, chemicals, and metals; all forms of machine building from rolling mills to high-performance aircraft and space vehicles; defense industries including radar, missile production, and advanced electronic components, shipbuilding; road and rail transportation equipment; communications equipment; agricultural machinery, tractors, and construction equipment; electric power generating and transmitting equipment; medical and scientific instruments; consumer durables, textiles, foodstuffs, handicrafts.

Russia ended 2004 with its sixth straight year of growth, averaging 6.5 per cent annually since the financial crisis of 1998. Although high oil prices and a relatively cheap rouble are important drivers of this economic rebound, since 2000 investment and consumer-driven demand have played a noticeably increasing role. Real fixed capital investments have averaged gains greater than 10 per cent over the last five years, and real personal incomes have realized average increases over 12 per cent.

Russia has also improved its international financial position since the 1998 financial crisis, having paid off its foreign debt by 2007. Strong oil export earnings have allowed Russia to increase its foreign reserves from only \$12 billion to some \$120 billion at yearend 2004.

These achievements, along with a renewed government effort to advance structural reforms, have raised business and investor confidence in Russia's economic prospects. Nevertheless, serious problems persist. Economic growth slowed down in the second half of 2004 and the Russian government forecast growth of only 4.5 per cent to 6.2 per cent for 2005. Oil, natural gas, metals, and timber account for more than 80 per cent of exports, leaving the country vulnerable to swings in world prices.

Russia's manufacturing base is dilapidated and must be replaced or modernized if the country is to achieve broad-based economic growth. Other problems include a weak banking system, a poor business climate that discourages both domestic and foreign investors, corruption, and widespread lack of trust in institutions.



TEXT AND VOCABULARY EXERCISES

29. Find in the text the words or phrases which mean the same as:

- | | |
|------------------------------------|----------------------------------|
| ▪ международная финансовая позиция | ▪ продвигать структурные реформы |
| ▪ иностранный долг | ▪ нефтяной экспорт |
| ▪ достижение | ▪ обновленное правительство |
| ▪ финансовый кризис | ▪ экономический рост |
| ▪ уязвимый | ▪ банковская система |
| ▪ недостаток доверия | ▪ экономические перспективы |

30. Make up situations using the English equivalents of the words given above.

31. Find in the text the right words to complete the sentences:

1. Russia has a ____ range of mining and extractive industries
2. Russia ended 2004 with its sixth straight year of ____, averaging 6.5 per cent annually since the financial ____ of 1998.
3. Real fixed capital ____ have averaged gains greater than 10 per cent over the last five years, and real personal ____ have realized average increases over 12 per cent.
4. Russia has also ____ its international financial ____ since the 1998 financial crisis.
5. These ____, along with a renewed government effort to ____ structural reforms, have raised business and investor ____ in Russia's economic prospects.
6. Economic ____ slowed down in the second half of 2004 and the Russian government forecasts ____ of only 4.5 per cent to 6.2 per cent for 2005.
7. Russia's manufacturing ____ is dilapidated and must be replaced or modernized if the country is to ____ broad-based economic growth.

32. Explain the meaning of the following words and word combination in English:

To have a complete range of mining and extractive industries; high-performance industry; communications equipment; to advance structural reforms; economic rebound; to be replaced; economic prospects; foreign investors; lack of trust.

33. Match each word in A with the Russian equivalent in B:

A	B
1. mining	a. оборудование
2. shipbuilding	b. самолет
3. foodstuffs	c. ремесла
4. handicrafts	d. товары длительного пользования
5. rolling mills	e. прокатный стан
6. aircraft	f. кораблестроение
7. durables	g. продукты питания
8. equipment	h. горное дело

34. Read the text below to find answers to the given questions:

Text 3 D
Moscow

1. *What is the administrative, economic, political and educational centre of Russia?*
2. *What is the population of Moscow?*
3. *What architectural features does Moscow combine?*
4. *Who was the founder of Moscow?*
5. *By what time had Moscow grown into a wealthy city?*
6. *Why is Moscow the city of Russian contrasts?*
7. *What is the heart of Moscow?*
8. *What are Moscow's places of interest?*

Moscow is the capital of Russia, its administrative, economic, political and educational centre. It is located on the river Moskva in the western region of Russia. It is one of Russia's major cities with the population of over 9 million people. Its total area is about 900 thousand square kilometers. Moscow is a unique city, its architecture combines the features of both Oriental and Western cultures. Today we are the witnesses of a new stage in Moscow's life. Here, more than anywhere else, one can feel the atmosphere of all those changes which draw the attention of the whole world.

The city was founded by Prince Yuri Dolgorukiy and was first mentioned in the chronicles in 1147. At that time it was a small frontier settlement. By the 15th century Moscow had grown into a wealthy city. In the 16th century, under Ivan the Terrible, Moscow became the capital of the state of Muscovy. In the 18th century Peter the Great transferred the capital to St. Petersburg, but Moscow remained the heart of Russia. That is

why it became the main target of Napoleon's attack in 1812. During the war of 1812 three quarters of the city were destroyed by fire, but by the middle of the 19th century Moscow was completely rebuilt. The present-day Moscow is the seat of the government of the Russian Federation. President of Russia lives and works here; government offices are located here, too. Moscow is a major industrial city. Its leading industries are engineering, chemical and light industries.

Russian contrasts are more present in Moscow than in any other city in Russia. Ancient monasteries and ultra-modern monoliths stand side by side and the new Russian millionaires and the poor pensioners walk side by side in the same streets. Moscow's streets are lined with small monolithic department stores and beautiful churches that are being restored after the vandalism of the Soviet era and the hardline atheism. Every visitor to



Moscow is irresistibly drawn to the Red Square, the historical and spiritual heart of the city, so loaded with associations and drama that it seems to embody all of Russia's triumphs and tragedies.

The Kremlin broads and glitters in the heart of Moscow. It thrills and tantalizes whenever you see its towers against the skyline or its cathedrals and palaces arrayed above the Moskva River. The Kremlin is surrounded by a beautiful residential district that is known as the White Town. The White Town was the very heart of the city during the sixteenth century, and even today it has a strongly medieval feel.

Moscow is also well known as the site of the Saint Basil's Cathedral,



with its elegant onion domes. The Patriarch of Moscow, whose residence is the Danilov Monastery, serves as the head of the Russian Orthodox Church. Moscow is also known for many other historical buildings, museums and art galleries, as well as for the famous Bolshoi, Maly and Art theatres. There are more than 80 museums in Moscow, among them the unique Pushkin Museum of Fine Arts and

the State Tretyakov Gallery, the Andrey Rublyov – Museum of Early Russian Art and many others.

Moscow is a city of science and learning. There are over 80 higher educational institutions in the city, including a number of universities.

TEXT AND VOCABULARY EXERCISES



35. Find in the text the words or phrases which mean the same as:

- | | |
|-------------------------|--------------------------------------|
| ▪ образовательный центр | ▪ ультрасовременные массивы (зданий) |
| ▪ бескомпромиссный | ▪ воплощать |
| ▪ жилой район | ▪ средневековый |
| ▪ древние монастыри | ▪ горизонт |

36. Match each word in A with the Russian equivalent in B:

- | A | B |
|--------------------------|---------------------------|
| 1. unique city | a. приграничное поселение |
| 2. chronicles | b. рядом |
| 3. wealthy city | c. блистать |
| 4. to thrill | d. манить, соблазнять |
| 5. to tantalize | e. уникальный город |
| 6. to glitter | f. вызывать трепет |
| 7. side by side | g. богатый город |
| 8. frontier settlement | h. хроники |
| 9. art galleries | i. исторические здания |
| 10. historical buildings | j. художественные галереи |

37. Fill in the gaps with the words from the box:

picturesque cuisine destination snow museums diverse travelling river snowboarding

Plan Your Russian Travel Experience Now

If you have considered **1** ____ to another country, you might as well consider Russia as the ideal destination. Russia is divided into some very exciting cities and many small **2** ____ countryside towns, each with its own special attractions. You can plan a day of fun and adventure by exploring Russia's landscape through some of the most beautiful waterways to be found in this country on a **3** ____ rafting tour. If you are amongst the ones that prefer the wildlife tours, then why not go on an exciting jeep tour to the Republic of Sakha in Yakutia, which has the largest hunting grounds in Russia. This region has a high population of brown bears so you can almost be sure of a 100% trophy warranty in this region. Russia offers a good measure of this too. Moscow and St. Petersburg have an abundance

of 4 ____, art galleries and guided tours through the older parts of the cities that feature sightseeing of monuments and Old Russian architecture.

Russia is also home to some of the oldest lakes in the world, such as Lake Baikal – an estimated 25–30 million years old. When visited in winter, Russia is covered in 5 ____ and the lakes are covered with a dense layer of ice, these conditions are very favorable for those who fascinate the winter adventures, such as skiing, 6 ____, ice-diving and ice-skating.

Russia is a large and extremely culturally 7 ____ country, with dozens of ethnic groups, each with their own forms of folk music, languages and religions. Russia is a country that has something to cater for everyone's taste, and when the sun sets, you can spoil yourself to some lip-smacking Russian 8 ____ in one of the many delightful restaurants. Make Russia your next holiday 9 ____ – you won't regret it!

Check your answers on p. 279.

38. Imagine, that you need to describe to a foreigner some interesting places or traditions of Russia. The pictures below will help you.



39. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about the second largest city in Russia – St. Petersburg (Text 7). Be ready to discuss the information you have read.

CONVERSATIONAL PRACTICE

40. Use the following formulas of polite request in sentences of your own:

Would you mind (visiting us...)? Не могли бы вы...? Будьте добры.
Could you (come here...)?
(Put that down), **will you**?

41. **ROLE-PLAY.** Disagree with the following statements. Give your reasons. Use the formulas of disagreement.

<i>Far from it...</i>	<i>I don't think so...</i>
<i>You are wrong...</i>	<i>Quite the opposite...</i>

1. The history of Russia is a short and insignificant story.
2. The history of the Russian Federation is very long, dating back to the Kievan Rus.
3. The modern Russian state is geographically isolated and the most impressive thing about the country is its tiny size.
4. Russia's climate is very mild, not distinguished by extremes of heat and cold.
5. Russia is one of the most poorly endowed nations in the world in mineral wealth.
6. Russia has a complete range of only extractive industries.
7. St. Petersburg is the capital of Russia, its administrative, economic, political and educational centre.
8. Moscow is not known as the city of numerous places of interest.

42. **Read and act out the conversations:**

1. At the Bolshoi Theatre

- Good evening, Ann!
- Good evening, Peter! This is a small world! How are you?
- Fine, thanks. How are you?
- Life is going its usual way. Thanks.
- Pleased to hear it. Incidentally, where do you have a seat?
- In the stalls, row C. And where is your seat?
- In the box, close to the stage.
- So you don't have to use opera glasses.
- That's right. What do you think of the play?

▪ The action develops slowly. Some scenes are dull. The cast is not very good. Do you share my opinion?

▪ Frankly speaking I do. That happens to be a rather poor performance. Have you been to this theatre before?

▪ Haven't had a chance, you know. I am here for the first time. I like the hall. It is beautifully decorated. The chairs are comfortable and the chandelier is wonderful. To put it in a nutshell everything here is magnificent but the performance.

▪ I advise you to see "Othello" by Shakespeare at this theatre. You will be impressed.

▪ I have been dreaming of seeing any play by Shakespeare in this country. I'll do my best to see "Othello".

▪ I want to inform you that the best actors are engaged in the performance. The leading man is the famous actor. His name is well-known both in this country and abroad.

▪ I hope I'll enjoy the performance. The lights are going down.

▪ We must hurry to the hall. In a minute the curtain will be up.

▪ Be seeing you later.

2. At the Cinema

▪ Shall we see a film this evening?

▪ That would be delightful. I haven't seen any films for many weeks.

▪ There are several movies in my neighbourhood which show the latest pictures.

▪ Let's consult the newspaper to see what movies are being shown in town.

▪ A splendid idea.

▪ At the nearest cinema house they show a film which is considered the best film of the year.

▪ My wife and I have already seen it. We enjoyed it immensely.

▪ Here is a good programme. They show two main pictures: a French film and an American. I don't think you have seen them.

▪ I have seen neither of them. Shall we be able to obtain seats? That movie house is always full.

▪ Seats are not reserved at that movie house, but I am sure we shall be able to get in. Most likely we'll have to wait for stall seats. Shall we buy balcony seats, if stall seats are not available?

▪ Please don't. I have seen a film from the balcony. It is too far from the screen. You know my eyesight is rather poor. I wear glasses.

▪ The movie starts in ten minutes. There are many comfortable seats in the foyer. We can wait there and enjoy a cigarette in the meantime. After the picture ends there will be many vacant seats.

▪ Well, what do you think of the films?

▪ I enjoyed both of them. In the French film the actors spoke English with a slight French accent. The acting was faultless. The plot of the English film was extremely interesting.

▪ You have said it – I was carried away by the plot, so I didn't see any faults.

▪ I liked the newsreel. Actually I had a lovely evening.

▪ Thank you for a pleasant evening. I am planning to go to the opera house with you in the near future.

▪ I am all for it.

43. Answer the following questions:

1. Are you a theatre/cinema-goer?
2. Are your parents theatre/cinema-goers?
3. How often do you go to the cinema/theatre?
4. Do you prefer watching TV or going to the cinema?
5. What films do you like?
6. Do you often watch horror films?
7. What do you think about horror films?
8. Do you often watch video-films?
9. Who is your favourite film actor, actress?
10. What is the most interesting film you have seen?
11. How many theatres are there in your town?
12. What theatre is the best in your town?
13. Do you reserve seats in advance?
14. Do theatres/cinemas offer a good programme?
15. Do you go to the cinema/theatre alone or with your classmates?
16. Have you ever been to any Moscow theatre?



WRITING PRACTICE

44. Read the text below and decide what the missing word might be in each case (the most are prepositions). Fill in the missing words where necessary. Read the following text carefully in order to discover the main line of thought and make a plan for writing a summary:

An Expensive Horseshoe

The English king Richard the Lion Heart **1** ___ a tall and strong man. He was very proud **2** ___ his strength and often liked to show people how strong he was. Once as he was riding **3** ___ horseback in the country-side, he suddenly noticed that his horse had lost one of its shoes. Luckily, he was not far **4** ___ a little village and soon he found a blacksmith. "Give me a good horseshoe," he said **5** ___ the man.

The blacksmith chose a horseshoe and gave it **6** ___ him. Richard took it **7** ___ his hands and broke it **8** ___ two. "This horseshoe is no good", he said **9** ___ the blacksmith, "give me a better one". The blacksmith gave him another but Richard broke it almost as easily as the first one. The blacksmith was surprised **10** ___ it, but he did not say a word. He found a third horseshoe and offered it **11** ___ the king. This time Richard seemed to be satisfied **12** ___ it and ordered the Blacksmith to shoe his horse.

When the work was done, Richard offered the man a coin. The blacksmith took the coin, looked **13** ___ it, and, putting it **14** ___ his fingers, broke it in two. Now it was Richard's turn to be surprised. He took a larger coin **15** ___ of his pocket and handed it **16** ___ to the blacksmith. The man broke it again **17** ___ the same ease, adding: "This coin is no good, give me a better one"! Richard smiled and, handing the man a gold coin, said: "Your horseshoes are rather expensive, my friend, but I am glad to have met a man who is as strong as I am. I should like to have you **18** ___ my army."

It is said that the blacksmith joined Richard's army and fought side **19** ___ side with the king **20** ___ many battles.

UNIT 4

Pre-Text Exercises

Word Building

Active Vocabulary

Text 4 A. *The United States of America*

Text 4 B. *Washington and New York*

Text 4 C. *British Parliament*

Text 4 D. *London*

Text and Vocabulary Exercises

Conversational Practice

Writing Practice

PRE-TEXT EXERCISES

1. Look at the following international words, guess their meaning and check the pronunciation:

Immigration, contact, continent, navigator, colony, geographical, federal, republic, industrial, decolonization, constitution, document, parliament, political, programme, system, minister, tradition, communication, finance, global, monument, collection, museum, gallery, international, corporation, economy, company, energy, cosmopolitan

2. Here are some expressions with the preposition *for*. Translate and learn them:

to ask for	to be famous for	to be late for
to be sorry for	to exchange for	to hope for
to leave for	demand for	to prepare for
respect for	to care for	to start for
to wait for	for good	for fear
for fun	for instance (for example)	for the time being
for a walk	for the first (last) time	for a purpose
for a reason		

3. Fill in the gaps with the preposition *for* or the expressions above in the appropriate form:

1. This actor is famous ___ his film "Rembo".
2. She is always late ___ lectures. The teachers do not like that.
3. We leave ___ London in a fortnight.
4. I like to go ___ a walk in the rain.
5. He said that he was leaving Scotland ___ ever.

6. Look at this. We always do this just ____ fun.
7. They will use it ____ special purpose.
8. She does not know about it. You had better prepare her ____ the bad news.
9. Children have been waiting ____ us for 2 hours, let us hurry.
10. Please, try to have respect ____ other people's opinions.
11. We always care ____ the problems of our children.
12. This train starts ____ Liverpool at 10 a. m.
13. Let us take ____ instance this case and study it.
14. He looked at the city ____ the last time and turned his head.
15. Hurry up. We are late ____ the concert.
16. Did you ask ____ permission to come so late?

4. Rearrange the sentences and put the prepositions in the correct places:

1. The road was with covered snow and it was very slippery.
2. The up kittens down jumped and looked very funny.
3. Tim lives in the hotel because his under house is repair.
4. The manuscripts to belonged old duke Wellington.
5. They told us they would over talk this problem.
6. My fridge is too old and now it is use of out.

5. Fill in the gaps with the correct word to complete the sentences:

1. They went ____ a walk every evening that autumn.
a) *for*; b) *in*; c) *on*.
2. This lady has been waiting ____ you for two hours.
a) *in*; b) *for*; c) *at*.
3. She was trembling ____ cold and looked sick.
a) *at*; b) *for*; c) *from*.
4. He prevented her ____ falling down.
a) *from*; b) *in*; c) *on*.
5. My Granddad always recites poems ____ memory.
a) *on*; b) *for*; c) *from*.
6. We cut this cake ____ ten pieces.
a) *into*; b) *on*; c) *from*.
7. He was named ____ his great grandfather.
a) *for*; b) *after*; c) *in*.
8. She is too tired and wants to lie ____

a) *near*; b) *at*; c) *down*.

9. This picture hangs upside _____. You should change its position.

a) *down*; b) *on*; c) *after*.

10. The books are _____ date. Don't buy them.

a) *into*; b) *out of*; c) *over*.

6. BRAINSTORMING: What is your understanding of the words below? Give examples.

- | | |
|-----------------------|---------------------------|
| ▪ immigration | ▪ Vikings |
| ▪ War of Independence | ▪ constitutional monarchy |

WORD BUILDING

7. Translate the following derivative words:

verb + -tion/ion/ation → noun

to educate – education, to adopt – adoption, to organize – organization, to produce – production, to transform – transformation, to apply – application, to vary – variation.

noun + -al → adjective

industry – industrial, person – personal, tradition – traditional, practice – practical, profession – professional, continent – continental, tropic – tropical.

verb + -ment → noun

to develop – development, to achieve – achievement, to move – movement.

8. Form nouns using suffixes *-ment*, *-tion*, *-ion*, *-ation*:

to found, to settle, to detach, to separate, to govern, to introduce, to elect, to agree, to relate, to oppose, to recommend, to appoint, to communicate, to entertain, to populate, to institute, to organize, to corporate.

9. Define to what parts of speech the following words belong and translate them:

builder; explorer; equipment; employment; hydraulic; assistant; electrical; useful; useless; building; inventor; invitation; connection; darkness; leadership; difference; improvement; famous; modernize; shorten; useful; dangerous; brotherhood.

ACTIVE VOCABULARY

10. Read and memorize the following words and word combinations:

agreement – соглашение
to appoint – назначать
approval – одобрение
armed forces – вооруженные силы
association – объединение
to be constituted on different principles – быть составленным на различных принципах
to consist of – состоять из
convention – соглашение, договор
to debate the major issues – обсуждать главные проблемы
to constitute – основывать; составлять
to define – определять
to dismiss – освобождать от обязанностей, обязательств

duration – продолжительность
to elect – выбирать
to establish – основывать
executive power – исполнительная власть
existence – существование
government – правительство
independence – независимость
legislative power – законодательная власть
to occupy – занимать
to represent – представлять
to scrutinize government policy – тщательно исследовать политику правительства
significance – значимость, значение
to support – поддерживать

11. Read and translate the text below focusing on the discovery of the USA:

Text 4 A The United States of America



The story of the American people is a story of immigration and diversity. The first Europeans to reach North America were Icelandic Vikings, about the year 1000. Traces of their visit have been found in the Canadian province of Newfoundland, but the Vikings failed to establish a permanent settlement and soon lost contact with the new continent. Five centuries later, the demand for Asian spices, textiles, and dyes spurred European navigators to dream of shorter routes between East and West. Acting on behalf of the Spanish crown, in 1492 the Italian navigator Christopher Columbus sailed west from Europe and landed on one of the Bahama Islands in the Caribbean Sea. Within 40

years, Spanish adventurers carved out a huge empire in Central and South America.

The USA came into existence on July 4th, 1776, when thirteen English colonies decided that they could no longer regard themselves as subjects to the British Crown. In 1783 the War of Independence ended in favour of the colonists. Since that time the United States has welcomed more immigrants than any other country – more than 50 million in all – and still admits almost 700,000 persons a year. In the past many American writers emphasized the idea of the melting pot, an image that suggested newcomers would discard their old customs and adopt American ways. Typically, for example, the children of immigrants learned English but not their parents' first language.

The United States is the fourth-largest country in the world, with an area of over 9 million square kilometers. It is bordered on the north by Canada and on the south by Mexico. Alaska and the Hawaiian Islands are both states of the Union, but because of their geographical detachment from the United States, they are described under separate headings. Different parts of the USA experience extremes of heat and cold characteristic of hot tropical deserts or cold Arctic continental regions. Another feature of the weather and climate of the United States is the variation of weather over quite short periods at all seasons of the year.

The USA is a federal republic. The President, elected for 4 years, is head of the state and government. The legislative power belongs to the Congress which consists of the House of Representatives and the Senate. Elections to the Congress are every two years, when the whole House of Representatives and 1/3 of the total number of senators are replaced. There are two major political parties in the US, the Democratic and the Republican.



The USA is a highly developed industrial country. There are coal-mines in the Cordillera Mountains, in the Kansas City region. The heavy industry is in the region of the Great Lakes, around Detroit and Chicago. Ship-building is developed along the Atlantic coast and in San Francisco on the Pacific coast. Agriculture of the USA is wide-spread and highly mechanized.

The capital of the USA is Washington. The other big and important cities are New York, Boston, Chicago, Detroit, Los Angeles, etc.



TEXT AND VOCABULARY EXERCISES

12. Find in the text the English equivalents to the following words:

иммиграция	разнообразие	поселение	законодательный
спрос	специи	мечтать	исполнительный
существование	решать	рассматривать	вокруг
пустыня	выборы	высокоразвитый	столица
состоять из...	погода	субъект	каждый

13. Compose your own sentences with each English equivalent of the words given in exercise 12. Compare your variants with the sentences of your partner.

14. Find in the text the synonyms to the following words:

- | | | |
|--------------|--------------|-------------|
| ▪ variety | ▪ to set up | ▪ to accept |
| ▪ to finish | ▪ reflection | ▪ foreigner |
| ▪ separation | ▪ warmth | ▪ displace |

15. Find in the text the antonyms to the following words:

- | | | |
|---------------------|--------------|--------------|
| ▪ native inhabitant | ▪ uniformity | ▪ earlier |
| ▪ to find | ▪ joining | ▪ dependence |

16. Find in the text phrases which mean the same as:

- | | |
|------------------------------|-------------------------------|
| ▪ история иммиграции | ▪ поселение |
| ▪ плавильный котел, смешение | ▪ географическая отдаленность |
| ▪ палата представителей | ▪ политическая партия |
| ▪ широко распространенный | ▪ высоко механизированный |
| ▪ глава государства | ▪ федеративная республика |
| ▪ важные города | ▪ тяжелая промышленность |

17. Choose among the words in parentheses the one that corresponds to the text above to complete the sentences:

1. The story of the American people is a story of immigration and ____.
(a. *diversity*, b. *uniformity*, c. *separation*).
2. Acting on behalf of the ____ crown, in 1492 the Italian navigator Christopher Columbus sailed west from Europe and landed on one of the Bahama Islands in the Caribbean Sea.
(a. *French*, b. *English*, c. *Spanish*)
3. In 1783 the War of Independence ____ in favour of the colonists.
(a. *ended*, b. *began*, c. *continued*)
4. The United States has ____ more immigrants than any other country.
(a. *rejected*, b. *repudiated*, c. *welcomed*)
5. The United States is the ____ country in the world.
(a. *fourth-largest*, b. *first-largest*, c. *the smallest*)
6. Different parts of the USA ____ extremes of heat and cold characteristic of hot tropical deserts or cold Arctic continental regions.
(a. *evoke*, b. *experience*, c. *cause*)
7. The ____, elected for 4 years, is head of the state and government.
(a. *Queen*, b. *Prime-Minister*, c. *President*)
8. The ____ power belongs to the Congress which consists of the House of Representatives and the Senate.
(a. *judicial*, b. *executive*, c. *legislative*)
9. The USA is a highly developed ____ country.
(a. *agricultural*, b. *industrial*, c. *mechanized*)

18. Read the above text once more. In pairs, discuss the statements below. Say what you think about them and ask your partner if he/she agrees or disagrees with you. Use the following phrases to help you:

<i>Agreeing</i>	<i>Disagreeing politely</i>
I agree with you.	Yes, but don't you think...?
Yes, that is what I think too.	True, but I think...
You are right!	I see what you mean, but...

1. The story of the American people is a story of immigration and diversity.
2. The demand for Asian spices, textiles, and dyes spurred European navigators to dream of shorter routes between East and West.
3. The USA came into existence on July 4th, 1489.
4. The USA is bordered on the north by Mexico.
5. Different parts of the USA experience extremes of heat and cold characteristic of hot tropical deserts or cold Arctic continental regions.
6. The USA is a constitutional monarchy.

7. The executive power belongs to the Congress which consists of the House of Representatives and the Senate.

8. Elections to the Congress are every three years.

9. The USA is a highly developed industrial country.

10. The capital of the USA is New York.

19. Fill in the gaps with the words from the box:

veto	two	four-year term	to appoint	vice president	amendment
Senate	legislation	commander-in-chief	influence		

EXECUTIVE BRANCH. The chief executive of the United States is the president, who together with the **1** ____ is elected for a **2** _____. As a result of a constitutional **3** ____ that went into effect in 1951, a president may be elected to only **4** ____ terms. Other than succeeding a president who dies or is disabled, the vice president's only official duty is presiding over the Senate. The vice president may vote in the **5** ____ only to break a tie. The president's powers are formidable but not unlimited. As the chief formulator of national policy, the president proposes **6** ____ to Congress. As mentioned previously, the president may **7** ____ any bill passed by Congress. The president is **8** ____ of the armed forces. The president has the authority **9** ____ federal judges as vacancies occur, including justices of the Supreme Court. As head of his political party, with ready access to the news media, the president can easily **10** ____ public opinion.

Check your answers on p. 279.

20. Read and translate the text below to learn about the main cities of the USA:

Text 4 B

Washington and New York

Washington is the capital of the United States. The city was founded in 1790 on a site chosen by George Washington, the first President of the USA. Washington is not the largest city in the USA, it has the population about one million people. In the political sense, however, it is the most important city in the US. Washington is one of the world's most beautiful capitals, not only the centre of the National Government, but also it has become a great cultural, educational and scientific centre. It has many famous monuments: the Library of the Congress of the USA, the Abraham Lincoln Memorial, the Tomb of the Unknown Soldier, the Washington Monument.

New York is the most populous city in the United States, the most densely populated major city in North America, as well as the centre of international finance, politics, entertainment, and culture. New York City is home to an almost unrivaled collection of world-class museums, galleries, performance venues, media outlets, international corporations, and stock exchanges. The city is also home to all of the missions to the United Nations, which has its headquarters in New York City. New York is widely regarded as one of the great intellectual, financial, and cultural centers of the world. New York has an area of 309 square miles (800 km²). Estimated in 2004 to have more than 8,168,388 residents, it is the heart of the New York Metropolitan Area, which is one of the largest urban conglomerations in the world with a population of over 22 million. New York City proper comprises five boroughs: Brooklyn, the Bronx, Manhattan, Queens, and Staten Island.



The city includes large populations of immigrants from over 180 countries who help make it one of the most cosmopolitan places on earth. Many people from all over the United States are also attracted to New York City for its culture, energy, and cosmopolitanism, and by their own hope of making it big in the “Big Apple”. The city serves as an enormous engine for the global economy, and is home to more than 500 companies.

TEXT AND VOCABULARY EXERCISES



21. Find in the text the words or phrases which mean the same as:

- | | |
|-----------------------------|----------------------------|
| ▪ в политическом смысле | ▪ научный центр |
| ▪ густонаселенный город | ▪ музеи мирового класса |
| ▪ место совершения действия | ▪ средства информации |
| ▪ биржа | ▪ скопление, конгломерация |
| ▪ штаб-квартира | ▪ оценивать |

22. Match each word in A with the Russian equivalent in B:

- | A | B |
|-------------|---------------------|
| 1. enormous | a. культурный центр |
| 2. hope | b. столичный |
| 3. populous | c. густонаселенный |

- | | |
|-----------------------|--------------------------|
| 4. important | d. образовательный центр |
| 5. educational centre | e. городской |
| 6. cultural centre | f. важный |
| 7. metropolitan | g. надежда |
| 8. urban | h. огромный |

23. Find in the text the right word to complete the sentences:

1. ____ is the capital of the United States.
2. In the political sense it is the ____.
3. Washington is one of the world's most beautiful ____.
4. New York is the ____.
5. New York City is home to an almost unrivaled collection of world-class ____.
6. The city includes large populations of immigrants ____.

24. Work in pairs. Fill in the gaps in the following paragraph with appropriate prepositions. Act out the conversation.

"Would you please tell me how to get ____ the baseball park?"

"Certainly. You go down Arch Street two blocks and turn left ____ King Street. Stay ____ King Street ____ about two miles. You will go ____ a bridge and ____ a tunnel. You will come to Ocean Avenue, and ____ the middle of the block you will see the main entrance ____ the ball park. I would suggest that you drive your car ____ the block and park ____ the parking lot behind the field".

"Thank you".

25. Fill in the gaps with the prepositions from the box:

of (9)	to (4)	in (5)	with	by (2)	on	for (2)
--------	--------	--------	------	--------	----	---------

Common names and abbreviations ____ the United States of America include the *United States*, the *U.S.*, the *U.S.A.*, *the States* (informal), and *America* (colloquially). The earliest known use ____ the name America is attributed ____ the German cartographer Martin Waldseemüller who ____ 1507 created a globe and a large map showing North and South America. According ____ the Library ____ Congress "Waldseemüller christened the new lands 'America' ____ recognition ____ Amerigo Vespucci's understanding that a new continent had been uncovered as a result ____ the voyages ____ Columbus and other explorers ____ the late fifteenth century." Citizens and residents often use *the States* to contrast it ____ other countries. The term is especially common among expatriates. *U.S. of A* is often used ____ other English-speaking countries.

The full name ____ the country was first used officially ____ the Declaration ____ Independence, which was the “unanimous Declaration of the thirteen united States of America” adopted ____ the “Representatives ____ the united States of America” ____ July 4, 1776. On November 15, 1777, the Second Continental Congress adopted the Articles of Confederation, the first of which stated «The Style of this Confederacy shall be ‘The United States of America’». The name was originally proposed ____ Thomas Paine.

The most common adjectival and demonymic form ____ the United States is *American*. This term is used to designate U.S. citizens who are abroad, and ____ cultural characteristics (“American language”, “American sports”) and is rarely (at least not in English) used to refer ____ people not connected ____ the U.S.

26. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about large cities of the USA (Texts 8, 9, 10, 11, 12, 13). Be ready to discuss the information you have read.

27. Read the text below to find answers to the given questions:

Text 4 C
British Parliament

1. *What does the term “constitutional monarchy” mean?*

Great Britain is a constitutional monarchy. This means that it has a monarch as its Head of the State. The monarch reigns with the support of Parliament. The powers of the monarch are not defined precisely. Everything today is done in the Queen’s name. It is her government, her armed forces, her law courts and so on. She appoints all the Ministers, including the Prime Minister. Everything is done however on the advice of the elected Government, and the monarch takes no part in the decision-making process.

2. *What is the name of the association of former members of the British Empire?*

Once the British Empire included a large number of countries all over the world ruled by Britain. The process of decolonization began in 1947 with the independence of India, Pakistan, and Ceylon. Now there is no Empire and only few small islands belong to Britain. In 1997 the last colony, Hong Kong, was given to China. But the British ruling classes tried not to lose influence over the former colonies of the British Empire. An association of former members of the British Empire and Britain was founded in 1949. It is called the Commonwealth. The Queen of Great Britain is also Head of the Commonwealth.

3. What is the British constitution?

The British constitution is to a large extent a product of many historical events. Unlike the constitutions of most other countries, it is not set out in any single document. Instead it is made up of statute law, common law and conventions. The constitution can be changed by Act of Parliament, or by general agreement to alter a convention.

4. What elements make up British Parliament?



The three elements, which make up Parliament – the Queen, the House of Lords and the elected House of Commons, are constituted on different principles. They meet together only on occasions of symbolic significance such as the State Opening of Parliament, when the Commons are invited by the Queen to the House of Lords or coronation of a new monarch. Parliament consists of two chambers known as the House of Lords and the House of Commons. The division of Parliament into two Houses goes back

over some 700 years when feudal assembly ruled the country. In modern times, real political power rests in the elected House although members of the House of Lords still occupy important cabinet posts. Parliament and the monarch have different roles in the government of the country. In reality, the House of Commons is the only one of the three which is true power. It is here that new bills are introduced and debated. If the majority of the members aren't in favour of a bill, it goes to the House of Lords to be debated and finally to the monarch to be signed. Only then it becomes law. Although a bill must be supported by all three bodies, the House of Lords only has limited powers, and the monarch hasn't refused to sign one.

5. What are the functions of Parliament?

The main functions of Parliament are: to pass laws; to provide, by voting, taxation, the means of carrying on the work of government; to scrutinize government policy and administration; to debate the major issues of the day. In carrying out these functions, Parliament helps to bring the relevant facts and issues before the electorate. By custom, Parliament is also informed before all-important international treaties and agreements are ratified. A Parliament has a maximum duration of five years, but in practice general elections are usually held before the end of this term. Parliament is dissolved and rights for a general election are ordered by the Queen on the advice of the Prime Minister. The life of a Parliament is divided into sessions. Each usually lasts for one year – normally beginning

and ending in October or November. At the start of each session the Queen's speech to Parliament outlines the Government's policies and proposed legislative programme.

6. What is the British political party system?

The present political system depends upon the existence of organized political parties, each of which presents its policies to the electorate for approval. The parties are not registered or formally recognized in law, but in practice most candidates in elections, and almost all winning candidates, belong to one of the main parties. For the last 150 years there were only two parties: the Conservative Party and the Labour Party. The effectiveness of the party system in Parliament rests largely on the relationship between the Government and the Opposition parties. Depending on the relative strengths of the parties in the House of Commons, the Opposition may seek to overthrow the Government by defeating it in a vote on a "matter of confidence".

7. What is the cabinet of ministers?

It is responsible for the administration of national affairs. The Prime Minister is appointed by the Queen, and all other ministers are appointed by the Queen on the recommendation of the Prime Minister. Most ministers are members of the Commons, although the Government is also fully represented by ministers in the Lords. The composition of governments can vary both in the number of ministers and in the titles of some offices. New ministerial offices may be created, others may be abolished and functions may be transferred from one minister to another. The Cabinet is composed of about 20 ministers chosen by the Prime Minister. The functions of the Cabinet are initiating and deciding on policy, the supreme control of government and the co-ordination of government departments. The Prime Minister is, by tradition, First Lord of the Treasury and Minister for the Civil Service. The Prime Minister's unique position of authority derives from majority support in the House of Commons and from the power to appoint and dismiss ministers. By modern convention, the Prime Minister always sits in the House of Commons. The Prime Minister presides over the Cabinet, is responsible for the allocation of functions among ministers and informs the Queen at regular meetings of the general business of the Government. The Prime Minister's Office is situated at 11 Downing Street.

So Great Britain is the constitutional monarchy. Monarch is the Head of the State. But Queen or King rules with the support of the parliament. And practically monarch has no real political power. The main political decisions are made by the Parliament and the Cabinet.



TEXT AND VOCABULARY EXERCISES

28. Find in the text the words or phrases which mean the same as:

- | | |
|-----------------------------------|--|
| ▪ глава государства | ▪ глава Содружества наций |
| ▪ в большой степени | ▪ большинство членов |
| ▪ основные функции | ▪ всеобщие выборы |
| ▪ эффективность партийной системы | ▪ координация правительственных ведомств |
| ▪ освобождать от должности | ▪ конституционная монархия |
| ▪ поддержка парламента | ▪ зависеть от... |

29. Compose your own sentences with each English equivalent of the words or phrases given in exercise 28. Compare your variants with the sentences of your partner.

30. Give Russian equivalents to the following word combinations:

Constitutional monarchy; the powers of the monarch; Prime Minister; on the advice; the process of decolonization; to lose influence; head of the Commonwealth; historical events; symbolic significance; two chambers; real political power; coronation of a new monarch; to be supported; the main functions; to debate the major issues; general elections; political system; national affairs; to be appointed; to be abolished; the supreme control of government; to have no real political power.

31. Work in pairs and decide whether these statements are true or false:

1. Great Britain is a federal republic.
2. Once the British Empire included a large number of countries all over the world ruled by Britain.
3. An association of former members of the British Empire and Britain is called the United Nations Organization.
4. Unlike the constitutions of most other countries, British constitution is not set out in any single document.
5. Parliament consists of two chambers known as the House of Lords and the House of Commons.
6. The House of Lords is the only true power in Great Britain.
7. The Prime Minister is appointed by the Queen, and all other ministers are appointed by the Prime Minister.

32. Translate the following sentences into English using a dictionary:

1. Соединенное Королевство Великобритании и Северной Ирландии состоит из четырех исторических национальных областей: Англии, Уэльса, Шотландии и Северной Ирландии.

2. Великобритания является конституционной монархией, во главе государства – королева Елизавета II.

3. Законодательная власть в стране принадлежит монарху и парламенту, состоящему из палаты общин и палаты лордов.

4. Исполнительная власть сосредоточена в руках правительства, возглавляемого премьер-министром.

5. Великобритания – высокоразвитая индустриальная страна, крупный поставщик готовой промышленной продукции на мировой рынок и крупный экспортёр капитала.

6. Культура Соединённого Королевства богата и разнообразна.

7. Великобритания имеет крепкие культурные связи со своими бывшими колониями, особенно с теми государствами, где английский язык является государственным.

8. Великобритания – страна удивительной красоты с богатой историей и вековыми традициями.

9. В числе разнообразных памятников культуры и истории легендарный Стоунхендж – наиболее известный доисторический участок в Европе.

33. Read the text and give its brief summary:

Text 4 D

London

London is the capital city of the United Kingdom. The capital of the former empire, London is a leader in culture, communications, politics, finance, entertainment and the arts and has considerable influence worldwide. London is one of the four major global cities along with New York, Tokyo and Paris. London is the most populous city in the European Union, with an estimated population on 1 January, 2005, of 7,421,328, and several million more living in the wider metropolitan area.

London's population includes a very diverse range of peoples, cultures, and religions, making it one of the most cosmopolitan, vibrant and energetic cities on earth. Over 300 languages are spoken in London, making the capital one of the most linguistically diverse cities in the world.

London is the home to many institutions, organisations and companies, and as such retains its leading role in global affairs. It has a great number of important buildings and iconic landmarks, including

world-famous museums, theatres, concert halls, airports, palaces, and offices. It is also the location of many foreign embassies.

Historically, London referred to the square mile of the City of London at the conurbation's heart, from which the city grew. Today, London usually refers to the conurbation known as Greater London, which comprises the City of London and the 32 London boroughs including the City of Westminster.

The dominant centre of activity in London is the City of Westminster including the West End which is the main cultural, entertainment and shopping district, the location of most of London's major corporate headquarters outside of the financial services sector, and the centre of the UK's national government.

The City of London is the banking centre of the world and Europe's main business centre. The headquarters of more than 100 of Europe's 500 largest companies are in London. The London foreign exchange market is the largest in the world, with an average daily turnover of \$504 billion, more than the New York and Tokyo exchanges combined. While very busy during the working week, most parts of the City tend to be quiet at weekends, since it is primarily a non-residential area.

London attracts very large numbers of visitors and tourists. Tourist attractions are mainly in Central London, comprising the historic City of London; the West End with its cinemas, bars, clubs, theatres, shops and restaurants; the City of Westminster with Westminster Abbey, the Royal palaces of Buckingham Palace, the Royal Borough of Kensington and Chelsea with its museums (the Science Museum, Natural History Museum, and Victoria and Albert Museum) and Hyde Park. Other important tourist attractions include St Paul's Cathedral, the National Gallery, London Bridge, Tower of London, the British Museum. There are many other museums and places of interest.



TEXT AND VOCABULARY EXERCISES

34. Give English equivalents to the following word combinations:

- быть политическим, культурным и финансовым лидером
- иметь значительное влияние
- столичный
- иностранные посольства
- Большой Лондон
- банковский мировой центр
- привлекать большое число посетителей и туристов
- достопримечательности

35. Give Russian equivalents to the following word combinations:

former empire; the most populous city; metropolitan area; very diverse range of peoples; leading role; global affairs; national government; banking centre; foreign exchange market; working week; non-residential area; important tourist attractions; places of interest.

36. Choose the correct word from Text 4D to complete the sentences:

1. The capital of the former empire, London is a leader in culture, communications, politics, finance, entertainment and the arts and has considerable ____ worldwide.

2. London is the most ____ city in the European Union.

3. Over 300 languages are spoken in London, making the capital one of the most linguistically ____ cities in the world.

4. London is the home to many institutions, organisations and companies, and as such retains its ____ role in global affairs.

5. Today London refers to the conurbation known as ____ London.

6. The City of London is the ____ centre of the world and Europe's main business centre.

7. London attracts very large numbers of visitors and ____.

37. Fill in the gaps with the words from the box:

microclimate rise climate summers snowfalls

London has a temperate **1** ____, with warm but seldom hot **2** ____, cool but rarely severe winters, and regular but generally light precipitation throughout the year. Summer temperatures rarely **3** ____ much above 33°C (91°F), though higher temperatures have become more common recently. The highest temperature ever recorded in London was 38.1°C (100.6°F), measured at Kew Gardens during the European heatwave of 2003. Heavy **4** ____ are almost unknown. In recent winters, snow has rarely settled to more than an inch (25 mm). London's average annual precipitation of less than 24 inches (600 mm) is lower than that of Rome or Sydney. London's large built-up area creates a **5** ____, with heat stored by the city's buildings: sometimes temperatures are 5°C (9°F) warmer in the city than in the surrounding areas.

Check your answers on p. 279.

38. Match each word in A with the Russian equivalent in B:

A	B
1. entertainment	a. искусство
2. arts	b. биржа
3. metropolitan	c. развлечение
4. diverse	d. столичный
5. shopping	e. достопримечательности
6. exchange	f. привлекательность
7. attraction	g. разнообразный
8. places of interest	h. посещение магазина

39. Translate the following sentences into English using the dictionary:

1. Лондон – столица Великобритании и крупнейший город на Британских островах с населением более 7 млн. человек.

2. Лондон играет ведущую роль в политической, экономической и культурной жизни Великобритании.

3. В городе находится международный аэропорт Хитроу, один из крупнейших в мире, речной порт на реке Темзе, многие всемирно известные достопримечательности.

4. Лондон – один из самых древних городов страны и мира.

5. Во времена Британской Империи Лондон часто неофициально называли столицей мира.

40. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about the British capital (Texts 14, 15, 16, 17, 18). Be ready to discuss the information you have read.

CONVERSATIONAL PRACTICE

41. Speak about English-speaking countries and their capitals using the Active Vocabulary and the expressions below:

- | | |
|--|---|
| ▪ I think we should ... | ▪ It would be better to ... |
| ▪ I (don't) agree | ▪ I like .../ I quite like .../ I really like ... |
| ▪ I (don't) think it's a good idea to ... | ▪ It is important to ... |
| ▪ A good way to ... is to ... /The best way to ... is to ... | ▪ I don't mind ... |

WRITING PRACTICE



42. Read the following article carefully in order to discover the main line of thought and make a plan for writing a summary:

The British media is concentrated in London and is sometimes accused of having a “London bias”. All the major television networks are headquartered in London including the BBC, which remains Britain’s most influential media organisation.

Partly to counter complaints about London bias, the BBC announced in June 2004 that some departments (BBC Sport, CBBC, Cbeebies, BBC Three, and BBC Radio Five Live) are to be relocated to Manchester. Other major networks include ITV and BSkyB, Channel 4 and Five are also based in London. Like the BBC, these produce some programmes elsewhere in the UK, but London is their main production centre.

The English newspaper market is dominated by national newspapers, all of which are edited in London. Until the 1970s, most of the national newspapers were concentrated in Fleet Street, but in the 1980s they relocated to new premises with automated printing works. Most of these are in East London, most famous of them being the News International plant at Wapping.

The move was resisted strongly by the printing trade union SOGAT 82, and strike action at Wapping in 1986 led to violent skirmishes. The last major news agency in Fleet Street, Reuters, moved to Canary Wharf in 2005, but Fleet Street is still commonly used as a collective term for the national press. Regional Editions of most national newspapers are available, including editions for northern England, Scotland and Wales.

UNIT 5

Pre-Text Exercises

Word Building

Active Vocabulary

Text 5 A. *To Learn or Not to Learn Foreign Languages?*

Text 5 B. *Tourism*

Text 5 C. *British Library*

Text 5 D *Public Libraries*

Text and Vocabulary Exercises

Conversational Practice

Writing Practice

PRE-TEXT EXERCISES

1. Look at the following international words, guess their meaning and check the pronunciation:

Business; partner; vision; mentality; tolerance; stable; tendency; expert; occupation; opportunities.

2. Here are some expressions with the preposition *into*. Translate and learn them:

- to cut into
- to take into consideration
- to divide into
- to translate into

3. Fill in the gaps with the preposition *into* or the expressions given above in the appropriate form:

1. Please ___ the meat ___ ten slices. There will be ten of us.
2. She ___ novels ___ German.
3. We always ___ all the remarks given.
4. He ___ his sandwich ___ three parts.
5. They ___ the apple ___ five pieces.
6. All your wishes ___.
7. They translated the text ___ English.
8. We have ___ the cake ___ six slices and put them on the table.

4. Fill in the correct prepositions:

1. We always like to play ___ the open air.
2. They hoped to find his relatives but ___ vain.
3. We came ___ the end of the month.

4. He laughed ____ her and she began to cry.
5. He visited his sick uncle day ____ day.
6. She went to Sochi ____ plane.
7. Her father was a surgeon ____ profession.
8. Be very attentive and think it ____.
9. She apologized ____ her brother for forgetting to buy the cigarettes for him.
10. We subscribed ____ five newspapers and two magazines.
11. This house is ____ repair and we can't move this month.
12. Don't wake me ____ so early because I had a sleepless night.
13. He filled the glass ____ cold water and slowly drank it.
14. It goes ____ saying that he always washes dishes.

5. Fill in the gaps with the correct word to complete the sentences:

1. Ted was sorry ____ his behaviour and apologized to his parents.
a) *for*; b) *on*; c) *of*.
2. I have been waiting ____ you for three hours.
a) *in*; b) *for*; c) *of*.
3. He got the papers somewhere ____ and gave them to us.
a) *from behind*; b) *from among*; c) *from on*.
4. The situation has got ____ in the last three days.
a) *from good to better*; b) *from bad to worse*; c) *from nice to nicer*.
5. We were translating the text ____ French when the principal entered.
a) *on*; b) *in*; c) *into*.
6. The book consisted ____ twenty units connected with each other.
a) *of*; b) *at*; c) *from*.
7. They are fond ____ skating very much and spend a lot of time on the lake.
a) *after*; b) *on*; c) *of*.
8. It was ____ his power to help her in this case.
a) *down*; b) *beyond*; c) *after*.
9. Please write it ____ in your copy books at once.
a) *over*; b) *above*; c) *down*.
10. I know he did it ____ purpose but I cannot prove it.
a) *on*; b) *at*; c) *in*.

6. Explain the meaning of the following phrases in English:

New standards of communication; to be able to speak foreign languages; understanding and tolerance towards other peoples' views.

7. BRAINSTORMING: What is your understanding of the words below? Give examples.

- | | |
|-----------|--------------------|
| ▪ culture | ▪ mentality |
| ▪ science | ▪ foreign language |

WORD BUILDING

8. Form nouns using suffixes –ment, –tion, –ion, –ation:

to move	to produce	to reflect
to transform	to develop	to celebrate
to promote	to construct	

9. Make nouns from the following verbs by adding –age to the end and making any other necessary changes in spelling:

use	post	break
store	wreck	stop
pass	shrink	leak

10. Make nouns ending in –cy from the following adjectives:

accurate	private	frequent
vacant	urgent	efficient

11. Guess the meaning of the words in bold type:

To work – **worker**; to produce – **producer**; noble – **nobility**; design – **designer**; change – **unchangeable**; to manufacture – **manufacturer**; expensive – **inexpensive**; beauty – **to beautify**; possible – **impossible**; to reflect – **reflection**; to train – **trainer**; to discover – **to rediscover**.

12. Choose the correct translation of the following English words:

understandable	понимать	понятный	понимание
meaningful	значение	значительный	незначительный
successful	успешный	иметь успех	успех
creative	творчество	создавать	творческий
solution	решать	решение	разрешимый
competition	конкурировать	конкурент	конкуренция
previously	прежде, раньше	предыдущий	предшествовать
application	применять	применение	применяемый
consumption	потреблять	потребление	потребляемый
definition	определять	определение	определяющий
efficiency	эффективный	эффективность	давать эффект

ACTIVE VOCABULARY

13. Read and memorize the following words and word combinations:

ability – способность	to insist on – настаивать на чем-либо
abroad – за границей	interpreter – переводчик
access – доступ	mentality – склад ума
advantage – преимущество	negotiations – переговоры
amateur – любитель, непрофессионал	to notice – замечать
apparent – очевидный, явный	opportunity – возможность
to be essential – быть существенным	to realize – понимать, осознавать
to be worth – иметь ценность	to require – требовать
to change – менять, изменять	to spend – тратить, расходовать
communication – информация; коммуникация	stable – стойкий; устойчивый
confirm – подтверждать	stylish – стильный, модный
contemporary – современный	to sum up – суммировать; обобщать
demand – требование	tolerance – терпимость; толерантность
experience – опыт	to travel – путешествовать
experienced specialist – опытный специалист	to understand – понимать
fashion – мода	valuable – ценный
to get acquainted with – познакомиться	vision – видение
	vulnerable – уязвимый, ранимый
	to waste time – зря тратить время

14. Read and translate the text below focusing on the reasons to learn foreign languages:

Text 5 A

“To Learn or Not to Learn Foreign Languages?”

Have you noticed that universal craziness about foreign languages? Everyone seems to study them now, even if there is no any practical use in it. What's the point in learning a language if you go abroad once a year or even less and not necessarily to the region where this language is spoken? You can easily do without that “fashionable” knowledge.

Even if you travel a lot, you can easily survive with your Russian; it is the business of the travel agencies to make you feel comfortable anywhere. If you are a businessman, you know the price of time, it's non-refundable. Are you ready to waste it, a good while of it, if you can easily hire an interpreter who has been studying the language for years and would do a better job of it? Indeed, it's better to be a professional in your own field than an amateur in everything.

As long as you are an expert in your field, nobody cares what language you are speaking. In addition to everything above, language studying is a very time and money consuming occupation. It is stylish to be able to speak a foreign language, but is doing it worth it? There are a lot of opportunities to spend time and money in a more practical or at least pleasant way.

Yet, the way people live in the modern society requires new standards of communication and that is why it is an essential demand of the contemporary society to be able to speak foreign languages. A foreign language is an important advantage for an experienced specialist in any field. Higher education cannot be called complete without at least one foreign language.

Languages make possible the immediate access to the hottest technological information all over the world. It is very useful in business as well. Any businessman will confirm the statement that ability to use your partner's language helps to establish the so-called personal contact that makes your negotiations more efficient. You will always be respected for your attempts to be closer to the culture of your partners. While negotiating it is preferable to be able to understand everything, at least in general, as the interpreter sometimes can set out the problem according to his or her own vision.

However, not only scientists and businessmen need languages. When travelling abroad, a person has an opportunity to get acquainted with other cultures, traditions, and different mentality. It is easier to do by means of their language. It makes for understanding and tolerance towards other peoples' views, and it is very important in our vulnerable world. To sum it all up, learning other languages is not a matter of fashion that can change in a year or two. The importance of it is apparent, and there is a stable tendency towards its rising; soon you would hardly be a valuable member of the contemporary integrated society if you feel absolutely helpless in communicating with non-Russian people. The earlier we realize it the better.

As you see, there are very important reasons to learn languages; it can never be called wasting of time. Firstly, it is essential if you want to meet the demands of an educated person. Foreign languages can educate – they help to accept the variety of mentalities existing in the world. Secondly, languages help other people to understand you while travelling abroad. Of course one can say that it is not difficult to feel comfortable on holidays, speaking only Russian, if you have chosen the right travel agency. But it is not so. It is not nice to be dependent on interpreters and travel agents. There is no pleasure in looking at advertisements and menus without understanding what it is all about.

And at last, but not least, it is business. It is impossible to be a professional without a good command of a foreign language. Each profession requires a certain language: Latin – for doctors, Ancient Greek – for archeologists, French or Italian – for researchers, English – for businessmen. Many centuries ago Aristotle wrote: “You are worth so many people as many languages you speak”.

TEXT AND VOCABULARY EXERCISES



15. Find in the text the English equivalents to the following words and expressions:

- | | | |
|-----------------------------|------------------------|---------------------------------------|
| ▪ доступ | ▪ требование | ▪ уважаемый |
| ▪ соответствовать | ▪ упомешательство | ▪ личный контакт |
| ▪ веские причины | ▪ точка зрения | ▪ потреблять |
| ▪ занятие, род деятельности | ▪ рекламные объявления | ▪ быть профессионалом в своей области |

16. Compose your own sentences with each English equivalent of the words given in Exercise 15. Compare your variants with the sentences of your partner.

17. Find in the text the synonyms to the following words:

- | | | |
|-----------------|--------------------|------------|
| ▪ contemporary | ▪ main | ▪ talks |
| ▪ understanding | ▪ with the help of | ▪ to study |
| ▪ specialist | ▪ can | ▪ manner |
| ▪ to assist | ▪ to need | ▪ worth |

18. Find in the text the antonyms to the following words and expressions:

- | | | |
|-------------|-------------|-----------------------|
| ▪ modern | ▪ essential | ▪ to be able |
| ▪ apparent | ▪ stable | ▪ non-refundable |
| ▪ to hire | ▪ amateur | ▪ to feel comfortable |
| ▪ dependent | ▪ certain | ▪ to be impossible |

19. Give Russian equivalents to the following word combinations:

Contemporary society; to be able to speak foreign languages; an important advantage; in any field; the immediate access; the hottest technological information; all over the world; to be very useful; important reasons

20. Choose among the words in parentheses the one that corresponds to the text above to complete the sentences:

1. The way people live in the modern society requires new standards of ____.
(a. *thinking*; b. *culture*; c. *communication*)
2. Higher education cannot be called ____ without at least one foreign language.
(a. *finished*; b. *completed*; c. *valuable*)
3. However not only scientists and businessmen ____ languages
(a. *need*; b. *look for*; c. *try*).
4. The importance of learning foreign languages is ____.
(a. *clear*; b. *great*; c. *apparent*)
5. Have you noticed that ____ craziness about foreign languages?
(a. *unique*; b. *universal*; c. *absolute*)
6. ____ you are an expert in your field, nobody cares what language you are speaking.
(a. *as long as*; b. *before*; c. *after*)
7. It is stylish ____ to speak a foreign language.
(a. *as long as*; b. *to have*; c. *to be able to*)
8. Foreign languages can ____; they help to accept the variety of mentalities existing in the world.
(a. *enrich*; b. *educate*; c. *make*)
9. It is not nice to be dependent on ____ and travel agents.
(a. *translators*; b. *speakers*; c. *interpreters*)
10. It is impossible to be a ____ without a good command of a foreign language.
(a. *professional*; b. *specialist*; c. *expert*)

21. Read Text 5A once more. In pairs, discuss the statements below. Say what you think about them and ask your partner if he/she agrees or disagrees with you. Use the following phrases to help you:

<i>Agreeing</i>	<i>Disagreeing</i>
That's right	That's wrong
Undoubtedly	I don't think so
Exactly	Quite the opposite
That's true	I am not sure
That's what it is...	I don't think so...

1. The way people live in the modern society requires new standards of communication and that is why it is an essential demand of the contemporary society to be able to speak foreign languages.

2. Higher education can be called completed without foreign languages.

3. There is no use learning foreign language because personal contacts do not make your negotiations more efficient.
4. Only scientists and businessmen need languages.
5. It is very important to be tolerant towards other peoples' views.
6. Nobody seems to study foreign languages now.
7. It's better to be a professional in your own field than an amateur in everything.
8. There are no important reasons to learn languages.
9. Languages help other people to understand you while travelling abroad.
10. It is nice to be dependent on interpreters.

22. Read the following text and try to find the answer to the question given in the title:

Why Would I Need to Know Another Language?

One in every 10 US citizens was born outside of the U.S. and speaks a language other than English as their first language. The U.S. is also one of the premiere tourist destinations for travellers from around the world.

Finally, growing expansion of US businesses abroad and foreign investments within the U.S. spell job opportunities for those who can communicate in more than one language. Even if you never leave the U.S., with the exponential growth of E-commerce world-wide you will undoubtedly encounter languages other than English in your professional life. Of the over 310 million Internet users around the world, less than half are English speakers.

- English only accounts for 36.5% of websites world wide;
- 10.8% of all websites are available in Chinese;
- 9.7% in Japanese;
- 7.4% in Spanish;
- 6.6% in German;
- 3.5% in French.

Also, did you know that learning a second language:

- Broadens your cultural and intellectual horizons?
- Provides a better understanding of your own language?
- Enables you to understand people who are different from you?
- Provides you with better job opportunities in many fields of work?
- Prepares you to connect virtually with others world-wide?

23. Find in the text the English equivalents to the following words and expressions:

- | | |
|--------------------------|-------------------------|
| ▪ расширять кругозор | ▪ лучшее понимание |
| ▪ профессиональная жизнь | ▪ общаться |
| ▪ по всему миру | ▪ электронная коммерция |

24. Find the English equivalent for the following Russian words:

- | | | | |
|-----------------|------------------|---------------|---------------|
| 1. расширение | a) expandability | b) expectancy | c) expansion |
| 2. возможность | a) opportunity | b) opportune | c) oppression |
| 3. никогда | a) ever | b) never | c) whenever |
| 4. жизнь | a) live | b) life | c) alive |
| 5. пользователь | a) user | b) useful | c) useless |
| 6. обеспечивать | a) to process | b) to produce | c) to provide |
| 7. лучше | a) bitter | b) better | c) butter |
| 8. делать | a) to enable | b) to disable | c) to enact |

ВОЗМОЖНЫМ

25. Make up a short situation using the following words and phrases and try to express your own point of view:

to communicate; to master a language; to provide job opportunities; a professional life; websites; to connect; Internet users

26. Fill in the gaps with the words from the box:

second	widespread	spoken	business	world	number
	popular	thing	necessary		

English is a **1** ___ language. It is the language of progressive science and technology, trade and cultural relations, commerce and **2** ___. English is **3** ___ by more than 350 million people. Geographically, it is the most **4** ___ language on earth, second only to Chinese in the number of people who speak it. It is also spoken as a **5** ___ language by many people in India, Pakistan, numerous countries in Africa. The **6** ___ of second-language speakers may soon exceed the number of native speakers, if it has not done so already.

In our country English is very **7** ___: it is studied at schools, colleges and universities. Learning a foreign language is not an easy **8** ___, but it is a long and slow process that takes a lot of time and patience. But to know English today is absolutely **9** ___ for every educated person, for every good specialist.

Check your answers on p. 279.

27. Read the text and give its brief summary:

Text 5 B

Tourism

Tourism is the act of travel for the purpose of recreation and business, and the provision of services for this act. Tourists are persons who are “travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes not related to the exercise of an activity remunerated from within the place visited”. A more comprehensive definition would be that tourism is a service industry, comprising a number of tangible and intangible components. The tangible elements include transport systems – air, rail, road, water and now, space; hospitality services – accommodation, foods and beverages, tours, souvenirs; and related services such as banking, insurance and safety and security. The intangible elements include: rest and relaxation, culture, escape, adventure, new and different experiences.

Many countries depend heavily upon travel expenditures by foreigners as a source of taxation and as a source of income for the enterprises that sell (export) services to these travellers. Sometimes Tourism and Travel are used interchangeably. In this context travel has a similar definition to tourism, but implies a more purposeful journey. The term tourism is sometimes used pejoratively, implying a shallow interest in the societies and places that the tourist visits.

One of the earliest definitions of Tourism was given by the Austrian economist Hermann Von Schullard in 1910. He defined it as “sum total of operators, mainly of an economic nature, which directly relate to the entry, stay and movement of foreigners inside and outside a certain country, city or a region”.

Tourism may be classified into the following types:

- Inbound international tourism: Visits to a country by nonresidents of that country.
- Outbound international tourism: Visits by the residents of a country to another country.
- Internal tourism: Visits by residents of a country to their own.
- Domestic tourism: Inbound international tourism + internal tourism.
- National tourism: Internal tourists + outbound international tourism.

Wealthy people have always travelled to distant parts of the world to see great buildings or other works of art; to learn new languages; or to taste

new cuisine. As long ago as the time of the Roman Republic places such as Bali were popular coastal resorts for the rich.

The terms *tourist* and *tourism* were first used as official terms in 1937 by the League of Nations. Tourism was defined as people travelling abroad for periods of over 24 hours. The history of European tourism can perhaps be said to originate with the medieval pilgrimage. Although undertaken primarily for religious reasons, the pilgrims in the Canterbury Tales quite clearly saw the experience as a kind of holiday (the term itself being derived from the 'holy day' and its associated leisure activities). Pilgrimages created a variety of tourist aspects that still exist – bringing back souvenirs, obtaining credit with foreign banks (in medieval times utilising international networks established by Jews and Lombards), and making use of space available on existing forms of transport (such as the use of medieval English wine ships bound for Vigo by pilgrims to Santiago De Compostella). Pilgrimages of one sort or another are still important in modern tourism – such as to Lourdes or Knock in Ireland. But there are modern equivalents – Graceland and the grave of Jim Morrison in Pere Lanchaise Cemetery.

Nowadays tourists have higher levels of disposable income and greater leisure time. They are also better educated and have more sophisticated tastes. There is now a demand for a better quality product in many quarters. This has resulted in the following trends:

- The old 'sun, sea, and sand' mass market has fragmented. People want more specialised versions of it, such as 'Club 18–30', quieter resorts with select hotels, self-catering, etc.
- People are taking second holidays in the form of short breaks/city breaks, ranging from British and European cities to country hotels.
- There has been a growth in niche markets catering for special interests or activities.
- The developments in technology and transport infrastructure (particularly the advent of jumbo jets) have placed some types of holiday in the affordable mainstream:
 - The development of a mass cruise holiday market.
 - The advent of affordable holidays to long-haul destinations such as Thailand or Kenya.
 - The phenomenon of the low budget airline, utilising a new generation of small regional airports.

There have also been changes in lifestyle, which may call into question the current definitions of tourism. Some people may be adopting a tourism lifestyle, living as a tourist all the year round – eating out several times a week, going to the theatre, daytripping, and indulging in short breaks several times a year.

TEXT AND VOCABULARY EXERCISES



28. Find in the text the words or phrases which mean the same as:

- | | |
|------------------------------------|-------------------------------|
| ▪ источник дохода | ▪ международный туризм |
| ▪ внутренний туризм | ▪ национальный туризм |
| ▪ средневековое паломничество | ▪ обычная среда проживания |
| ▪ образ жизни | ▪ питание вне дома |
| ▪ разнообразие туристских аспектов | ▪ транспортная инфраструктура |
| ▪ путешествие ради отдыха | ▪ сфера услуг |
| ▪ материальный | ▪ размещение |
| ▪ пищевые продукты и напитки | ▪ отдых и расслабление |

29. Compose your own sentences with each English equivalent of the words given in Exercise 28. Compare your variants with the sentences of your partner.

30. Work in pairs and decide whether these statements are true or false:

1. Tourism is the act of travel for the purpose of recreation and business.
2. Tourists are persons who are travelling to and staying in places outside their usual environment.
3. No country depends heavily upon travel expenditures by foreigners as a source of taxation and as a source of income for the enterprises that sell (export) services to these travellers.
4. Tourism may be classified into several types.
5. Wealthy people have never travelled to distant parts of the world to see great buildings or other works of art; to learn new languages; or to taste new cuisine.
6. Nowadays tourists have higher levels of disposable income and greater leisure time.
7. There have been changes in modern lifestyle.

31. Divide Text 5B into logical parts and give each a suitable title.

32. Work in pairs, think of some questions to review the contents of Text 5B and ask each other.

33. Fill in the gaps with the words from the box:

founding Hermitage Museum heritage tourism growing attractions popularity
--

Tourism in Russia has been 1 ____ rapidly in the years following the collapse of the former Soviet Union in 1991. Most of the 2 ____ is centered on the cities of Moscow and St. Petersburg, since these cities are the sites of some of the most famous 3 ____ of Russia, such as the Red Square, St. Basil's Cathedral, and the Kremlin in Moscow, and the Peter and Paul Cathedral, the State ____, and the Church of the Saviour on Blood in St. Petersburg, which recently celebrated the anniversary of its 5 ____ in 2003. Tourists are attracted by the very rich cultural 6 ____ and rather tumultuous (*бурный*) history of Russia, and this is reflected in the 7 ____ of Russia's most famous attractions.

Check your answers on p. 279.

34. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about tourism in Russia (Text 19). Be ready to discuss the information you have read.

35. Complete the following text using the facts you know:

What is Russia famous for? Its nature, its cities, its sights, and yet... What would our great "mother Russia" be without its great people – people that are not only worshipped here but also famous all over the world? Some are less famous abroad but nonetheless worth admiring. Who doesn't know the names of Alexander Pushkin, Fyodor Dostoevsky, Anton Chekhov, Pyotr Tchaikovsky?

And yet, there are so many other Russians who came down into history – Lermontov, Bulgakov, Esenin, Levitan, Shishkin, Nesterov, Vrubel, Serov, Aivazovsky, Akhmatova, Turgenev, Tolstoy, Rimsky-Korsakov, Glinka, Borodin, and many, many more!

These are the names that every child in Russia knows. The works of the writers and poets are read in schools, the paintings of the artists looked at in galleries and museums, the beautiful music of the composers listened to at home and in concert halls.

36. Act out the dialogues below in pairs

Dialogue 1. Where Are You From?

Mary: Where are you from, Peter?

Peter: From Kazan. What about you Mary?

Mary: I'm from Izhevsk, the capital of Udmurtia.

Peter: Oh, I do remember now. I heard you sing a song about Izhevsk and the Urals at the concert. You are very fond of your native town, aren't you?

Mary: Yes, I am. I adore it. I am dreaming about going back to my native lands. Very often I am home-sick.

Peter: When did you visit your parents last?

Mary: A year ago. But I keep up a regular correspondence with them. Mother and Father are missing me terribly, so am I.

Peter: I would like you to tell me something about Izhevsk.

Mary: With pleasure, but not at this moment. Now I am in a hurry. I'm going to Helen's birthday party.

Peter: Well, I send her my best regards and wish her many happy returns of the day. Hope to see you tomorrow.

Mary: So long, Peter. Drop in tomorrow evening if you have time.

Dialogue 2. A Boat Trip

- The boat sails in fifteen minutes.
- Let's hurry and find good seats. The boat is filling up very rapidly.
- What is the seating capacity of the boat?
- It accommodates 100 passengers.
- Do you think there will be so many people on the boat today?
- Yes, these boats are often filled to capacity on a nice day such as this.
- The weather turned out so beautiful. Where shall we sit?
- I suggest we go on the upper deck. We will have more fun there.
- If it gets cold, we can go downstairs. Let's take these seats before somebody else does.
- No sooner said than done. Here we are seated comfortably. The breeze is wonderful. The trip takes three hours.
- Where are we going?
- To Greenwich. We arrive at one o'clock.
- At what time does the boat leave Greenwich on return trip?
- At half past four. That gives us three and a half hours to spend there.
- Does the boat go back the same way?
- Yes, it does. We should arrive back at Westminster about eight o'clock.

▪ We never go to bed before eleven o'clock, so it won't be too late for us.

▪ There goes the whistle. We are off on a pleasant trip.

▪ The trip is delightful. I am sorry I didn't know of the trip yesterday. Otherwise I would have prepared some delicious sandwiches to take along.

▪ It doesn't matter. The food served on the boat is wholesome and the prices are reasonable.

▪ Really? What a pleasant surprise!

37. Give the English equivalents to the following Russian words and phrases which were used in the dialogues:

Родной город; откуда Вы? тоскующий по дому; регулярная переписка; поездка восхитительна!

38. Disagree:

Example: I am from New York. I'm not. I'm from London.

a) I live in Atlanta.

b) He likes to visit different cities.

c) I can windsurf.

d) I love travelling.

e) My mother's name is Jane.

f) I have two brothers.

g) I can change a tire.

h) I drive to work.

i) I work for Nestle.

39. Say why:

Example: I like to windsurf because it's very relaxing.

a) I travel ...

b) I go out at night ...

c) I don't smoke ...

d) I work out ...

e) I like the weekends ...

f) People visit their friends ...

g) I like to go for a walk ...

h) I ride my bike ...

40. Make up short dialogues with your partner about tourism and travelling. Begin your dialogues according to the patterns:

Pattern A

– I've heard that your brother has decided to take a trip to ...

– Are you sure of that? When I last spoke to him he told me that he was going to ...

Pattern B

– There are some specific travelling objectives, aren't there?

– Right you are. As a matter of fact...

41. Read and translate the text below about the main library of Great Britain:

Text 5 C
British Library

The Library has excellent holdings of modern British books and periodicals on history and society. These extend in subject matter far beyond the recent history of the British Isles but great emphasis is on British-related topics from the first decades of the twentieth century to today. In addition, the Modern British Collections contain many publications which are themselves the subject of historical research, from legislative documents and political pamphlets to recipe books and popular magazines, each, in their own way, evidence of the particular time in which they were created.

The Library also has rich resources relating to this subject within its various other collections, including: The Early Printed Collections, Manuscripts, The Map library, Sound Archive, Asia, Pacific and Africa Collections, and Newspapers. The British Library Newspapers catalogue includes entries for over 52,000 newspaper and periodical titles.

The collections include: all UK national daily and Sunday newspapers from 1801 to the present; most UK and Irish provincial newspapers, some dating from the early 18th century; selected newspapers from around the world in European languages, some dating from the 17th century; and a wide range of UK and Irish popular periodicals.

TEXT AND VOCABULARY EXERCISES



42. Find in the text the words or phrases which mean the same as:

- | | |
|----------------------------------|-----------------------------------|
| ▪ отличный, превосходный | ▪ фонды (библиотечные) |
| ▪ периодическое издание (журнал) | ▪ статья (в словаре, справочнике) |
| ▪ по-своему | ▪ законодательные документы |
| ▪ газета | ▪ рукопись |
| ▪ очевидность, подтверждение | ▪ исследование |

43. Complete the sentences according to the text above:

1. The Library has excellent ____ of modern British books and periodicals on history and society.
2. ____ the modern British Collections contain many publications.

3. The Library also has rich resources ____ to this subject within its various other collections.

4. The British Library Newspapers catalogue includes ____ for over 52,000 newspaper and periodical titles.

5. The collections ____ all UK national daily and Sunday newspapers from 1801 to the present.

44. Work with a partner. Take turns to ask and answer questions to text 5C. Use the words and word combinations below:

holdings of modern British books	periodicals on history and society
many publications	historical research
legislative documents	political pamphlets
popular magazines	rich resources
periodical titles	a wide range of

45. Translate the following text into English:

Британская библиотека

Британская библиотека Соединенного Королевства является одной из самых известных библиотек мира. Ежедневно библиотека получает копию каждой публикации, выпущенной в Соединенном Королевстве и Ирландии. Её коллекции включают 150 миллионов наименований на самых распространенных языках мира. В ней хранятся рукописи, карты, газеты, журналы, печатные или рисованные, музыкальные издания и патенты.

Британская библиотека является сравнительно молодой среди других государственных библиотек. Её основание началось в 1969 году. В 1972 году Акт о Библиотеке Британии был одобрен Парламентом. 1 июля 1973 года библиотека начала свою работу.

Ежедневно более 16 тысяч человек пользуются коллекциями библиотеки. Около полумиллиона человек посещают читальные залы Британской библиотеки. Архив Звучащей библиотеки хранит звуковые записи девятнадцатого века в виде цилиндров и современных CD, DVD дисков. В библиотеке хранятся 8 миллионов марок и других единиц филателии. Книжные полки библиотеки составляют более 625 км и ежегодно увеличиваются на 12 км. Если вы просматриваете 5 изданий в день, то вам потребуется 80 лет, чтобы увидеть всю коллекцию целиком. Вы можете увидеть в выставочных галереях среди других национальных сокровищ самую древнюю печатную книгу Diamond Sutra.

46. Read the text below. Be ready to answer the following questions:

Text 5 D
Public Libraries

- 1. Is there any difference between the lending library and the reference library?*
- 2. What kind of literature/publications can you read in the reading room?*
- 3. What do you know about the reference library?*

Anyone may join a library, that is become a member, and it costs nothing to borrow books. At the lending library you may borrow books and keep them for a fortnight. If, at the end of the fortnight, you have not finished reading a book, you may renew it for another fortnight. If the book you want is out you may ask the librarian to keep it for you when it is returned. Most public libraries also have a reading-room and a reference library. In the reading-room there are tables and desks where you can sit and read the daily paper and all the other important periodicals (the weeklies, monthlies and quarterlies). In the reference library there are encyclopedias, dictionaries, atlases, and other books of reference. They are not for continuous reading. We refer to them on occasion.

I get some of my books from the library. There is a very good one in the town where I live and the librarian knows a lot about literature and librarianship. She gives me advice about literature and recommends me what books to take. But I buy quite a lot of books too, particularly those that I have read before and have enjoyed. I have books of fiction, science fiction, historical novels, detective stories, adventure and travel books in my collection. I am a passionate reader. I like to sit in my room where my books are and, even if I am not reading. I like to look at the books on my shelves and to feel that I have my friends round me.

TEXT AND VOCABULARY EXERCISES



47. Find in the text the words or phrases which mean the same as:

- | | |
|-----------------------|------------------------------------|
| ▪ библиотечное дело | ▪ публичная библиотека |
| ▪ энциклопедия | ▪ еженедельная газета |
| ▪ научная фантастика | ▪ беллетристика |
| ▪ библиотекарь | ▪ большой любитель чтения |
| ▪ (еже)месячный | ▪ (еже)квартальный |
| ▪ исторические романы | ▪ детективные истории |
| ▪ при случае | ▪ продлить срок пользования книгой |

48. Ask your partners:

1. If he (she) has a rich collection of books at home.
2. If he (she) has joined a library.
3. If he (she) is a passionate reader.
4. What American and English writers he (she) knows.

49 Fill in the gaps with the words from the box:

informational also literature poetry reference borrow

Every town in Britain has a public lending-library, where you can **1** ___ books and sometimes tapes, too. There is a children's library, an adults' library and a **2** ___ library. The adults section has books on travel, sport, history, cookery and dozens of other **3** ___. There are books of fiction, biography, **4** ___, and humour. There are **5** ___ magazines and newspapers to read. The reference section has a lot of **6** ___ books, which cannot be taken home, but they can be read in the library.

Check your answers on p. 279.

CONVERSATIONAL PRACTICE

50. Read the dialogue, act it out:

In the University Library

John: I'd like to check this out, please. (He gives the librarian the book).

Librarian: May I see your I.D. card (зд. читательский билет), please? Then fill out this form.

John: How long can I keep the book?

Librarian: For two weeks. It'll be due in two weeks from today.

John: Can I have it renewed after that?

Librarian: Yes. Just bring it and we'll stamp it again.

John: All right. Thank you very much.

51. Compose your own dialogues using the information of texts 5C and 5D.

52. What would you answer if somebody asked you the following?

A.: I'd like to check out this book, please.

B.:

A.: Here you are. I am in the English department.

B.:

A.: Can I have it renewed after then?

B.:

A.: Thank you very much. Bye.

53. Discuss the following:

1. Does reading play an important role in your life?
2. How much time do you devote to it?
3. Do you read for pleasure or information, or both?
4. How often do you visit library? Do you like it?
5. How long can you keep books?

54. Speak about the statements below. To what extent do you think they are true? Express your own point of view:

1. Love for reading gives those who are great readers of books an advantage over those who have not read so much.
2. There is an art of reading as well as an art of writing.
3. The classics are boring.
4. The classics never die.

WRITING PRACTICE



55. Read the following text carefully in order to discover the main line of thought and make a plan for writing a short summary:

The Library of Congress

The Library of Congress is the Nation's library in the USA. It serves not only to members and committees of the Congress, but to libraries throughout the USA and the world, and to the scholars, researchers and scientists who use it.

Its foundation was laid in 1815 when President Thomas Jefferson offered his personal library accumulated for 50 years and considered one of the best in the United States at that time as the basis for a great national library. Now the Library of Congress complex on Capital Hill includes three buildings. The Thomas Jefferson Building, which has been built in Italian Renaissance style, is the oldest of them. It was the largest and costliest library building in the world when it was completed in 1897. It is decorated with splendid sculpture, murals created by 50 American artists. Its Main Reading Room is 160 feet high.

The Room houses a collection of 45,000 reference books, a part of the extensive main catalog of more than 23 million cards and desks for 212 readers. The computer Catalog Center provides public access to the Library's automated catalog.

The simply designed John Adams Building faced with white marble, was opened in 1939. Sculptures on its large doors represent 12 famous writers. The white marble James Madison Memorial Building opened in 1980 more than doubled the Library's available Capitol Hill space. The building, which is the official memorial to the Nation's fourth President, contains the James Madison Memorial Hill, exhibition areas, eight reading rooms, offices and storage areas for collections which number over 50 million items.

READING FOR FUN

56. Put in the missing words from the box. Be ready to discuss this joke with your partner.

Down, in (4), at (2), off (2), out of, of (2), into, to (2), with, on (2), instead, by, about
--

A Frenchman, an Englishman, and an American were boasting ____ how fast the trains go ____ their countries. The Frenchman said '____ my country the trains go so fast that the telegraph posts ____ the line look like the a garden fence.' The Englishman said '____ England the trains go so fast that we have to pour water ____ the wheels to cool them because they get white hot and could melt.' The American said 'That's nothing. You must come ____ America to see how fast the trains go there. I was once leaving ____ a trip and my wife came ____ me to see me ____ . I got ____ the train and was standing ____ the window ____ my compartment. I wanted to give a kiss ____ my wife as the train was just starting. So I leant ____ ____ the window ____ my compartment to give her a kiss. But the train went ____ such a speed that ____ I kissed a cow ____ a field six miles ____ the line.

UNIT 6

Pre-Text Exercises

Word Building

Active Vocabulary

Text 6 A. *Our planet – the Earth*

Text 6 B. *Environmental Problems of the Earth*

Text 6 C. *Ecological Problems of Russia*

Text 6 D. *Pollution of Environment*

Text and Vocabulary Exercises

Conversational Practice

Writing Practice

PRE-TEXT EXERCISES

1. Look at the following international words, guess their meaning and check the pronunciation:

Million; galaxy; planet; person; diameter; kilometer; equator; mass; kilogram; orbit; second; perspective; system; meter; energy; absorb; temperature; season; effect; dramatic; circulation; atmosphere; ozone; result; ocean; factor.

2. Here are some expressions with the preposition *after*. Translate and learn them:

- after all
- day after day
- long after, soon after
- to be named (called) after somebody
- the day after tomorrow

3. Fill in the gaps with the preposition *after* or the expressions above in the appropriate form:

1. They did this hard work ____.
2. We shall finish this exercise ____.
3. She will clean the flat ____ he comes.
4. John is ____ his uncle.
5. ____ days and nights of waiting his parents were happy to see him.
6. We ____ our baby ____ our great grandfather.
7. ____ these years of searching he found his treasure.
8. The tournament will be held ____.
9. He polishes his car ____ and looks so happy.
10. We shall eat this cake ____ the guests come.

4. Fill in the gaps with the correct prepositions:

1. ___ fact he was right but she didn't want to tell it.
2. He met her ___ the street but didn't call her.
3. She went to the cinema ___ going to the lectures.
4. In our country children go to school ___ seven.
5. The children threw the stones ___ crows and laughed.
6. He did it ___ once without thinking about it.
7. We learn a lot of poems ___ heart at school.
8. Harry cared ___ his children very much as he was a model father.

5. Choose the correct word to complete the sentences:

1. He will always depend ___ his brother because he has no money.
a) *in*; b) *over*; c) *on*.
2. They found ___ that she had lost the documents.
a) *over*; b) *above*; c) *out*.
3. She was upset very much because all her dresses were ___ fashion.
a) *out of*; b) *on in*; c) *out after*.
4. We came here not on holiday but ___ business.
a) *to*; b) *on*; c) *at*.
5. Our children spend a lot of time ___ doors and they look well.
a) *from above*; b) *on in*; c) *out of*.
6. You know we must talk it ___ and then we shall tell you our decision.
a) *among*; b) *over*; c) *above*.
7. Nancy apologized ___ her friend and closed the door.
a) *to*; b) *on*; c) *at*.
8. Larry is always so attentive ___ his nieces.
a) *at*; b) *to*; c) *from*.
9. This house has been ___ repair for five years.
a) *over*; b) *after*; c) *under*.
10. She was shaking ___ fear and was deathly pale.
a) *on*; b) *with*; c) *in*.

6. BRAINSTORMING: What is your understanding of the phenomena below? Give examples.

- global warming
- air pollution
- acid rain

WORD BUILDING

7. Guess the meaning of the words in bold type:

to conceive – **conceivable** – **conceivably** – **inconceivable** – **inconceivably**; to transform – **transformation** – **transformer**; to react – **reactive** – **reactivate** – **reactivator** – **reactivation** – **reaction** – **reactionless** – **reactionary**; to circulate – **circulation**; to develop – **development** – **undeveloped** – **underdeveloped**; to grade – **gradual** – **gradually** – **to upgrade**; to notice – **noticeable** – **noticeably**; to relate – **relationship**; to create – **creature** – **creation** – **creative** – **creator** – **creativity**

8. Choose the correct translation of the following English words:

eventually	конечный	в конце концов	событие
helpful	полезный	бесполезный	полезно
consciously	сознательный	осознанно	неосознанно
significantly	существенно	существенный	значение
tolerant	терпимость	терпимый	нетерпимый
divergent	различный	различие	различно
impossible	возможный	возможно	невозможный
impractical	непрактичный	практичный	непрактично

9. Form nouns from the following words using suffixes *-ment*, *-ance*, *-ence*, *-tion*, *-ion*, *-ation*. Translate them into Russian:

Maintain, require, perform, differ, develop, achieve, fulfil, equip, move, construct, produce, transform, exist, generate, circulate, contaminate, preserve, interfere, destruct, prevent, evaluate, protect, create, reproduce, pollute, require, purify.

10. Add the prefix to form words with the opposite meaning:

an ___resistible	an ___responsible	an ___legal business
temptation	student	agreement
an ___accurate	an ___mature young	an ___convenient
calculation	poet	arrangement
an ___moral action	an ___logical answer	an ___possible idea
an ___patient driver	an ___secure feeling	an ___polite answer
an ___literate person	___legible handwriting	an ___regular train
		service
an ___dependent	___formal clothes	an ___expensive
person		present

11. Find a noun in each line:

- a) enlarge b) precaution c) take d) write
a) bend b) deepen c) destroy d) density
a) operate b) operator c) together d) alone

ACTIVE VOCABULARY

12. Read and memorize the following words and word combinations:

to absorb – поглощать	impact – влияние, воздействие
acid rain – кислотный дождь	in a sense – в некотором смысле
to affect – воздействовать	interference – вмешательство
circulation – круговорот, циркуляция	living things – живые существа
compared to – по сравнению с ...	nuclear power source – источник ядерной энергии
to contaminate – загрязнять	on the one hand ... , on the other hand – с одной стороны ..., с другой стороны
contamination – загрязнение	ozone layer – озоновый слой
to create – создавать	petroleum – нефть
to be of crucial importance – иметь критическое значение	pollution – загрязнение
depletion – истощение	poisonous – ядовитый
destruction – разрушение	preservation – сохранение
to deteriorate – ухудшаться	to prevent – предотвращать
to emit – испускать	to protect – охранять, защищать
environment – окружающая среда	to provide – обеспечивать
to evaluate – оценивать	purification – очистка
to exist – существовать	renewable natural resources – возобновляемые природные ресурсы
fossil fuel – ископаемое топливо	reproduction – воспроизводство
from a perspective – с точки зрения	to require – требовать
to generate – производить	significance значение
global warming – глобальное потепление	to survive – выживать
greenhouse effect – парниковый эффект	to transform – преобразовать
harmful – вредный	vegetation – растительность
hazardous – опасный, рискованный	wildlife – живая природа

13. Read and translate the text below focusing on the Earth's relationship with the sun:

Text 6 A

Our Planet — the Earth

Our galaxy, the Milky Way, is part of the universe, which includes millions of other galaxies and their stars and planets. Compared to the rest of the universe, the Earth is very small. Compared to a person, on the other hand, the Earth is enormous. It has a diameter of 12,756 kilometers at the equator, and it has a mass of about 6×10^{24} kilograms. The Earth orbits the sun at a speed of about 29.79 kilometers per second.

From our perspective on Earth, the sun looks very small. This is because it is about 93 million miles away from us. The sun's diameter at its equator is about 100 times bigger than Earth's, and about a million Earths could fit inside the sun. The sun is inconceivably bigger. But without the sun, the Earth could not exist. In a sense, the Earth is a giant machine, full of moving parts and complex systems. All those systems need power, and that power comes from the sun.

The sun is an enormous nuclear power source – through complex reactions, it transforms hydrogen into helium, releasing light and heat. Because of these reactions, every square meter of our planet's surface gets about 342 Watts of energy from the sun every year. The only way the Earth could generate more power than the sun would be if every three people had a power plant of their own. When this energy reaches the Earth, it provides power for a variety of reactions, cycles and systems. It drives the circulation of the atmosphere and the oceans. It makes food for plants, which many people and animals eat. Life on Earth could not exist without the sun, and the planet itself would not have developed without it.

As the Earth spins on its axis, parts of the planet are in the sun while others are in the shade. In other words, the sun appears to rise and set. The parts of the world that are in daylight get warmer while the parts that are dark gradually lose the heat they absorbed during the day. You can get a sense of how much the sun affects the Earth's temperature by standing outside on a partly cloudy day.

When the sun is behind a cloud, you feel noticeably cooler than when it is not. The surface of our planet absorbs this heat from the sun and emits it the same way that pavement continues to give off heat in the summer after the sun goes down. Our atmosphere does the same thing – it absorbs the heat that the ground emits and sends some of it back to the Earth.

The Earth's relationship with the sun also creates seasons. The Earth's axis tips a little – about 23.5 degrees. One hemisphere points toward the sun as the other points away. The hemisphere that points toward

the sun is warmer and gets more light – it's summer there, and in the other hemisphere it's winter. This effect is less dramatic near the equator than at the poles, since the equator receives about the same amount of sunlight all year. The poles, on the other hand, receive no sunlight at all during their winter months, which is part of the reason why they're frozen.

Most people are so used to the differences between night and day (or summer and winter) that they take them for granted. But these changes in light and temperature have an enormous impact on other systems on our planet. One is the circulation of air through our atmosphere.

For example: The sun shines brightly over the equator. The air gets very warm because the equator faces the sun directly and because the ozone layer is thinner there. As the air warms, it begins to rise, creating a low pressure system. The higher it rises, the more the air cools. Water condenses as the air cools, creating clouds and rainfall. The air dries out as the rain falls.

The result is warm, dry air, relatively high in our atmosphere. Because of the lower air pressure, air rushes toward the equator from the north and south. As it warms, it rises, pushing the dry air away to the north and the south. The dry air sinks as it cools, creating high-pressure areas and deserts to the north and south of the equator.

This is just one piece of how the sun circulates air around the world – ocean currents, weather patterns and other factors also play a part. But in general air moves from high-pressure to low-pressure areas, much the way that high-pressure air rushes from the mouth of an inflated balloon when you let go. Heat also generally moves from the warmer equator to the cooler poles. Imagine a warm drink sitting on your desk – the air around the drink gets warmer as the drink gets colder. This happens on Earth on an enormous scale.



TEXT AND VOCABULARY EXERCISES

14. Find in the text the words or phrases which mean the same as:

- | | |
|-------------------------------|-------------------------------|
| ▪ ставить наравне, уподоблять | ▪ большой |
| ▪ существовать | ▪ ухудшаться |
| ▪ источник энергии | ▪ преобразовывать |
| ▪ производить | ▪ обеспечивать |
| ▪ развивать(ся) | ▪ постепенно |
| ▪ терять (что-л.) | ▪ получать |
| ▪ считать само собой | ▪ циркулировать, двигаться по |
| разумеющимся | кругу |
| ▪ относительно, сравнительно | ▪ иметь огромное воздействие |

15. Find in the text the synonyms to the following words:

- | | |
|-----------------|--------------|
| ▪ to liken | ▪ large |
| ▪ to subsist | ▪ to worsen |
| ▪ to produce | ▪ to evolve |
| ▪ comparatively | ▪ to revolve |

16. Find Russian equivalents to the following word combinations:

Nuclear power source; to release light and heat; power plant; a variety of reactions; the circulation of the atmosphere; to absorb heat; over the equator; a low pressure system; high-pressure areas; in general; an enormous scale.

17. Find the English equivalent to the following Russian words:

- | | | | |
|---------------------------|-----------------|----------------|-----------------|
| 1. вселенная | a) university | b) universal | c) universe |
| 2. изменять(ся) | a) to transform | b) to transfer | c) to translate |
| 3. поверхность | a) surfing | b) surface | c) surfusion |
| 4. круговорот | a) circulation | b) circuit | c) circus |
| 5. подвергать воздействию | a) to affiliate | b) to affect | c) to effect |
| 6. излучать | a) to emit | b) to permit | c) to mitigate |
| 7. получать | a) to recede | b) to receive | c) to recess |

18. Fill in the gaps with a suitable word:

1. Our galaxy, the Milky Way, is part of the universe, which ____ millions of other galaxies.

- *includes* ▪ *included* ▪ *were included* ▪ *is including*

2. Compared to the rest of the universe, the Earth is very ____.

- *small* ▪ *the smallest* ▪ *more small* ▪ *smaller*

3. Most people ____ so used to the differences between night and day that they take them for granted.

- *is* ▪ *are* ▪ *was* ▪ *were*

4. The only way the Earth ____ generate more power than the sun would be if every three people had a power plant of their own.

- *could* ▪ *can* ▪ *must* ▪ *may*

5. When the ____ is behind a cloud, you feel noticeably cooler than when it is not.

- *Moon* ▪ *Earth* ▪ *Sun* ▪ *Venus*

19. Complete these sentences with information from the text and put them in the right order:

1. The Earth's relationship with the Sun also creates ____.
2. The sun shines brightly over the ____.
3. The sun is an enormous nuclear ____.
4. The only way the Earth could generate more power than the sun would be if ____.
5. Because of the lower air pressure, air rushes toward ____.
6. Life on Earth could not exist without the Sun, and the planet itself would ____.
7. Our galaxy, the Milky Way, is part of the universe, which includes millions of other ____.
8. From our perspective on Earth, the Sun looks very ____.

20. Think of some questions to review the contents of Text 6A and ask each other.

21. Read the text below to find answers to the given questions:

Text 6 B Environmental Problems of the Earth

1. What is environment?

The environment is our physical surroundings. This includes both human (man-made), social, and physical (natural) features. Natural features include soil, the atmosphere, vegetation and wildlife. Human features include housing, transport and industry. Social features include things such as culture, language and political systems.

A variety of environmental problems now affect our entire world. As globalization continues and the Earth's natural processes transform local problems into international issues, few societies are being left untouched by major environmental problems.

Many people are concerned about human action in the environment. Human interference with the environment causes many environmental problems. Some of the largest problems now affecting the world are acid rain, air pollution, global warming, hazardous waste, ozone depletion, smog, water pollution, overpopulation, and rain forest destruction. Every environmental problem has causes, numerous effects, and most importantly, a solution.

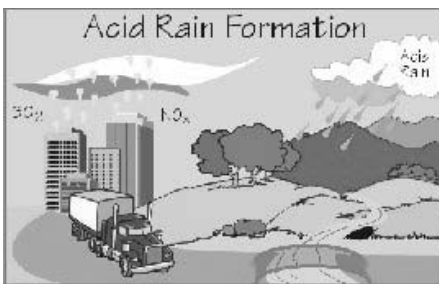
2. What causes acid rain?

Acid rain is caused by the burning of fossil fuels. Burning oil, gas and coal in power stations releases sulphur dioxide (SO₂) into the atmosphere.

Burning oil and petrol in motor vehicles puts nitrogen oxides (NO_x) into the atmosphere. These gases mix with water droplets in the atmosphere creating weak solutions of nitric and sulphuric acids. When precipitation occurs these solutions fall as acid rain.

3. What problems are caused by acid rain?

Acid rain increases the acidity levels of rivers, lakes and seas. This can kill aquatic life. Acid rain increases the acidity levels of soils. This can kill vegetation. Acid rain from the UK has been found to destroy the roots and leaves of forests in Germany and Scandinavia. Acid rain can erode buildings and monuments (particularly if they are made from limestone).



4. What is global warming?

Global warming is the worldwide warming of the atmosphere. Global warming is caused by the increases in the amount of carbon dioxide and other gases being released into the atmosphere by the burning of fossil fuels. These gases add to the natural greenhouse effect.

5. What is the greenhouse effect?

To understand global warming you first need to know about the greenhouse effect. The greenhouse effect is a natural phenomenon that controls the balance of heat within the Earth's atmosphere. It is the process whereby the natural layer of gases in our atmosphere traps a small percentage of the sun's radiation reflected from the Earth's surface. Without the greenhouse effect, the average surface temperature would be about -18 degrees Celsius.

6. What problems are caused by global warming?

Sea levels will rise due to the melting of the ice caps. This will cause flooding in many low-lying areas of the world. These areas include Bangladesh, East Anglia (England) and The Netherlands.

7. What is water pollution?

Water is necessary to life on earth. All organisms contain it; some live in it; some drink it. Plants and animals require water that is moderately pure, and they cannot survive if their water is loaded with toxic chemicals or harmful microorganisms. If severe, water pollution can kill large numbers of fish, birds, and other animals, in some cases killing all members of a species in an affected area.

Pollution makes streams, lakes, and coastal waters unpleasant to look at, to smell, and to swim in. Fish and shellfish harvested from polluted

waters may be unsafe to eat. People who ingest polluted water can become ill, and, with prolonged exposure, may develop cancers or bear children with birth defects. The major water pollutants are chemical, biological, or physical materials that degrade water quality. Pollutants can be classed into eight categories, each of which presents its own set of hazards.

8. What is the harmful effect of petroleum products?

Oil and chemicals derived from oil are used for fuel, lubrication, plastics manufacturing, and many other purposes. These petroleum products get into water mainly by means of accidental spills from ships, tanker trucks, pipelines, and leaky underground storage tanks. Many petroleum products are poisonous if ingested by animals, and spilled oil damages the feathers of birds or the fur of animals, often causing death. In addition, spilled oil may be contaminated with other harmful substances.

9. What is the harmful effect of pesticides and herbicides?

Chemicals used to kill unwanted animals and plants, for instance on farms or in suburban yards, may be collected by rainwater runoff and carried into streams, especially if these substances are applied too lavishly. Some of these chemicals are biodegradable and quickly decay into harmless or less harmful forms, while others are not biodegradable and remain dangerous for a long time.

10. What are environmental engineers?

Environmental engineers develop solutions to environmental problems using the principles of biology and chemistry. They are involved in water and air pollution control, recycling, waste disposal, and public health issues.

Environmental engineers conduct hazardous-waste management studies in which they evaluate the significance of the hazard, advice on treatment and containment, and develop regulations to prevent mishaps. They design municipal water supply and industrial wastewater treatment systems. They conduct research on the environmental impact of proposed construction projects, analyze scientific data, and perform quality-control checks.

Environmental engineers are concerned with local and worldwide environmental issues. They study and attempt to minimize the effects of acid rain, global warming, automobile emissions, and ozone depletion. They may also be involved in the protection of wildlife. Many environmental engineers work as consultants, helping their clients to comply with regulations and to clean up hazardous sites.

TEXT AND VOCABULARY EXERCISES



22. Find in the text the words or phrases which mean the same as:

- | | |
|------------------------------|------------------------------|
| ▪ окружающая среда | ▪ ядовитые химикалии |
| ▪ выпадение осадка | ▪ подвергать воздействию |
| ▪ водное загрязнение | ▪ человеческое вмешательство |
| ▪ проводить исследование | ▪ физическая среда |
| ▪ оценить значение опасности | ▪ растительность |

23. Compose your own sentences with each English equivalent of the words or phrases given in exercise 22. Compare your variants with the sentences of your partner.

24. Work in pairs and decide whether these statements are true or false:

1. The environment is our physical surroundings and it includes only human (man-made) features.

2. People are never concerned about human action in the environment.

3. Some of the largest problems now affecting the world are acid rain, air pollution, global warming, etc.

4. Acid rain is caused by the burning of fossil fuels.

5. The term “global warming” does not mean the worldwide warming of the atmosphere.

6. To understand global warming you first need to know about the greenhouse effect.

7. Water is necessary to life on earth.

8. People who ingest polluted water can not become ill.

9. Many petroleum products are poisonous if ingested by animals, and spilled oil damages the feathers of birds or the fur of animals, often causing death.

10. Chemicals used to kill unwanted animals and plants may be collected by rainwater runoff and carried into streams, especially if these substances are applied too lavishly.

11. Environmental engineers develop solutions to environmental problems using the principles of biology and chemistry.

12. Environmental engineers conduct research on the environmental impact of proposed construction projects, analyze scientific data, and perform quality-control checks.

25. Explain in Russian the meaning of the following word combination:

physical surroundings; globalization; human action in the environment; acid rain; global warming; greenhouse effect; water pollution; oil and chemicals; to develop solutions to environmental problems.

26. Fill in the gaps with the words from the box:

interaction smog air disappear oxygen industrial atmosphere

Large cities with thousands of smoky **1** ___ enterprises have appeared all over the world today. The byproduct of their activity pollutes the **2** ___ we breathe, the water we drink, the land we grow grain and vegetables on. Every year world industry pollutes the **3** ___ with about 1000 million tons of dust and harmful substances. Many cities suffer from **4** ___. Vast forests are cut and burned in fire. Their disappearance upsets the **5** ___ balance. As a result some rare species of animals, birds, fish and plants **6** ___ forever, a number of lakes and rivers dry up. The pollution of air and the world's ocean, destruction of the ozone layer are the result of man's careless **7** ___ with nature, a sign of ecological crises.

Check your answers on p. 279.

27. Match each word in A with the Russian equivalent in B:

- | A | B |
|-------------------|-------------------------|
| 1. to transform | a. существовать |
| 2. to exist | b. вмешательство |
| 3. impact | c. преобразовать |
| 4. interference | d. живые существа |
| 5. destruction | e. создавать |
| 6. living things | f. разрушение |
| 7. to create | g. живая природа |
| 8. wildlife | h. влияние, воздействие |
| 9. to deteriorate | i. выживать |
| 10. harmful | j. требовать |
| 11. to survive | k. вредный |
| 12. to require | l. ухудшаться |

28. Read the text below to learn about the ecological problems of Russia:

Text 6 C
Ecological Problems of Russia

In today's world, preservation of the environment is of crucial importance for the future of civilization. In the near future the importance of maintaining the environment at a level capable of supporting human life and ensuring the reproduction of renewable natural resources and preservation of non-renewable resources will eclipse all other human achievements to date.

The demographic explosion and scientific and technological revolution of the second half of the twentieth century have led to a sharp increase in the exploitation of natural resources, and thus to their depletion. For example, currently more than 3.5 billion tonnes of oil and about 4.5 billion tonnes of coal and charcoal are taken out of the ground every year. Furthermore, the human race produces a huge quantity of industrial and domestic waste.

Between 1970 and 1990, the planet was stripped of almost 200 million hectares of forest; there has been serious degradation and desertification of vast tracts of land; soil pollution by waste, rubbish, slag-heaps, heavy metals, pesticides, toxins, radioactive materials, and abandoned and disused factories.

Pollution of the atmosphere is caused mainly by the industrial and transport sectors, which combined emit millions of tonnes of solid and gaseous substances; of these, the major pollutants are: soot, carbon dioxide, sulphurous gases, chlorofluorohydrocarbons, and acids. Also under threat are the planet's water resources, which are of no less importance for the survival of the human race.

The human race mainly uses fresh water from the ground, rivers and lakes; in volume, they make up just over 2% of the Earth's water resources (35 million cubic kilometres), but they are distributed unevenly around the world, and the quality of these resources is deteriorating catastrophically.

Water which is used in industry, agriculture, and in the home, returns to reservoirs unfiltered, chemically and biologically polluted. Water resources, therefore, become polluted by oil products and other forms of waste. The enumerated ecological problems, individually and collectively, are leading to the rapid decline in bio-diversity of fauna and flora, both in specific regions and on the planet as a whole.

Russia is the largest country in the world with a territory of more than 17 million square kilometres, covers 12.6% of the dry-land surface of

the planet, and thus bears responsibility for the protection of a significant share of the world's natural and biological diversity. Official data show that currently the ecological situation in Russia is generally poor, and in places catastrophic. 14–15% of Russian territory is classed as ecological 'problem zones'.

In the future, it is expected that the ecological situation will worsen, as projected economic growth is to be achieved principally using out-dated technologies and techniques. Negative ecological and economic factors are among the causes of the worsening demographic situation in Russia. Life expectancy has reached impermissibly low levels: 57 years for men, and 70 years for women.

According to experts' assessments, ecological factors are to a considerable extent responsible for these depressing demographic indicators. Ecological problems are extremely closely intertwined, and are closely connected to global problems, such as: the greenhouse effect, global warming (causing the sea-level to rise by 1.2 mm per year), ozone layer depletion, and destruction of tree cover. Satellite photographs show that forests are being cut down at an alarming rate in Russia.

Society has developed a number of methods for minimizing the ecologically damaging consequences of economic activity, amongst which the most effective are:

- rationalizing the use of natural resources;
- introducing ecologically clean, and low-waste or waste-free technologies; building purification facilities; and rationally locating production;
- concluding various international environmental protection agreements;
- the activities of private, public and state ecological organizations, committees and funds, which promote and sponsor environmental protection activities;
- improving people's ecological awareness through upbringing and education;
- setting up a system of 'Red books' containing information about rare fauna and flora which are on the verge of extinction, etc.

These are only the initial steps of people that must be carried forward to protect the environment not only for the sake of the present but for the future generations.

TEXT AND VOCABULARY EXERCISES



29. Find in the text the English equivalents to the following words:

- | | |
|--------------------------------------|--------------------------------|
| ▪ сохранение | ▪ начальные шаги |
| ▪ экологические проблемы | ▪ водные ресурсы |
| ▪ воспроизводство природных ресурсов | ▪ поддержание окружающей среды |
| ▪ демографический взрыв | ▪ биологическое разнообразие |
| ▪ устарелые технологии | ▪ близко связанный |

30. Find the Russian equivalents to the following phrases:

Preservation of the environment; to be of crucial importance; to support human life; natural resources; demographic explosion; technological revolution; depletion of natural resources; water resources; biological diversity; ecological situation; to be closely connected; global warming; purification facilities; ecological awareness; initial steps; for the sake of; future generations.

31. Match each word in A with the Russian equivalent in B:

- | A | B |
|-----------------|--------------------|
| 1. negative | a. воспроизводство |
| 2. reproduction | b. ответственный |
| 3. worsening | c. разрушение |
| 4. consequence | d. защищать |
| 5. agreement | e. соглашение |
| 6. to protect | f. последствие |
| 7. destruction | g. отрицательный |
| 8. responsible | h. ухудшение |

32. Complete the sentences according to Text 6 C:

1. Preservation of the environment is of ____.
2. The demographic explosion and scientific and technological revolution of the second half of the twentieth century ____.
3. Pollution of the atmosphere is caused mainly by ____.
4. The human race mainly uses fresh water from ____.
5. The enumerated ecological problems are leading to the rapid decline in ____.

6. Negative ecological and economic factors are one of the causes of the ____.

7. Ecological problems are extremely closely intertwined, and are closely connected to ____.

8. Society has developed a number of methods for minimizing the ecologically damaging ____.

33. Find in the text the situations in which the following word combinations are used:

Preservation of the environment; importance of maintaining the environment; the demographic explosion; pollution of the atmosphere; ecological problems; negative ecological and economic factors.

34. Test yourself:

How Green Are You?

green – (зд.) поддерживающий движение защитников окружающей среды

1. If you had a lot of old newspapers and empty bottles, would you ...

- a) *leave them on the pavement?*
- b) *put them in a rubbish bin?*
- c) *recycle them?*

2. If somebody offered to give you one of the following as a gift, which would you choose?

- a) *a big, fast car*
- b) *a motorbike*
- c) *a bicycle*

3. If you were in the middle of a city and wanted to go somewhere one or two kilometres away, would you...

- a) *take a taxi?*
- b) *take a bus?*
- c) *walk/cycle?*

4. If you had a picnic on the beach, what would you do with your rubbish? Would you ...

- a) *leave your rubbish on the beach?*
- b) *put your rubbish in the first bin you found?*
- c) *take your rubbish home?*

5. If you had 1000\$ to spend, would you ...

- a) *buy a fur coat?*
- b) *go on a safari?*
- c) *adopt a dolphin?*

Check at page. 279.

35. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about ecology as a science (Texts 20, 21). Be ready to discuss the information you have read.

36. Read the text and give a brief summary of it:

Text 6 D
Pollution of Environment

Since ancient times nature has served man, being the source of his life. For thousands of years people lived in harmony with environment and it seemed to them that natural riches were unlimited. But with the development of civilization man's interference in nature began to increase. Today the contradictions between man and nature are great. Every year world industry pollutes the atmosphere with about 1000 million tons of dust and other substances. The waste from factories and plants, electric and atomic power stations gets into lakes, rivers and seas, it poisons the air, and it destroys plants and animals. The pollution of the environment affects man's health greatly. It can lead to such diseases as asthma, bronchitis, cancer, it tells on the central nervous system and so on.

Ecological ignorance of the people leads to the further destruction of nature and worsens the living conditions for all living beings. A lot of forests are cut, marshes and lakes are dried. And it breaks the ecological balance and deprives lots of animals of places to live. In the course of its history mankind has waged destructive wars which didn't spare the nature. People have destroyed nature by building huge cities, cutting woods, excavating mountains and digging mines. In pursuit of new inventions and discoveries, as well as higher and higher profits man has forgotten about nature and it has led him to the edge of the ecological catastrophe. Mankind has nearly committed suicide. So the goal of mankind is to stop destroying the planet we live on first of all. And then step by step we must begin to restore what has been destroyed, so that future generations could happily live here.

TEXT AND VOCABULARY EXERCISES



37. Find in the text the words or phrases which mean the same as:

- | | |
|----------------------------------|----------------------------|
| ▪ древние времена | ▪ восстановить |
| ▪ вмешательство человека | ▪ противоречия |
| ▪ экологический баланс | ▪ экологическое невежество |
| ▪ прекращать, уничтожать | ▪ лишить |
| ▪ в гармонии с окружающей средой | |

38. Translate the following phrases into Russian:

Source of his life; to live in harmony with environment; to be unlimited; development of civilization; contradictions between man and nature; to pollute the atmosphere; to destroy plants and animals; to affect man's health; ecological ignorance; to worsen the living conditions; to stop destroying the planet; destructive wars.

39. Make up situations using the English phrases given in exercise 38.

40. Choose among the words in parentheses the one that corresponds to the text above to complete the sentences:

1. Today the ____ between man and nature are great.
(a. *agreements*; b. *relations*; c. *contradictions*)
2. With the development of ____ man's interference in nature began to increase.
(a. *globalization*; b. *civilization*; c. *evolution*)
3. The pollution of the environment ____ man's health greatly.
(a. *affects*; b. *effects*; c. *reacts*)
4. Ecological ____ of the people leads to the further destruction of nature and worsens the living conditions for all living beings.
(a. *knowledge*; b. *comprehension*; c. *ignorance*)
5. People ____ nature by building huge cities, cutting woods, excavating mountains and digging mines.
(a. *have destroyed*; b. *have created*; c. *have formed*)
6. The goal of mankind is ____ destroying the planet we live on first of all.
(a. *to stop*; b. *to begin*; c. *to continue*)

41. Fill in the gaps with the words from the box:

environment human definition branch organisms

Ecology is usually considered a **1** ____ of biology, the general science that studies living **2** _____. Ecology is a multi-disciplinary science. Because of its focus on the higher levels of the organization of life on earth and on the interrelations between organisms and their **3** ____, ecology draws heavily on many other branches of science, especially geology and geography, meteorology, chemistry, and physics. Agriculture, fisheries, forestry, medicine and urban development are among **4** ____ activities that would fall within explanation of the **5** ____ of ecology: "where organisms are found, how many occur there, and why".

Check your answers on p. 279.

42. Find as many words concerning the problem of ecology as you can:

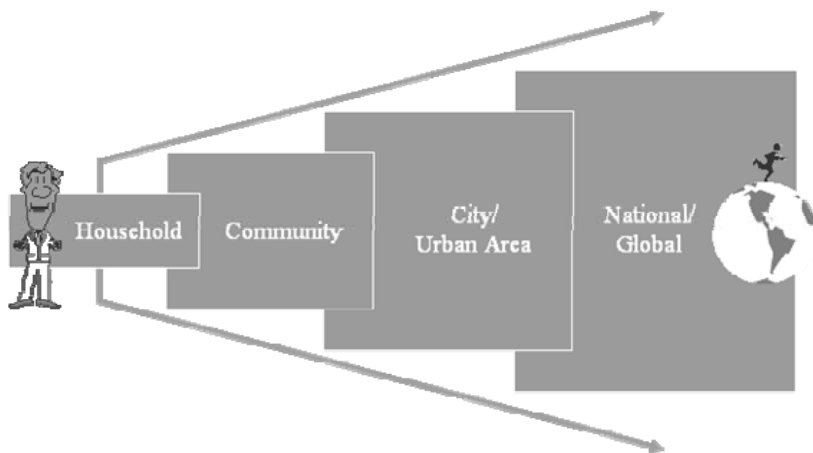
N	E	C	O	L	O	G	Y	K	E	D	M
W	P	N	R	S	Y	P	P	E	H	U	O
E	O	E	V	U	H	Z	O	O	P	M	Z
A	L	W	I	I	X	O	P	I	E	P	O
P	L	S	A	M	R	P	R	B	S	I	N
O	U	V	A	D	I	O	A	T	X	O	E
N	T	A	K	F	R	L	N	O	A	N	N
E	I	G	K	W	E	L	A	M	T	G	I
N	O	D	M	A	X	U	S	Y	E	R	E
W	N	N	S	S	I	T	T	S	B	N	Q
W	T	X	I	U	D	E	E	A	Y	O	T
G	A	Y	S	L	R	Q	H	V	P	A	F
D	V	S	G	Q	O	V	L	E	W	S	B
E	D	C	T	D	H	L	I	P	V	U	Y
E	A	O	R	E	J	D	V	V	Q	L	I
R	V	A	C	A	U	S	E	Q	E	R	Q
Q	P	S	Y	N	I	W	M	K	O	D	E

CONVERSATIONAL PRACTICE

43. Speak about ecological situation in Russia using the Active Vocabulary and the expressions below:

- | | |
|---|---------------------------------|
| ▪ I think we should ... | ▪ It would be better to ... |
| ▪ The best way to ... is to ... | ▪ It is important to ... |
| ▪ I (don't) think it's a good idea to ... | ▪ I like .../ I really like ... |
| ▪ I don't agree... | ▪ I don't mind ... |

44. Use the diagram to discuss with your partners the problems of environmental pollution.



WRITING PRACTICE

45. Read the following text carefully in order to discover the main line of thought and make a plan for writing a summary:

The Earth's oxygen content is maintained by plants. Plants use a process called photosynthesis to convert carbon dioxide and water molecules into carbohydrate and oxygen molecules. Carbohydrates are a broad class of molecules ranging from the cellulose that gives the plant its rigidity to the sugars that provide energy for the plant and for the animals that eat it. Since the carbohydrate and oxygen molecules contain more chemical potential energy than the carbon dioxide and water molecules from which they're produced, the plant needs an input of energy to carry out the conversion. In the process of photosynthesis, this energy is provided by sunlight.

Plants absorb light in brightly coloured photosynthetic pigments, such as the green chemical chlorophyll, and these chemicals use the light's energy to perform chemical reactions. In effect, photosynthesis is the opposite of combustion. While it's easy to burn wood in oxygen to form water and carbon dioxide, it's much harder to use light energy to turn carbon dioxide and water into wood and oxygen.

Nonetheless, plants have developed very capable mechanisms for performing this reverse-combustion process. Without plants, the Earth's atmosphere would quickly become depleted of oxygen.

Much of the effort to reduce deforestation throughout the world is motivated by a desire to keep the atmosphere's oxygen level high and its carbon dioxide level low. Plants are able to use light energy to induce chemical reactions in part because light is emitted and absorbed in discrete packets of energy.

Each time it absorbs a packet of light energy, a photon, the photosynthetic chemical takes a step toward converting carbon dioxide and water into carbohydrate and oxygen. The energy in a photon is related to the wavelength of the light – long wavelength infrared light is absorbed or emitted as small packets of energy while short wavelength ultraviolet light is absorbed or emitted as large packets of energy. Visible light falls somewhere in between and has the right range of photon energies to support photosynthesis.

READING FOR FUN

46. Fill in the gaps with the missing words from the box. Be ready to discuss this joke with your partner.

of (7), to (3), at (3), into, out of, in (2), to (2), on, into, for

A Border Station

A train stopped ___ a French border station. The passengers opened their trunks and waited ___ the inspection ___ their things. One ___ the passengers ___ a first class carriage took a lot ___ boxes ___ cigarettes ___ his trunk and wanted to put them ___ his pockets. When his pockets were already full ___ cigarettes and he couldn't put any more ___ them he said ___ another man who was ___ window 'Will you, please take some ___ boxes and put them ___ your pockets?' 'Why don't you leave them ___ your trunk?' asked the other passenger. 'Because I don't want to pay duty ___ them' answered the first passenger. 'All right' said the passenger ___ the window. 'Give them ___ me. But I must tell you I'll not return them ___ you. 'Why?' 'Because I am a French Customs officer.'

PART II

UNIT 7

Pre-Text Exercises

Word Building

Active Vocabulary

Text 7 A. *Modern Engineering*

Text 7 B. *Principles of the Engineering Science Division*

Text 7 C. *Ergonomics*

Text 7 D. *Nanotechnology*

Text and Vocabulary Exercises

Conversational Practice

Writing the CVs

Writing Practice

PRE-TEXT EXERCISES

1. Fill in the gaps with the correct prepositions:

1. Trees always look very beautiful ____ spring when they are in blossom.
2. She was so angry that she left the room ____ saying good bye.
3. She was dressed ____ blue that day and looked rather smart.
4. The small table was ____ the corner of the living room.
5. You can find me ____ home in the evening.
6. Instead ____ going home he went to the pub.
7. Speaking frankly ____ general he is right.

2. Choose the correct word to complete the sentences:

1. What will you do ____ these circumstances?
a) *under*; b) *over*; c) *after*.
2. Hurry ____ because the train is just on the platform.
a) *up*; b) *on*; c) *from*.
3. He was red ____ anger and shouted at them.
a) *from*; b) *at*; c) *with*.
4. It is ____ what to do in this situation. It must be your decision.
a) *up to now*; b) *up to you*; c) *up to it*.
5. I don't like to speak ____ people like him. He is always boasting.
a) *at*; b) *of*; c) *to*.

6. When you come, we'll talk it _____. It is a very serious question.
 a) *over*; b) *under*; c) *after*.
7. It was clear _____ everybody that he was lying.
 a) *at*; b) *on*; c) *to*.
8. She was so pleased _____ this present.
 a) *with*; b) *at*; c) *on*.

3. Translate the following words into Russian and learn their pronunciation:

Research; applied; knowledge; development; appropriateness; reference; value; environmental; tools; behavioral; multifunctioning; licensing; installations; overwhelmingly.

4. Fill in the gaps with the suitable word to complete the sentences:

1. Engineers use their knowledge of science, mathematics, and appropriate experience to find _____ solutions to a problem.

- *suitable* ▪ *unsuitable* ▪ *suite*

2. Engineers typically attempt to predict how well _____ designs will perform to their specifications prior to full-scale production.

- *their* ▪ *your* ▪ *our* ▪ *his*

3. As with all modern scientific and technological endeavours, computers and software _____ an increasingly important role.

- *plays* ▪ *play* ▪ *is playing* ▪ *played*

4. Using computer-aided design software, engineers _____ more easily create drawings and models of their designs.

- *may* ▪ *must* ▪ *are able to* ▪ *have to*

5. Engineering is a subject that ranges _____ large collaborations to small individual projects.

- *from* ▪ *of* ▪ *in* ▪ *on*

5. BRAINSTORMING: Explain in English the meaning of the words below:

- | | |
|----------------------|-------------------|
| ▪ engineering | ▪ technology |
| ▪ scientific methods | ▪ computerization |

WORD BUILDING

6. Translate the words with prefixes into Russian:

co-; re-; ex-; inter-: Cooperate, intercontinental, ex-president, international, rewrite, repaint, ex-servicemen, coeducational

bi-; pre-; semi-; counter-: Counterattack, bicycle, prehistoric, semicircle, bilingual, bilateral, preschool, counterespionage, semidetached semi-conscious

post-; mono-; anti-; non-: Postgraduate, nonstop, monosyllable, nonsense, postwar, monorail, antifreeze, non-corroding, non-dimensional, non-freezing

multi-; trans-; super-; de-: Deforested, transatlantic, derailed, superhuman, transplant, multiracial, depopulated, supernatural, supersonic, multimillionaire

pro-; sub-; uni-; tri-: Subway, procomununist, submarine, subterranean, uniform, tricycles, probritish, triangle, pro-war, unisex

over-; under-: Overwork, oversleep, underdone, overcharge, undergraduate, underpaid, underpopulated, overcrowded, underdeveloped, overeat, underestimate

7. Translate the following compound words:

Broadband; clockwork; railroad; gunpowder; tramway; waterway; pipeline; railway; highway; airway; airplane; skateboard; low-pollution; air-resistance; troubleshooter; broadcast; dial-up; gateway; network; telnet; workstation.

8. Translate the following terms analyzing their word-formation model:

transceiver	acknowledgement	application	connectionless
driver	knowbot	multicast	multimedia
multiplexing	repeater	selector	catenet
Ethernet	Internet	modem	netiquette
netizen	broadcasting	subnetwork	carcinotron
cryotron	plasmatron	as-cast	as-controlled
as-welded	streamwise	slantwise	inductance
divergence	composition	activation	treatment
filament	programming	amplifier	low-noise
turbogenerator	gasometer	radio-transmitter	video-gain
superpower	single-needle	voltage	navigation
d.c.	a.c.	s.a.	b.p.

ACTIVE VOCABULARY

9. Read and memorize the following words and word combinations:

ability – способность, умение

approach – подход

approval – одобрение

to blend – объединять

to cause accidents – быть причиной аварий, вызывать аварии

to concern – касаться, иметь отношение

to consider – считать, рассматривать

control panel – пульт управления

to eliminate – устранять

to employ – использовать

engineering – техника, конструирование

environmental – относящийся к окружающей обстановке

to exclude – исключать

to generate – производить

to include – включать

to interact with – взаимодействовать

reference – ссылка, упоминание

research – исследование

safety – безопасность

science – наука; **applied sciences** – прикладные науки; **engineering**

science – инженерное дело, наука

shape – форма

to seek – искать, пытаться, стремиться

size – размер

to slow – замедлять, сбавлять

to solve problems – решать проблемы

to store – хранить

tools – инструменты, орудие труда

trend – направление

utility – полезность, практичность

10. Read and translate the text:

Text 7 A

Modern Engineering

The history of the concept of “engineering” stems from the earliest times when humans began to make clever inventions, such as the pulley, lever, or wheel, etc. The exact etymology of the word engineer, however, is a person occupationally connected with the study, design, and implementation of engines. Hence, an engineer, essentially, is someone who makes useful or practical inventions.

The first electrical engineer is considered to be William Gilbert, with his 1600 publication of *De Magnete*, who was the originator of the term “electricity”. The first steam engine was built in 1698 by mechanical engineer Thomas Savery.

With the rise of engineering as a profession in the nineteenth century the term became more narrowly applied to fields in which mathematics and science were applied to these ends. Similarly, in addition to military and civil engineering the fields then known as the mechanic arts became incorporated into engineering. The first PhD in engineering (technically,

applied science and engineering) awarded in the United States went to William Gibbs at Yale University in 1863; it was also the second PhD awarded in science in the U.S.

Now engineering science is among the world's top undergraduate engineering programmes. Its mission is to prepare the students for careers at the forefront of research, teaching, design and professional practice in applied science and engineering, or for careers in other professions to which they can bring their superior knowledge of applied science and engineering to bear.

Modern Engineering includes technology, but is also concerned with development and understanding of technological systems and the products. It is also concerned with non-technological approaches. Technical engineering is the activity of transforming and transporting (1) of materials and forces of nature and (2) of energy and information, which are technical measures of utility. This statement excludes reference to value and method. To complete the understanding of modern engineering, one should identify its values, its societal and environmental objectives and its tools. Scientific methods of engineering are applied in several fields not connected directly to manufacture and construction. Modern engineering is characterized by the broad application of what is known as systems engineering principles.

A related field of engineering, human-factors engineering, also known as ergonomics, received wide attention in the late 1970s and the '80s when the safety of nuclear reactors was questioned following serious accidents that were caused by operator errors, design failures, and malfunctioning equipment. Human-factors engineering seeks to establish criteria for the efficient, human-centered design of, among other things, the large, complicated control panels that monitor and govern nuclear reactor operations. Engineering is the design, analysis, and/or construction of works for practical purposes. One who practices engineering is called an engineer.

The broad discipline of engineering encompasses a range of specialized subdisciplines that focus on the issues associated with developing a specific kind of product, or using a specific type of technology. The crucial and unique task of the engineer is to identify, understand, and interpret the constraints on a design in order to produce a successful result. It is usually not enough to build a technically successful product; it must also meet further requirements. Constraints may include available resources, physical, imaginative or technical limitations, flexibility for future modifications and additions, and other factors, such as requirements for cost, safety, marketability, and serviceability. Engineers use their knowledge of science, mathematics, and appropriate experience to find suitable solutions to a problem. Engineers typically attempt to

predict how well their designs will perform to their specifications prior to full-scale production.

As with all modern scientific and technological endeavors, computers and software play an increasingly important role.

Computers are increasingly used for solving complex problems as well as for handling, storing, and generating the enormous volume of data modern engineers must work with.

TEXT AND VOCABULARY EXERCISES



11. Find in the text the words or phrases which mean the same as:

- | | |
|--------------------------|---------------------------|
| ▪ инженерная наука | ▪ технология |
| ▪ прикладные науки | ▪ соответствие, точность |
| ▪ критерии полезности | ▪ характеризуется |
| ▪ инженерные принципы | ▪ решение сложных проблем |
| ▪ исследование процессов | ▪ принятие решений |

12. Find in the text the synonyms to the following words:

- | | | |
|----------|----------------|-----------------|
| ▪ task | ▪ to get ready | ▪ qualification |
| ▪ manner | ▪ to recognize | ▪ sphere |
| ▪ basis | ▪ new | ▪ to produce |

13. Find in the text the antonyms to the following words:

- | | | |
|-----------------|---------------|------------------|
| ▪ top | ▪ to include | ▪ understanding |
| ▪ technological | ▪ to complete | ▪ several |
| ▪ directly | ▪ broad | ▪ malfunctioning |
| ▪ efficient | ▪ complicated | ▪ approval |

14. Find the English equivalents to the following Russian words:

- | | | | |
|-------------------------|----------------|----------------|---------------|
| 1. наука | a) since | b) science | c) sincere |
| 2. включать | a) to include | b) to conclude | c) to induce |
| 3. исключать | a) to exclaim | b) to excrete | c) to exclude |
| 4. реактор | a) reactant | b) reaction | c) reactor |
| 5. широкий | a) wide | b) weigh | c) wild |
| 6. относиться, касаться | a) to coincide | b) to consider | c) to concern |

15. Give Russian equivalents to the following word combinations:

engineering programmes; to prepare the students for careers; professional practice; understanding of technological systems; non-technological approaches; scientific methods; various engineering disciplines; human-factors engineering; to establish criteria for the efficient, human-centered design; solving complex problems.

16. Choose among the words in parentheses the one that corresponds to the text above to complete the sentences:

1. Engineering Science is among the world's top undergraduate engineering ____.

(a. *contents*; b. *context*; c. *programmes*)

2. Its mission is ____ the students for careers at the forefront of research, teaching, design and professional practice in applied science and engineering.

(a. *to prepare*; b. *to make*; c. *to learn*)

3. Modern Engineering is ____ by the broad application of systems engineering principles.

(a. *defined*; b. *known*; c. *characterized*)

4. Human-factors engineering, also known as ____ received wide attention in the late 1970s and the 1980s.

(a. *ergonomics*; b. *economics*; c. *environment*)

5. Ergonomics seeks to establish ____ for the efficient human-centered design of the large, complicated control panels that monitor and govern nuclear reactor operations.

(a. *foundations*; b. *theories*; c. *criteria*)

6. Among various recent trends in the engineering profession, licensing and computerization are the most ____.

(a. *widespread*; b. *large*; c. *useful*)

7. Computers are increasingly ____ for solving complex problems as well as for handling, storing, and generating the enormous volume of data.

(a. *described*; b. *written*; c. *used*)

17. Read Text 7A once more. In pairs, discuss the statements below. Say what you think about them and ask your partner if he/she agrees or disagrees with you. Use the following phrases to help you:

<i>Agreeing</i>	<i>Disagreeing politely</i>
I agree with you.	Yes, but don't you think...?
Yes, that is what I think too.	True, but I think...
You are right!	I see what you mean, but...

1. Engineering science is among the world's top undergraduate engineering programmes.

2. Its mission is to prepare the students only for careers at the forefront of research, teaching, design and professional practice in applied science and engineering.

3. Modern engineering is concerned with development and understanding of technological systems and products.

4. To complete the understanding of modern engineering, one should identify its values, its societal and environmental objectives and its tools.

5. Scientific methods of engineering are applied in several fields connected to manufacture and construction.

6. The systems approach is a methodology of decision-making in design, operation or construction.

7. Human-factors engineering seeks to establish criteria for the efficient, human-centered design of the large, complicated control panels that monitor and govern nuclear reactor operations.

8. Among various recent trends in the engineering profession, licensing and computerization are the most widespread.

18. Fill in the gaps with the words from the box:

more devices creative performed smart efficiency result control

Computers are part of many machines and devices, that once required continual human supervision and **1** _____. Today, computers in security systems **2** _____ in safer environment. Computers in cars improve energy **3** _____. These **4** _____ machines are designed to take over some of the basic tasks previously **5** _____ by people. With small computing **6** _____ people are able to spend more time doing what they often do best – being **7** _____. Computers can help people work **8** _____ creatively.

Check your answers on p. 280.

19. Read the text to learn about the principles of the engineering science division:

Text 7 B

Principles of the Engineering Science Division

There is no unique principle for or any constancy to the way in which the individual sciences and technologies within engineering are originally placed and subsequently grouped. It may be according to association: public health and environmental engineering are traditionally part of civil engineering because of civil engineering's concern with sanitation.

However, medical and chemical principles are required. It may be according to where related technologies exist: thus industrial engineering began and often continues in mechanical engineering.

It may be according to where the basic principles are found. Power engineering and energy are largely electro-mechanical and may be found associated with either mechanical or electrical engineering. As the chemistry of combustion, as in fluidized beds, becomes important in the context of pollution control, furnace design, traditionally part of mechanical engineering, becomes of interest to chemical engineers.

Because of the thermal and energy aspect, heating, ventilation and air-conditioning as well as refrigeration are part of mechanical engineering. It may be according to the type of system to which application is found. Thus, controls are primarily of interest in mechanical, electrical, chemical and guidance technologies.

It may be according to physical conditions or climate. Rural applications of engineering are usually agricultural and civil while mechanical, electrical and communications technologies are usually imported. Thus rural and primitive and remote regions applications are often, by force of routine, part of civil or agricultural engineering.

Mechanical, electrical, communications technology is largely industrial and urban. Cold regions engineering, which includes topics such as materials and systems behavior at low temperatures and ice mechanics, is a specialty found in places like Alaska, Siberia and the Antarctic. It is clear that the categories in engineering are not fixed. Nor, in practice, are there absolute schemes which define the categories because the boundaries to the divisions are somewhat circumstantial.



TEXT AND VOCABULARY EXERCISES

20. Divide the text above into logical parts and give each a suitable title.

21. Find in the text the words or phrases which mean the same as:

- | | |
|-------------------------------|-------------------------------|
| ▪ единственный в своем роде | ▪ здравоохранение |
| ▪ гражданское строительство | ▪ применение |
| ▪ контроль за загрязнением | ▪ определять, характеризовать |
| ▪ промышленное машиностроение | |

22. Make up situations using the English equivalents of the words given above.

23. Work in pairs and decide whether these statements are true or false:

1. There is no unique principle for or any constancy to the way in which the individual sciences and technologies within engineering are originally placed and subsequently grouped.
2. Medical and chemical principles are not required at all.
3. Power engineering and energy are largely electro-mechanical and may be associated with either chemical or mechanical engineering.
4. Controls are primarily of interest in mechanical, electrical, chemical and guidance technologies.
5. Mechanical, electrical, communications technology is largely rural.
6. Cold regions engineering is a specialty found in places like Alaska, Siberia and the Antarctic.

24. Find in Text 7B the situations in which the following word combinations are used:

Sciences and technologies; public health and environmental engineering; industrial engineering; mechanical engineering; rural applications; urban

25. Fill in the gaps with the words from the box:

appeared	important	executing	applied
engines	explanation	engineering	

The term **1** ____ is a modern one. The new Marriam-Webster Dictionary gives the **2** ____ of the word “engineering” as the practical principles. Nowadays the term engineering means the art of designing, constructing or using **3** _____. But this word is now **4** ____ in a more extended sense. It is applied also to the art of **5** ____ such words as objects of civil and military architecture, in which engines or other mechanical appliances are used. The most **6** ____ of them are: civil, mechanical, electrical, nuclear, mining, military, marine and sanitary. In the middle of the 20th century there **7** ____ some other new branches of engineering – nuclear and space engineering.

Check your answers on p. 280.

26. Read and translate the text below:

Text 7 C Ergonomics

Ergonomics, also known as human engineering or human factors engineering, is the science of designing machines, products, and systems to maximize the safety, comfort, and efficiency of the people who use them. Ergonomists draw on the principles of industrial engineering, psychology, anthropometry (the science of human measurement), and biomechanics (the study of muscular activity) to adapt the design of products and workplaces to people's sizes and shapes and their physical strengths and limitations.

Ergonomists also consider the speed with which humans react and how they process information, and their capacities for dealing with psychological factors, such as stress or isolation. Armed with this complete picture of how humans interact with their environment, ergonomists develop the best possible design for products and systems, ranging from the handle of a toothbrush to the flight deck of the space shuttle.

Ergonomists view people and the objects they use as one unit, and ergonomic design blends the best abilities of people and machines. Humans are not as strong as machines, nor can they calculate as quickly and accurately as computers.

Unlike machines, humans need to sleep, and they are subject to illness, accidents, or making mistakes when working without adequate rest. But machines are also limited – cars cannot repair themselves, computers do not speak or hear as well as people do, and machines cannot adapt to unexpected situations as well as humans. An ergonomically designed system provides optimum performance because it takes advantage of the strengths and weaknesses of both its human and machine components.

One of the primary goals of ergonomics is prevention of workplace illness and accidents. Ergonomists work to eliminate these problems by designing workplaces, such as offices or assembly lines, with injury prevention in mind. They position tools and machinery to be accessible without twisting, reaching, or bending. They design adjustable workbenches, desks, and chairs to comfortably accommodate workers of many different sizes, preventing the need to continuously lean or overextend the arms.

Ergonomists also determine and design safe workplace environmental conditions, such as correct temperature, lighting, noise, and ventilation to ensure that workers perform under optimal conditions. Ergonomists also seek to increase worker efficiency and productivity when designing workspaces. They place those pieces of equipment used most

frequently in closest proximity to the worker and arrange systems in ways that are convenient and easy to use.

Well-designed workspaces ensure that workers perform their jobs in optimal comfort, without experiencing the unnecessary physical and mental fatigue that can slow work performance, reduce accuracy, or cause accidents.

TEXT AND VOCABULARY EXERCISES



27. Find in the text the words or phrases which mean the same as:

- | | |
|-------------------------------|---|
| ▪ наука проектирования | ▪ окружающая среда |
| ▪ обрабатывать информацию | ▪ конвейерные линии |
| ▪ точно | ▪ совершать ошибку |
| ▪ приспособлять, адаптировать | ▪ хорошо спроектированные рабочие места |

28. Find in the text the synonyms to the following words:

- | | | |
|------------------------|----------------|-------------|
| ▪ to employ | ▪ fundamentals | ▪ to view |
| ▪ to be concerned with | ▪ to mix | ▪ parts |
| ▪ aims | ▪ to place | ▪ to define |

29. Find in the text the antonyms to the following words:

- | | | |
|---------------|------------------|-------------|
| ▪ to minimize | ▪ incomplete | ▪ like |
| ▪ weak | ▪ with | ▪ unsafe |
| ▪ seldom | ▪ badly-designed | ▪ necessary |

30. Choose among the words in parentheses the one that corresponds to the text above to complete the sentences:

1. Ergonomics is the science of designing machines, products and systems to maximize the safety, comfort and ____ of the people who use them.
(a. *importance*, b. *effect*, c. *efficiency*)
2. Ergonomists ____ the best possible design for products and systems.
(a. *develop*, b. *imagine*, c. *create*)
3. Ergonomists view people and the objects they use as one unit, and ergonomic design blends the best ____ of people and machines.
(a. *abilities*, b. *skills*, c. *characteristics*)
4. ____ machines, humans need to sleep, and they are subject to illness, accidents or making mistakes when working without adequate rest.
(a. *like*, b. *unlike*, c. *as*)

5. Machines cannot ____ to unexpected situations as well as humans.
(a. *adapt*, b. *regulate*, c. *correspond*)
6. One of the ____ goals of ergonomics is prevention of work place illness and accidents.
(a. *main*, b. *important*, c. *primary*)
7. They ____ tools and machinery to be accessible without twisting, reaching, or bending.
(a. *make*, b. *position*, c. *design*)
8. Ergonomists determine and design safe workplace ____ conditions, such as correct temperature, lighting, noise and ventilation.
(a. *house*, b. *place*, c. *environmental*)
9. Well-designed workspaces ensure that workers perform their jobs in optimal ____.
(a. *convenience*, b. *comfort*, c. *atmosphere*)

31. Read Text 7C once more. In pairs, discuss the statements below. Say what you think about them and ask your partner if he/she agrees or disagrees with you. Use the following phrases to help you:

<i>Agreeing</i>	<i>Disagreeing politely</i>
I agree with you.	Yes, but don't you think...?
Yes, that is what I think too.	True, but I think...
You are right!	I see what you mean, but...

1. Ergonomics is an applied science.
2. Ergonomists draw on principles of industrial engineering, psychology, anthropometry and biomechanics to adapt the products and workplaces to people's sizes and shapes and their physical strengths and limitations.
3. Ergonomists also consider the speed with which humans react and how they process information, and their capacities for dealing with psychological factors.
4. Humans are not as strong as machines, nor can they calculate as quickly and accurately as computers.
5. Machines are also limited.
6. Ergonomists seek to increase worker efficiency and productivity when designing workplaces.
7. Ergonomists place those pieces of equipment used most frequently in closest proximity to the worker and arrange systems in ways that are convenient and easy to use.

32. Give your own ideas concerning your understanding of ergonomics. Do it in written form (8–10 sentences).

33. Read the following text and render it according to the following scheme:

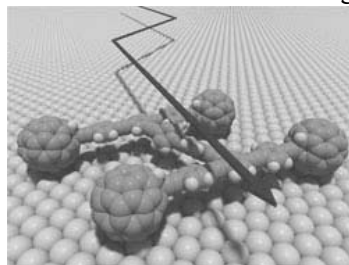
- the title of the text is ...
- the text tells/ runs about .../ the main/central idea is .../ to put it in a few words .../ the aim of the article/the text is to tell the reader about...
- according to the text...
- to all appearances (по всей видимости)...
- needless to say (не нужно говорить)...
- then I'm going to add...
- I want to point out the following facts that were new to me...
- in conclusion I'd like to say...

Text 7 D
Nanotechnology

Nanotechnology is a field of applied science and technology covering a broad range of topics. The main unifying theme is the control of matter on a scale smaller than 1 micrometre, normally between 1–100 nanometers, as well as the fabrication of devices on this same length scale. It is a highly multidisciplinary field, drawing from fields such as colloidal science, device physics, and supramolecular chemistry.

Much speculation exists as to what new science and technology might result from these lines of research. Some view nanotechnology as a marketing term that describes pre-existing lines of research applied to the sub-micron size scale.

Nanotechnology could variously be seen as an extension of existing sciences into the nanoscale, or as a recasting of existing sciences using a newer, more modern term. Two main approaches are used in nanotechnology: one is a “bottom-up” approach where materials and devices are built from molecular components which assemble themselves chemically using principles of molecular recognition; the other being a «top-down» approach where nano-objects are constructed from larger entities without atomic-level control.



The first distinguishing concepts in nanotechnology were made by physicist Richard Feynman at an American Physical Society meeting at Caltech in 1959. Feynman described a process by which the ability to manipulate individual atoms and molecules might be developed, using one

set of precise tools to build and operate another proportionally smaller set, and so on down to the needed scale.

The term “nanotechnology” was defined by Tokyo Science University Professor Norio Taniguchi in a 1974 paper as follows: “Nanotechnology” mainly consists of the processing, separation, consolidation, and deformation, of materials by one atom or by one molecule.» In the 1980s the basic idea of this definition was explored in much more depth by Dr. K. Eric Drexler, who promoted the technological significance of nanoscale phenomena.

Nanotechnology and nanoscience got started in the early 1980s with two major developments: the birth of cluster science and the invention of the scanning tunneling microscope (STM). This development led to the discovery of fullerenes in 1986 and carbon nanotubes a few years later. In another development, the synthesis and properties of semiconductor nanocrystals were studied. This led to a fast increasing number of metal oxide nanoparticles of quantum dots.

A unique aspect of nanotechnology is the vastly increased ratio of surface area to volume present in many nanoscale materials, which opens new possibilities in surface-based science, such as catalysis. A number of physical phenomena become noticeably pronounced as the size of the system decreases. These include statistical mechanical effects, as well as quantum mechanical effects, for example the “quantum size effect” where the electronic properties of solids are altered with great reductions in particle size. This effect does not come into play by going from macro to micro dimensions.

However, it becomes dominant when the nanometer size range is reached. Additionally, a number of physical properties change when compared to macroscopic systems. One example is the increase in surface area to volume of materials. This catalytic activity also opens potential risks in their interaction with biomaterials.

Materials reduced to the nanoscale can suddenly show very different properties compared to what they exhibit on a macroscale, enabling unique applications. For instance, opaque substances become transparent (copper); inert materials become catalysts (platinum); stable materials turn combustible (aluminum); solids turn into liquids at room temperature (gold); insulators become conductors (silicon). A material such as gold, which is chemically inert at normal scales, can serve as a potent chemical catalyst at nanoscales.

Much of the fascination with nanotechnology stems from these unique quantum and surface phenomena that matter exhibits at the nanoscale. Molecular nanotechnology, sometimes called molecular manufacturing, is a term given to the concept of engineered nanosystems

(nanoscale machines) operating on the molecular scale. It is especially associated with the concept of a molecular assembler, a machine that can produce a desired structure or device atom-by-atom using the principles of mechanosynthesis.

Manufacturing in the context of productive nanosystems is not related to, and should be clearly distinguished from, the conventional technologies used to manufacture nanomaterials such as carbon nanotubes and nanoparticles.

As nanotechnology is a very broad term, there are many disparate but sometimes overlapping subfields that could fall under its umbrella. Note that these are fairly nebulous and a single subfield may overlap many of them, especially as the field of nanotechnology continues to mature.

34. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about the nature of the engineers' work (Text 22), civil engineering (Text 23) and about the history of mechanical engineering (Text 24). Be ready to discuss the information you have read.

CONVERSATIONAL PRACTICE

35. Speak about the engineering and its tools. Use the information you've read in the TEXTS FOR SUPPLEMENTARY READING, the Active Vocabulary and the expressions below:

- | | |
|-------------------------------|---|
| ▪ As far as I know... | ▪ I think you are right |
| ▪ I don't think you are right | ▪ I think it is a good idea |
| ▪ It would be better to... | ▪ I like... /I quite like.../I really like... |
| ▪ It is very important to... | ▪ I don't mind... |

WRITING THE CVs (RESUME)

СОСТАВЛЕНИЕ РЕЗЮМЕ

?

Резюме играет огромную роль. Хорошо составленное резюме должно давать полное представление о Вашем трудовом опыте, образовании и о других деловых качествах, чтобы потенциальный работодатель (employer) мог судить о Вашей квалификации. От четкости и информативности резюме во многом зависят Ваши шансы быть принятым на работу или учебу. Часто вместо слова «resume» используют аббревиатуру CV (Curriculum Vitae), что в переводе с латыни обозначает «ход жизни».

Резюме обычно состоит из следующих основных частей:

1. Личная информация / Personal information
2. Цель / Objective
3. Образование / Education
4. Профессиональный опыт /Work Experience, или Employment
5. Специальные навыки / Special skills
6. Рекомендации / References

1) Personal Information

Напишите полностью свое имя и фамилию, укажите адрес, телефон (вместе с кодом страны и города); электронную почту. Если в России сначала указывают фамилию, затем имя и отчество, то в англоговорящих странах сначала указывают имя, затем – первую букву отчества, и только потом – фамилию.

2) Objective

Следует указать не только желаемую должность, но и в одном-двух предложениях объяснить, почему вы считаете свою кандидатуру наиболее подходящей.

3) Education

Пишите о том, какой вуз вы окончили. Название учебного заведения сокращать не принято. Укажите факультет и специальность, месяц и год окончания учебного заведения, средний балл аттестата.

4) Work Experience, или Employment

Обычно указывают не более трех последних мест работы. Укажите полностью название компании, свою должность, отдел, в котором вы трудились. Перечислите свои основные должностные обязанности.

5) Special skills

В разделе специальных навыков нужно указать:

- а) знание иностранных языков и уровень этих знаний.
- б) уровень компьютерной грамотности.
- в) наличие водительских прав (driver's license)
- г) опыт воинской службы, если он есть и если он может иметь отношение к вашей предполагаемой работе.

6) References

Обычно рекомендаций должно быть как минимум две, и не от коллег, а от непосредственных начальников. Укажите конкретные лица, которые могут рекомендовать вас, напишите полностью имя, должность, место работы и контактную информацию ваших поручителей.

36. Here are some samples of CV. Look through them in order to compose your own CV:

Sample 1

На должность администратора /секретаря

JASON DAWSON
235 White Road
San-Francisco, California 029992
+ 01 (245) 987-6543

OBJECTIVE:

To obtain an administrative assistant position which would utilize my administrative skills and offer opportunity for growth.

EDUCATION:

Technical College of San-Francisco September 1988 – May 1991

EMPLOYMENT:

6/94 to present

The Institute of Medical Care; San-Francisco

Unit Secretary, Child and Adolescent Unit – Responsible for maintaining patient charts, entering patient data on database, transcribing medication orders, tracking and paging medical personnel. Relaying patient records to other treatment facilities and fielding incoming phone calls.

10/91 to 5/94

University of National Law; San-Francisco

Administrator, Registrar's Office

– Answered telephones, filed documents, produced letters for certification and deferment, proctored exams. Registered students for courses, proofread grade sheets, registration materials, exams and course schedules, computed grade point average, Interacted with students, faculty and staff.

SPECIAL SKILLS:

Languages: English – mother tongue, German – beginning

Computer literate: word-processing (Word Perfect & Word for Windows), Spreadsheet (Lotus 1-2-3)

Excellent interpersonal and communications skills.

REFERENCES:

Available upon request

Sample 2

На должность маркетингового аналитика

ELENA K. PETROVA

0/01–1000 Neizvestnaya St., Moscow

Tel. (home): + 7 (095) 000-0000

E-mail: unknown@orc.ru

OBJECTIVE:

A full-time position as a Market Analyst, where a motivated high-energy team player capable of individual initiative will contribute to the efficiency and profitability of the company.

EDUCATION:

September, 1991 – June, 1996: Institute of International Economic Affairs, Finance Academy (Moscow)

WORK EXPERIENCE:

June, 1998 – present

Procter & Gamble, Junior Marketing Manager, Cosmetics department:

- register clients' orders on the data base;
- analyze the efficiency of sales;

Area of work: My duties are to provide the Head of Marketing Department with the relevant information about the market of cosmetic goods in Moscow, about costs' dynamics and to maintain the clients' data base.

September, 1995 – June, 1998

Milling Ltd, Specialist in advertising and marketing:

- Development of advertising strategy of the company;
- Copywriting advertising information;
- Clients data base administration.

Area of work: During my work for Milling Ltd I developed advertising profile for the company, created its corporate web site and conducted constant analysis of relevant markets in Russia.

SPECIAL SKILLS:

Languages: Russian – Mother tongue, English – fluent at the Advanced level, French – fluent at the Intermediate level.

Computer literate: Windows 95/98/NT, Word, Excel, Access, PowerPoint, CorelDraw, HTML.

Clerical: Typing 20 wpm.

Other: A professional Internet user. Have a driving license and prepared to be as mobile as necessary to provide the best performance.

REFERENCES:

Available upon request

WRITING PRACTICE



37. Compose your own CV. The phrases below and the Action Verbs will help you:

Sir ... or Madam ...	<ul style="list-style-type: none"> ▪ I'd like to apply for a position as a ... ▪ I've been interested in working in ... ▪ I can offer many skills, for example ... ▪ I'm available for interview from ... 	<ul style="list-style-type: none"> ▪ communicative ▪ hard-working ▪ strong academical qualifications ▪ enthusiastic ▪ team-player ▪ leading qualities ▪ competence ▪ flexibility ▪ receptive ▪ a strong command of (language) 	<ul style="list-style-type: none"> ▪ acquired ▪ achieved ▪ established ▪ assisted ▪ coordinated (a project) ▪ developed (a new way of working) ▪ delivered (the project on time) ▪ initiated (a new system)
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Action Verbs

Action verbs should be used abundantly throughout your resume and cover letters to promote your achievements. They help make a strong impression.

Management	Communication	Research	Technical	Teaching
achieved	arranged	clarified	analyzed	adapted
administered	drafted	collected	assembled	advised
analyzed	developed	conceived	built	clarified
consolidated	defined	critiqued	calculated	coached
coordinated	directed	detected	computed	coordinated
decided	edited	diagnosed	designed	defined
developed	formulated	disproved	devised	developed
executed	interpreted	evaluated	engineered	enabled
improved	moderated	examined	fabricated	encouraged
incorporated	motivated	extracted	inspected	evaluated
increased	negotiated	identified	maintained	explained
inspired	persuaded	inspected	operated	facilitated
managed	promoted	interpreted	overhauled	guided
organized	reported	interviewed	programmed	informed
planned	researched	investigated	remodeled	initiated
produced	summarized	organized	repaired	instructed
reported	spoke	researched	solved	presented
reviewed	translated	searched	trained	stimulated
scheduled	wrote	studied	upgraded	trained
strengthened		systematized		updated

Financial	Creative	Helping	Clerical Detail	or
administered	acted	advised	activated	
analyzed	applied	assisted	assembled	
appraised	composed	coordinated	approved	
balanced	created	demonstrated	arranged	
calculated	designed	diagnosed	classified	
compared	developed	educated	collected	
computed	directed	encouraged	described	
developed	established	facilitated	edited	
estimated	evaluated	guided	executed	
managed	formed	helped	implemented	
marketed	founded	inspired	maintained	
planned	integrated	maintained	monitored	
projected	invented	modified	observed	
reevaluated	originated	performed	organized	
reconciled	performed	referred	prepared	
researched	presented	represented	published	

Additional Action Verbs

checked	experimented	lectured	received	selected
classified	explained	lifted	recommended	separated
collected	expressed	listened	performed	served
completed	fixed	maintained	piloted	showed
conducted	followed	managed	predicted	solved
consolidated	formulated	mediated	prescribed	sorted
constructed	founded	monitored	processed	symbolized
controlled	gathered	motivated	projected	synthesized
delivered	generated	predicted	promoted	talked
detailed	headed	persuaded	purchased	tended
eliminated	helped	memorized	recruited	trained
emphasized	imagined	negotiated	protected	translated
enforced	implemented	observed	reduced	treated
estimated	informed	originated	related	tutored
evaluated	initiated	performed	rendered	unified
examined	innovated	piloted	restored	utilized

UNIT 8

Pre-Text Exercises

Word Building

Active Vocabulary

Text 8 A. *Transport*

Text 8 B. *Who Invented the Automobile?*

Text 8 C. *Geographical Challenges Facing Urban Transportation*

Text 8 D. *Automobile Dependency*

Text and Vocabulary Exercises

Conversational Practice

Writing the CVs

Writing Practice

PRE-TEXT EXERCISES

1. Here are some expressions with the prepositions *with* and *without*. Translate and learn them:

- | | |
|-------------------------|---------------------------|
| ▪ to cover with | ▪ to fill with |
| ▪ to leave with | ▪ to shake (tremble) with |
| ▪ to be pleased with | ▪ to be popular with |
| ▪ to be pale (red) with | ▪ to be satisfied with |
| ▪ without fail | |

2. Fill in the gaps with the word combinations above in the appropriate form:

1. The mountains and hills were ____ snow and it was very cold.
2. The children were ____ and crying in the dark room.
3. The dean was ____ the results of the session.
4. The writer is very ____ the children and his books have been sold.
5. He ____ the gaps ____ the prepositions and started a new exercise.
6. She was ____ and left the room hurriedly.
7. As a very famous actor he is ____ the spectators.
8. Ann was ____ the results of her exams because she got only 'fives'.
9. He was ____ because he got frightened.

3. Correct the mistakes:

1. This book is rather popular at young people.
2. Neil stood up and left the room.
3. The truck ran in the tree and broke it
4. She always does it in envy.

5. The children congratulated their mother of her birthday.
6. Canada borders at the USA in the south.
7. Barry had been ill for a long time and fell after the group.

4. Choose the correct word to complete the sentences:

1. We came home ___ night and went to bed at once.
a) *in*; b) *at*; c) *on*.
2. It happened ___ a cold winter day and we couldn't help him.
a) *in*; b) *at*; c) *on*.
3. The debates were ___ this urgent problem.
a) *by*; b) *over*; c) *on*.
4. She is the best ___ mathematics and chemistry.
a) *in*; b) *on*; c) *at*.
5. The bumblebee stung him ___ the leg when he went barefoot.
a) *in*; b) *on*; c) *at*.
6. The international conference ___ the problems of disarmament has already started.
a) *by*; b) *over*; c) *on*.
7. He promised he would come ___ Friday.
a) *on*; b) *at*; c) *on*.
8. The lecturer read the lecture ___ the problems of natural environment.
a) *by*; b) *over*; c) *on*.
9. Have you heard? Sally's dog bit her ___ her hand.
a) *in*; b) *on*; c) *at*.

5. Explain the meaning of the following phrases in English:

- Transport networks ▪ urban planning ▪ modes of transport

6. Fill in the gaps with the suitable word to complete the sentences:

1. The automobile industry ___ often regarded as the main engine of industrial growth of the 20th century.

is are has have

2. The automobile industry ___ an important and dynamic sector of economics.

remain is remaining remains remained

3. Europe is the largest producer ___ automobiles in the world.

in of at with

4. Some ex-colonies of the British Empire continue to drive ___ the left, but others, such as Canada, Ghana, Nigeria, Sierra Leone, and the United States switched to the other side.

on in at within

5. In the United States each state ___ its own traffic code.

has have will have had

6. The first legal reference in Britain to an order for traffic to remain on the left occurred in 1756 ___ regard to London Bridge.

in with on at

7. BRAINSTORMING: What was the impact of the above-mentioned on the transport development? Give your ideas.

- Economic boom
- Rapid development of technology
- Economic growth

WORD BUILDING

8. Guess the meaning of the words in bold type. Analyze their word-formation model:

To exist – **existence** – **coexistence**, function – **functional** – **functionally**, cheap – **cheaply**, individual – **individuality**, to build – **to rebuild**, to think – **thinking** – **rethinking**, class – **classless**, structure – **structural**; to accumulate – **accumulation**; to move – **movement**; to operate – **operation**; to satisfy – **satisfaction**; to relate – **relationship**; to develop – **development**; to concentrate – **concentration**; to consume – **consumption**; to depend – **dependency** – **independence**.

9. Translate the following words analyzing their word-formation model:

televIEWer	half-life	polychromatic	monochromatic
polysterol	high-rise	Hard-line	earthday
write-off	middle-of-the-read	easy-to-use	reaction
reduction	assimilation	read-write	tailless
threewheeled	semiconductor	control-surface	adjustment
measurement	disafforest	full-time	motor-cycle
motor-car	taxi-cab	well-established	well-trodden
thenceforward	straightforward	blackjack	meanwhile
absent-minded	undergraduate	sky-line	reading-matter

ACTIVE VOCABULARY

10. Read and memorize the following words and word combinations:

accident – несчастный случай
accumulation – накопление
agglomeration – скопление
to avoid – избегать
concentration – концентрация
congestion – скопление
convenience – удобство
conventional – обычный
consumption – потребление
dependency – зависимость
development – развитие
diffusion – распространение
highway – шоссе
impediment – препятствие
infrastructure – инфраструктура
intensity – интенсивность
mileage – расстояние
mobility – подвижность
mode – способ
movement – движение
operation – действие
prevalent – распространенный

pipeline – трубопровод
(oil pipeline – нефтепровод
gas pipeline – газопровод)
railroad, railway – железная дорога
to relate – иметь отношение
ridership – количество
перевезённых пассажиров
to satisfy – удовлетворять
spatial – пространственный
to streamline – модернизировать
suburb – пригород
transport – транспорт (**passenger**
transport – пассажирский
транспорт; **freight transport** –
грузовые перевозки; **transport**
networks – транспортные сети)
unsustainable – нежизнеспособный
urban planning – городское
планирование
vehicle – транспортное средство

11. Read and translate the text below:

Text 8 A Transport

Transport or transportation is the movement of people and goods from one place to another. The term is derived from the Latin *trans* (“across”) and *portare* (“to carry”). The field of transport has several aspects which can be divided into a triad of infrastructure, vehicles, and operations. Infrastructure includes the transport networks (roads, railways, airways, waterways, canals, pipelines, etc.) that are used, as well as the nodes or terminals (such as airports, railway stations, bus stations and seaports). The vehicles generally ride on the networks, such as automobiles, bicycles, buses, trains, airplanes. The operations deal with the control of the system, such as traffic signals and ramp meters, railroad switches, air traffic control, etc., as well as policies, such as how to finance the system (for example, the use of tolls or gasoline taxes). Broadly speaking, the design of networks is the domain of civil engineering and urban planning, the design of vehicles of mechanical engineering and

specialized subfields such as nautical engineering and aerospace engineering, and the operations are usually specialized, though might appropriately belong to operations research or systems engineering.

There are different modes of transport. Modes are combinations of networks, vehicles, and operations, and include walking, the road transport system, rail transport, ship transport and modern aviation.



Worldwide, the most widely used modes for passenger transport are the automobiles, followed by buses, air, railways, and urban rail. The most widely used modes for freight transport are sea, followed by road, railways, oil pipelines and inland navigation.

There is a well-known relationship between the density of development and types of transportation. Intensity of development is often measured by Floor Area Ratio (FAR), the ratio of useable floorspace to area of land. As a rule, FARs of 1.5 or less are well suited to automobiles, those of six and above are well suited to trains. The range of densities from about two up to about four is not well served by conventional public or private transport. Many cities have grown into these densities, and are suffering traffic problems.



People need transport to go from one place to the other (from home to work, to shop, back to home, for instance). Transport is a “derived demand” in that transport is unnecessary but for the activities pursued at the ends of trips. Good land use keeps common activities close (e.g. housing and food shopping), and places higher-density development closer to transportation lines and hubs. Poor land use concentrates activities (such as jobs) far from other destinations (such as housing and shopping). Transportation facilities consume land, and in cities, pavement (devoted to streets and parking) can easily exceed 20 percent of the total land use. An efficient transport system can reduce land waste.



Notes on the text

Floor Area Ratio – коэффициент общей площади



TEXT AND VOCABULARY EXERCISES

12. Find in the text the words or phrases which mean the same as:

- | | |
|---------------------------|------------------------|
| ▪ несколько аспектов | ▪ транспортные сети |
| ▪ железнодорожные станции | ▪ морской порт |
| ▪ велосипед | ▪ управление движением |
| ▪ как правило | ▪ во всем мире |
| ▪ пассажирский транспорт | ▪ грузовые перевозки |
| ▪ нефтепроводы | ▪ внутренняя навигация |
| ▪ способы транспортировки | ▪ обычные действия |

13. Find in the text the synonyms to the following words:

- | | | |
|----------------|---------------|---------------|
| ▪ a few | ▪ to comprise | ▪ project |
| ▪ various | ▪ mixture | ▪ individual |
| ▪ extensively | ▪ strength | ▪ to require |
| ▪ to transcend | ▪ to diminish | ▪ for example |

14. Find in the text the antonyms to the following words:

- | | | |
|--------------|---------------|-----------------|
| ▪ to exclude | ▪ identical | ▪ lower-density |
| ▪ necessary | ▪ unexercised | ▪ to raise |

15. Find the right English equivalent for the following Russian words:

- | | | | |
|------------------|---------------|--------------|---------------|
| 1. разделять(ся) | a) to diverge | b) to decide | c) to divide |
| 2. расти | a) to grow | b) to draw | c) to drow |
| 3. тротуар | a) bailment | b) pavement | c) payment |
| 4. сокращать | a) to reduce | b) to refuse | c) to repulse |
| 5. внутренний | a) island | b) inland | c) lowland |

16. Give Russian equivalents to the following word combinations:

The field of transport; transport networks; traffic control; vehicle; to deal with; broadly speaking, urban planning; specialized subfields; transport system; worldwide; widely used; passenger transport; to go from one place to the other.

17. Match each word in A with the Russian equivalent in B:

A	B
1. movement	a. избегать
2. to avoid	b. развитие
3. operation	c. иметь отношение
4. development	d. потребление
5. consumption	e. движение
6. to relate	f. транспортное средство
7. vehicle	g. действие
8. to streamline	h. модернизировать

18. Choose among the words in parentheses the one that corresponds to the text above to complete the sentences:

1. Transport or transportation is the ____ of people and goods from one place to another.
(a. *movement*; b. *walking*; c. *rising*)
2. The field of transport has several aspects which can be divided into a triad of infrastructure, ____, and operations.
(a. *vehicles*; b. *cars*; c. *carts*)
3. The vehicles ____ ride on the networks, such as automobiles, bicycles, buses, trains, airplanes.
(a. *never*; b. *seldom*; c. *generally*)
4. The design of networks is the domain of ____ engineering and urban planning.
(a. *mining*; b. *civil*; c. *mechanical*)
5. There are ____ modes of transport.
(a. *different*; b. *no*; c. *single*)
6. Worldwide, the most widely used modes for passenger transport are the ____.
(a. *trains*; b. *ships*; c. *automobiles*)
7. There is a ____ between the density of development and types of transportation.
(a. *treatment*; b. *relationship*; c. *brotherhood*)
8. People ____ transport to go from one place to the other.
(a. *try*; b. *need*; c. *do not use*)

19. Read Text 8A once more. In pairs, discuss the statements below. Say what you think about them and ask your partner if he/she agrees or disagrees with you. Use the following phrases to help you:

<i>Agreeing</i>	<i>Disagreeing politely</i>
I agree with you.	Yes, but don't you think...?
Yes, that is what I think too.	True, but I think...
You are right!	I see what you mean, but...

1. The term "transport" is of Greek origin.
2. The field of transport has very few aspects, one of which is vehicles.
3. Infrastructure includes the transport networks (roads, railways, airways, waterways, canals, pipelines, etc.).
4. Worldwide, the most widely used modes for passenger transport are the automobiles, followed by buses.
5. People seldom use transport to go from one place to the other.
6. There is not any relationship between the density of development and types of transportation.

20. Fill in the gaps with the words from the box:

officially recreational fastest muscle bicycle town aircraft

A Human-Powered Vehicle

A human-powered vehicle (HPV) is a vehicle powered solely by human **1** _____. The most common human-powered vehicle is the **2** _____. Of more limited but still sometimes functional use are the tricycle and some rowing boats. Of common **3** _____ use are the skateboards, ice skates, and roller skates. Many other kinds of vehicles can employ human power, including submarines, **4** _____, hydrofoils (*судно на подводных крыльях*), hovercraft (*судно на воздушной подушке*), and kinetic sculpture vehicles. In 1969, artists in a small northern California **5** _____ began the Kinetic sculpture race which has grown to a 42 mile, three-day all terrain, human-powered sculpture race and county wide event. It is held every year in the last weekend in May. The first **6** _____ authenticated take-off and landing of a human-powered aircraft (one capable of powered takeoffs, unlike a glider) was done in November 1962 by Derek Piggott in Southampton University's Man Powered Aircraft (SUMPA). Perhaps the best-known human-powered plane is the Gossamer Albatross, which flew across the English Channel in 1979. Recumbent bicycles are the **7** _____ human-powered vehicles: as of 2004, Sam Whittingham holds the record, having cycled for 200 m at 81.00 mph (130.36 km/h).

Check your answers on p. 280.

21. Read the following text and render it according to the following scheme:

- the title of the text is ...
- the text tells/ runs about .../ the main/central idea is .../ to put it in a few words .../ the aim of the article/text is to tell the reader about...
- according to the text...
- to all appearances (по всей видимости)...
- needless to say (не нужно говорить)...
- then I'm going to add...
- I want to point out the following facts that were new to me...
- in conclusion I'd like to say...

Text 8 B

Who Invented the Automobile?

This question does not have a straightforward answer. The history of the automobile is very rich and dates back to the 15th century when Leonardo da Vinci was creating designs and models for transport vehicles. There are many different types of automobiles – steam, electric, and gasoline – as well as countless styles. Exactly who invented the automobile is a matter of opinion. In terms of the lives of average people, there is little doubt that the automobile is the most revolutionary invention in the history of transportation since the wheel. The basic premise of the automobile is simple; choose a wheeled vehicle from the many types typically pulled by horses or oxen, add a motor and create a self-propelled, personal transportation vehicle.



The earliest ancestor of the modern automobile is probably the Fardier, a three-wheeled, steam-powered, 2.3-mph vehicle built in 1771 by Nicolas Joseph Cugnot for the French minister of war. This cumbersome machine was never put into production because it was much slower and harder to operate than a horse-drawn vehicle. Amedee Bollee, also a Frenchman, built an improved 12-passenger steam car in 1873, but the steam engine proved impractical for a machine that was intended to challenge the speed of a horse-and-buggy. The invention of the practical automobile had to await the invention of a workable internal combustion engine.



The milestone vehicle was built in Germany in 1889 by Gottlieb Daimler and Wilhelm Maybach. Powered by a 1.5 hp, two-cylinder gasoline engine, it had a four-speed transmission and traveled at 10 mph. Another German, Karl Benz, also built a gasoline-powered car the same year. The gasoline-powered automobile, or motor car, remained largely a curiosity for the rest of the nineteenth century, with only a handful being manufactured in Europe and the United States.

The first automobile to be produced in quantity was the 1901 Curved Dash Oldsmobile, which was built in the United States by Ransom E. Olds. Modern automobile mass production, and its use of the modern industrial assembly line, is credited to Henry Ford of Detroit, Michigan, who had built his first gasoline-powered car in 1896. Ford began producing his Model T in 1908, and by 1927, when it was discontinued, over 18 million had rolled off the assembly line.

22. Fill in the gaps with the prepositions from the box:

of (8) with (3) in (6) during for (3) by between
--

Automotive History

The history ____ the automobile begins ____ the technological breakthroughs that occurred ____ Europe ____ the early 1800's and continues a century later ____ the pioneering efforts ____ American manufactures to begin mass-producing cars. The world economic downturn leading up to World War II led to consolidation ____ the fragmented automobile manufacturing market, while ____ the postwar period, renewed economic growth, television advertising, and an expanding road system accelerated sales ____ automobile producers ____ many industrialized countries. Design, service, and speed became trademarks ____ the successful companies, as evidence ____ the every growing range ____ car models and the increasing popularity ____ NASCAR racing ____ the United States.

However, as the industry matured, manufacturers had to reach an accommodation ____ labor unions, increasing government controls, and consumer expectations ____ annual changes ____ product design. Trade conflicts led to Voluntary Export Restraints (VERs) and new questions about the value ____ globalization. The automobile, while providing greater personal freedom and economic growth, also served as the basis ____ questioning the value ____ technological progress. Scholars considered the effects of urban sprawl (and the advantages of urban planning), and the tradeoffs ____ economic growth, pollution, and conservation. Subsequent

industry mergers, the ongoing threat ____ oil crises and environmental degradation continue to affect the automobile industry today.

23. Read the text below to learn about geographical challenges facing urban transportation:

Text 8 C

Geographical Challenges Facing Urban Transportation

Cities are locations having a high level of accumulation and concentration of economic activities and are complex spatial structures that are supported by transport systems. The most important transport problems are often related to urban areas, when transport systems, for a variety of reasons, cannot satisfy the numerous requirements of urban mobility. Urban productivity is highly dependent on the efficiency of its transport system to move labor, consumers and freight between multiple origins and destinations. Some problems are ancient, like congestion (which plagued cities such as Rome), and others are new like urban freight distribution or environmental impacts, notably CO₂ emissions linked with the diffusion of the internal combustion engine. Among the most notable urban transport problems are:

Traffic congestion and parking difficulties. Congestion is one of the most prevalent transport problems in large urban agglomerations. It is particularly linked with the diffusion of the automobile, which increases the demand for transport infrastructure that has often not been able to keep up with the growth of mobility.

Public transport inadequacy. Many public transit systems, or parts of them, are either over or underused. During peak hours, crowdedness creates discomfort for users, while low ridership makes many services financially unsustainable, particularly in suburban areas.

Difficulties for pedestrians. These difficulties are either the outcome of intense traffic, where the mobility of pedestrians and vehicles are impaired, but also because of a blatant lack of consideration for pedestrians in the physical design of facilities.

Loss of public space. The majority of roads are publicly owned and free of access. Increased traffic has adverse impacts on public activities which once crowded the streets such as markets, agoras, parades and processions, games, and community interactions. These have gradually disappeared to be replaced by automobiles. In many cases, these activities have shifted to shopping malls while in other cases, they have been abandoned altogether. Traffic flows influence the life and interactions of residents and their usage of street space. More traffic impedes social interactions and street activities. People tend to walk and cycle less when traffic is high.

Environmental impacts and energy consumption. Pollution, including noise, generated by circulation has become a serious impediment to the quality of life and even the health of urban populations. Further, energy consumption by urban transportation has dramatically increased and so the dependency on petroleum.

Accidents and safety. Growing traffic in urban areas is linked with a growing number of accidents and fatalities, especially in developing countries. As traffic increases, people feel less safe to use the streets.

Land consumption. Between 30 and 60% of a metropolitan area may be devoted to transportation, an outcome of the over-reliance on some forms of urban transportation.

Freight distribution. The materialization of the economy has produced growing quantities of freight moving within metropolitan areas. As freight traffic commonly shares infrastructures with passengers' circulation, the mobility of freight in urban areas has become increasingly problematic. City logistics strategies can be established to mitigate this problem.



TEXT AND VOCABULARY EXERCISES

24. Find in the text the phrases which mean the same as:

- | | |
|-------------------------|--|
| ▪ разнообразие причин | ▪ многочисленные требования |
| ▪ затор, пробка | ▪ транспортные проблемы |
| ▪ нежизнеспособный | ▪ потоки движения |
| ▪ серьезное препятствие | ▪ качество жизни |
| ▪ господство автомобиля | ▪ находится в общественной собственности |

25. Give Russian equivalents to the following word combinations:

Concentration of economic activities; urban mobility; environmental impacts; internal combustion engine; prevalent transport problems; crowdedness; public activities; street activities; serious impediment; quality of life; accidents and fatalities; passengers' circulation; mobility of freight.

26. Match each word in A with the Russian equivalent in B:

- | A | B |
|----------------|----------------------|
| 1. location | a. воздействие |
| 2. requirement | b. потребитель |
| 3. consumer | c. движение |
| 4. impact | d. грузовое движение |

- | | |
|--------------------|----------------------|
| 5. pedestrian | e. смягчать |
| 6. traffic | f. взаимодействие |
| 7. freight traffic | g. распространение |
| 8. to mitigate | h. использование |
| 9. accident | i. местоположение |
| 10. interaction | j. требование |
| 11. diffusion | k. несчастный случай |
| 12. usage | l. пешеход |

27. Choose the correct word from Text 8C to complete the sentences:

1. Cities are locations having a high ____ of accumulation and concentration of economic activities and are complex spatial structures that are supported by transport systems.

2. The most important transport problems are often related to urban areas, when transport systems, for a variety of reasons, ____ satisfy the numerous requirements of urban mobility.

3. Congestion is one of the most prevalent transport ____ in large urban agglomerations.

4. The majority of roads are ____ owned and free of access.

5. ____, including noise, generated by circulation has become a serious impediment to the quality of life and even the health of urban populations.

6. Growing ____ in urban areas is linked with a growing number of accidents and fatalities.

28. Discuss the following situations from the text:

- | | |
|---|--------------------------------|
| ▪ The most important transport problems | ▪ Urban productivity |
| ▪ Traffic congestion | ▪ Difficulties for pedestrians |
| ▪ Environmental impacts | ▪ Safety |

29. Match each word on the left with the correct definition on the right:

- | | |
|------------------|---|
| 1. concentration | a. a lot of sth in one place |
| 2. urban | b. something that you must have in order to do sth else |
| 3. influence | c. the point from which sth starts |
| 4. satisfy | d. the power that sb/sth has to make sb/sth behave in a particular way |
| 5. requirement | e. connected with a town or city |
| 6. mobility | f. the rate at which a worker, a company produces goods |
| 7. productivity | g. the ability to move easily from one place, social class, or job to another |
| 8. origin | h. to provide what is wanted |

30. Work in pairs and decide whether these statements are true or false:

1. Cities are locations having a low level of accumulation and concentration of economic activities and are complex spatial structures that are not supported by transport systems.

2. The most important transport problems are often related to urban areas, when transport systems, for a variety of reasons, cannot satisfy the numerous requirements of urban mobility.

3. Urban productivity is not dependent on the efficiency of its transport system to move labor, consumers and freight between multiple origins and destinations.

4. All transport problems are new, such as urban freight distribution or environmental impacts, notably CO₂ emissions linked with the diffusion of the internal combustion engine.

5. During peak hours, crowdedness creates discomfort for users.

6. The roads are privately owned and are not free of access.

7. Traffic flows influence the life and interactions of residents and their usage of street space.

8. Pollution, including noise, generated by circulation has become a serious impediment to the quality of life and even the health of urban populations.

9. Growing traffic in urban areas is not linked with a growing number of accidents and fatalities.

10. The materialization of the economy has produced growing quantities of freight moving within metropolitan areas.

11. There are several dimensions to the urban transport problem, most of them linked with the dominance of the automobile.

31. Read the text and give its brief summary:

Text 8 D

Automobile Dependency

Automobile use obviously produces a variety of advantages such as performance, comfort, status, speed, and convenience. These advantages jointly illustrate why automobile ownership continues to grow worldwide, especially in urban areas. Several factors influence the growth of the total vehicle fleet, such as sustained economic growth (increase in income and quality of life), complex individual urban movement patterns (many households have more than one automobile), more leisure time and suburbanization. The acute growth in the total number of vehicles also gives rise to congestion at peak traffic hours on major thoroughfares, in business districts and often throughout the metropolitan area. Over time, a state of

automobile dependency has emerged which results in a diminution in the role of other modes, thereby limiting still further alternatives to urban mobility. There are two major factors contributing to automobile dependency:

Underpricing and consumer choices. Most road infrastructures are subsidized as they are considered a public service. Consequently, drivers do not bear the full cost of automobile use. Like the “Tragedy of the Commons”, when a resource is free of access (road), it tends to be overused and abused (congestion). This is also reflected in consumer choice, where automobile ownership is a symbol of status, freedom and prestige, especially in developing countries. Single home ownership also reinforces automobile dependency.

Planning and investment practices. Planning and the ensuing allocation of public funds aim towards improving road and parking facilities in an ongoing attempt to avoid congestion. Other transportation alternatives tend to be disregarded. In many cases, zoning regulations impose minimum standards of road and parking services and de facto impose a regulated automobile dependency.

Cities are important generators and attractors of movements, which have created a set of geographical paradoxes that are self-reinforcing. There are several levels of automobile dependency with their corresponding land use patterns and alternatives to mobility. Among the most relevant indicators of automobile dependency are the level of vehicle ownership, per capita motor vehicle mileage and the proportion of total commuting trips made using an automobile. A situation of high automobile dependency is reached when more than three quarters of commuting trips are done using the automobile.

For the United States, this proportion has remained around 88% over the recent years. Automobile dependency is also served by a cultural and commercial system promoting the automobile as a symbol of status and personal freedom, namely through intense advertising and enticements to purchase new automobiles. The second half of the 20th century saw the adaptation of many cities in North America and Europe to automobile circulation. Motorized transportation was seen as a powerful symbol of modernity and development. Highways were constructed, streets were enlarged, and parking lots were set often disrupting the existing urban fabric. However, from the 1980s, several cities were trying to limit automobile circulation by a set of strategies including:

Dissuasion. Although automobile circulation is permitted, it is impeded by regulations and physical planning. For instance, parking space can be severely limited.

Prohibition of downtown circulation. During most of the day the downtown area is closed to automobile circulation but deliveries are

permitted during the night. Such strategies are often undertaken to protect the character and the physical infrastructures of an historical city.

Tolls. Imposing tolls for parking and entry to some parts of the city. Most evidence underlines, however, those drivers are willing to bear additional toll costs, especially when commuting is concerned.

Tentative solutions have been put forth such as transport planning measures (synchronized traffic lights, regulated parking), limited vehicle traffic in selected areas, the promotion of bicycle paths and public transit. In Mexico City, vehicle use is prohibited according to license plate numbers and the date (even-uneven). Affluent families have solved this issue by purchasing a second vehicle, thus worsening the existing situation. Singapore is the only country in the world which has successfully controlled the amount and growth rate of its vehicle fleet by imposing a heavy tax burden and purchasing permits on automobile owners.

There are many alternatives to automobile dependency such as intermodality (combining the advantages of individual and collective transport) or carpooling (strengthened by policy and regulation by the US government). These alternatives, however, can only be partially executed as the automobile remains the prime choice for providing urban mobility. There are however powerful countervailing forces that can influence modal choice, namely congestion.



TEXT AND VOCABULARY EXERCISES

32. Find in the text the words or phrases which mean the same as:

- | | |
|--------------------------------------|--|
| ▪ комфорт | ▪ скорость |
| ▪ удобство | ▪ собственность |
| ▪ транспортное средство | ▪ экономический рост |
| ▪ домашнее хозяйство | ▪ пиковые часы движения |
| ▪ зависимость | ▪ уменьшение |
| ▪ выбор потребителя | ▪ общественные фонды |
| ▪ символ статуса, свободы и престижа | ▪ улучшение дороги и стоянки для автомобилей |

33. Match each word in A with the Russian equivalent in B:

- | A | B |
|---------------|-------------|
| 1. additional | a. пошлина |
| 2. toll | b. выбор |
| 3. tentative | c. запрещен |
| 4. solution | d. шоссе |

- | | |
|------------------|-------------------------|
| 5. choice | e. поездка |
| 6. is prohibited | f. дополнительный |
| 7. highway | g. уместный |
| 8. disrupt | h. предварительный |
| 9. trip | i. разрушить (перевать) |
| 10. relevant | j. решение |

34. Make up situations using the English equivalents of the words given in exercise 32.

35. Choose among the words in parentheses the one that corresponds to the text above to complete the sentences:

1. Automobile use obviously ____ a variety of advantages such as performance, comfort, status, speed, and convenience.

(a. *produces*; b. *fulfils*; c. *does*)

2. The acute growth in the total number of vehicles also gives rise to congestion at peak traffic hours on major thoroughfares, in business districts and often throughout the ____ area.

(a. *urban*; b. *rural*; c. *metropolitan*)

3. Most road infrastructures are subsidized as they are considered a ____ service.

(a. *private*; b. *public*; c. *mixed*)

4. Planning and the ensuing allocation of public funds aim towards improving road and parking facilities in an ongoing attempt ____ congestion.

(a. *to avoid*; b. *to reach*; c. *to mount to*)

5. Cities are important generators and attractors of movements, which have ____ a set of geographical paradoxes that are self-reinforcing.

(a. *created*; b. *done*; c. *made*)

6. There are several levels of automobile dependency with their corresponding land use patterns and alternatives to ____.

(a. *immobility*; b. *smoothness*; c. *mobility*)

7. The second half ____ the 20th century saw the adaptation of many cities in North America and Europe to automobile circulation.

(a. *of*; b. *in*; c. *at*)

8. Motorized transportation was seen as a powerful symbol of ____ and development.

(a. *unmodernity*; b. *modernity*; c. *antiquity*)

9. ____ were constructed, streets were enlarged, and parking lots were set often disrupting the existing urban fabric.

(a. *roads*; b. *lines*; c. *highways*)

36. Work in pairs, think of some questions to review the contents of Text 8 C and ask each other. Use the word combinations below:

- automobile dependency
- a variety of advantages
- growth of vehicles
- to avoid congestion
- transport planning measures
- urban mobility

37. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about congestion (Text 25), the urban transit challenge (Text 26), and automobiles (Text 27). Be ready to discuss the information you have read.

38. Fill in the gaps with the words from the box:

tendency	congestion	protection	private	worsening	costs
	suffers	transport	improvement		

The tendency to rely on **1** ___ cars, buses, and taxis is explained by the lower costs of road solutions in the short term. The longer-term social costs and negative externalities have been ignored and are rarely passed on to users in terms of higher private **2** ___. Apart from lost time and, recently, a **3** ___ for public transport to raise its fares, the majority of these externalities are passed on as social costs. As a result, there has been little sign of **4** ___ in the transport sector in America's major cities; most of the evidence points to **5** ___ congestion, longer journeys, and slower traffic speeds. It is difficult to say who **6** ___ most from this deterioration. Bus passengers are certainly paying more in terms of longer journeys, and in recent years fare levels have also risen as transport subsidies have been cut. These changes have clearly hit the poor, as the bus is their principal method of **7** ___. But car-owners have also suffered from growing **8** ___ in terms of longer journey times. Their main **9** ___ is that at least they can sit in comfort as the traffic crawls along.

Check your answers on p. 280

39. Fill in the gaps with the prepositions from the box:

Sahara Driving

after; among; at (2); down; for (3); in (5); of (3); off (2); on (6); over;
under; with (5)

Boring. That's what driving is like ____ American interstate highways. I fight to stay awake ____ the wheel because there is little effort needed as I steer my car ____ the wide straight stretch ____ asphalt. Boredom is built into the highway's design.

For example, fences alongside the freeway keep interesting animals and pedestrians ____ the roadway; white and yellow lines serve to encourage drivers to keep to their lanes (no excitement there); and, the smooth roadbed eliminates most bumps. I' safer, they say. Perhaps, but I'd be happy to exchange that security ____ the always-changing, exciting experience of driving ____ the Sahara Desert.

For one thing, the sand never stays ____ one place. Road maintenance crews are hard-pressed to keep ahead ____ the restless sand as it seeks to overrun major highways. I have a vivid memory ____ a warm sunny day ____ April when my wife and I were enjoying a drive ____ the majestic white dunes near El Oued, Algeria. The good asphalt road was easy to drive on until it ended abruptly ____ a dune which had drifted ____ it during the night. We came prepared and ____ an hour of shoveling, we managed to be ____ our way. Sand ____ top of the road isn't the only problem.

Sand underneath the asphalt can also cause some surprises ____ the unaware motorist. Underlying sand can shift, thereby causing the road to sink. What is the result? The seemingly solid roadbed can suddenly be punctuated ____ immense potholes – some as large as 3 feet across and a foot deep. Imagine what that can do to the car that hits it at 60 mph! I have dented more than one wheel rim ____ such potholes.

However, the Sahara Desert has more than sand to contend with. You might have to share your normally empty driving space ____ anything from jackals and wandering camels to enormous trans-Saharan trucks or vans loaded ____ German tourists.

If one of these obstacles forces you ____ the road, you might puncture a tire ____ sharp rocks or find yourself axle-deep ____ sand. One hot summer day, we found ourselves stuck behind a slow military convoy, but, because ____ the narrow road bed, we could not pass until the convoy pulled over ____ a rest stop. We just followed the last truck and exchanged smiles and waves ____ the bored soldiers.

The excitement of motoring ____ the Sahara has its advantages, the chief of which is that one is never tempted to sleep ____ the wheel. With the lovely sand dunes ____ all sides and ____ the interesting presence of others who share the road, who could ever be bored?

40. Guided summary. Use the sentences from the text below to complete this paragraph. You are free to make any changes.

*First of all ... Then ... It should be noted that ... That's why ... But ...
Of course ... It is interesting to mention*

London's Transport Problems

Resolving London's transport problems is the highest priority of the Mayor of London, Ken Livingstone. His goal is to create a world class transport system that enhances business efficiency, supports greater economic prosperity and improves the quality of life for every resident and visitor to London. The Mayor's transport strategy has ten key priorities:

- reducing traffic congestion;
- overcoming the backlog of investment on the Underground;
- making radical improvements to bus services across London;
- better integration of the National Rail system with London's other transport systems;
- increasing the overall capacity of London's transport system;
- improving journey time reliability for car users;
- supporting local transport initiatives;
- making the distribution of goods and services in London more reliable, sustainable and efficient.

The priority of congestion charging in central London is to reduce traffic congestion. To improve air quality in London – which is currently among the worst in Europe – the Mayor is proposing to designate Greater London as a Low Emission Zone (LEZ). The objectives of the proposed LEZ are two-fold:

- To move London closer to achieving national and EU (European Union) air quality objectives for 2010.
- To improve the health and quality of life of people who live and work in London, through improving air quality

A LEZ would aim to reduce air pollution by discouraging the most polluting vehicles from driving in Greater London. These are generally older, diesel-engined lorries, buses and coaches. Cars would not be included in the LEZ. As air quality in London is currently among the worst in Europe, air pollution affects the quality of life of a large number of Londoners, especially those with respiratory and cardiovascular conditions.

It is estimated that every year some 1,000 premature deaths and a similar number of hospital admissions occur due to poor air quality in the Capital. Many more people experience discomfort as a result of air pollution aggravating existing conditions.

41. Translate the following text into English:

Широкое применение автомобиля как транспортного средства началось с появления быстроходного двигателя внутреннего сгорания. Немецкий изобретатель Н.А. Отто построил в 1876 году двигатель внутреннего сгорания, топливом для которого служил газ. КПД этого двигателя оказался в три раза выше, чем у построенных в то время паровых машин.

В 1897 году Рудольф Дизель создал двигатель внутреннего сгорания с воспламенением рабочей смеси не от искры, как у Отто, а от сжатия.

Двигатель Р. Дизеля показал еще более высокое значение КПД. В 1885 Г. Даймлер (Германия) построил мотоцикл с бензиновым двигателем, а в 1886 его соотечественник К. Бенц взял патент на трехколесный автомобиль с таким же двигателем мощностью 0,75 л. с. Последующие годы явились началом промышленного производства автомобилей.

В 1890-е годы появились первые автомобили «Панар-Левассор», и «Де Дион-Бутон» (Франция), в 1892 году построил свой первый автомобиль Генри Форд (США) и начал их промышленное производство в 1903 году.

Одним из первых русских автомобилей был «Руссо-Балт» (1908). Первый советский автомобиль был выпущен в 1924 году – АМО-Ф15, а в 1932 году в СССР началось массовое производство автомобилей ГАЗ.

CONVERSATIONAL PRACTICE

42. Discuss with your partner the following questions:

1. Do you think that the invention of the automobile was the greatest achievement of mankind? Why/ Why not?
2. Do you think that automobile use produces a variety of advantages? What are they?
3. What are the factors which influence the growth of the total number of vehicles? Give your reasons.
4. Do you really think that an automobile is a symbol of status, freedom and prestige? Why/ Why not?
5. Is it really necessary for a modern person to drive automobile? Why/ Why not?



WRITING THE CVs

43. Read and translate the following sample of CV.

FirstName, LastName
87 Washington Street
Hopedale, NY 11233
Phone: 555-555-555
Email: xxxxx@xyz.edu

EDUCATION

XYZ UNIVERSITY

Hopedale, NY: BA, American Studies

Cumulative GPA: 3.93

GEORGETOWN UNIVERSITY STUDY ABROAD

University of Trier, Germany

(Summer 2005)

AMERICAN UNIVERSITY

Washington, DC: Washington Semester in American Politics (Spring 2004)

RESEARCH AND ANALYTICAL EXPERIENCE

U.S. Department of Education

Intern, Office of the Deputy Secretary (Spring 2005)

- Generated concise written synopses of current legislative action for use by the Department, Congress members, and the general public through the ED website.

LEADERSHIP EXPERIENCE

Vice President/Academic Affairs

Student Government Association, XYZ University (2003–2004)

- Chaired 60-member body representing each academic department and student perspectives on curricular issues

- Participated in college-wide policy decisions concerning such ethical issues as the sale of cigarettes on campus

ADDITIONAL ACTIVITIES

- Student Alumni Society: Founding Member (2002-present)

- Committee on Academic Freedoms: Student Representative (2002-present)

- Skidmore Orchestra: French Horn (2001-present)

- American Studies Club: Secretary (2001-present)

COMPUTER/LANGUAGE SKILLS

- Proficient in written and spoken German

- Extensive experience with Internet Explorer, HTML, Lexis-Nexis and Microsoft Office

WRITING PRACTICE



44. Compose your own CV. Use the phrases and the Action Verbs from Unit 7.

45. Read the following advertising text carefully in order to discover the main line of thought and make a plan for writing a summary:

Automotive Technician – Schools and Careers

Learn the skills you need to become an Automotive Technician. Jobs for Auto Technicians are in abundance according to experts in the industry. With technology rapidly changing, the need for highly skilled auto technicians is continually growing. Today's automobiles are more complex than ever and Auto Technicians are required to have in-depth knowledge of auto mechanics, electronics and computer systems.

Strong mechanical and technical skills are essential to being successful in the profession. Automotive technology programmes provide the skill set needed for diagnosing, servicing and repairing both domestic and foreign automobiles. Students learn how to troubleshoot problems using the latest engine analyzers, hand held scanners and other computerized diagnostic equipment. In general, studies range from basic engine systems to custom-built, high performance engines.

There are also courses on computerized fuel injection, anti-lock brakes, passenger restraint systems, computerized engine control and more. Some schools offer programmes to prepare technicians for the ASE Certification. ASE stands for Automotive Service Excellence – the national standard of automotive technician competence.

Other schools offer manufacturer sponsored advanced automotive training programmes. Some schools specializing in training for Automotive Technicians provide graduates with internships at auto dealerships and automotive repair centers.

Many automotive technology schools are industry accredited and provide job placement assistance for graduates. Financial assistance is normally available to those who qualify.

Graduation from an automotive technology school can prepare you for a rewarding career in this exciting industry. Put yourself in the driver's seat and begin a career as an Automotive Technician.

UNIT 9

Pre-Text Exercises

Word Building

Active Vocabulary

Text 9 A. *Computer Use and Computer Engineering*

Text 9 B. *Computer Inside*

Text 9 C. *The Motherboard*

Text 9 D. *The Educational Purposes of Computer Use in Russia*

Text and Vocabulary Exercises

Conversational Practice

The Business Letter

Writing Practice

PRE-TEXT EXERCISES

1. Here are some expressions with the prepositions *under* and *up*. Translate and memorize them:

- | | | |
|---------------------------------|-----------------------------|----------------------|
| ▪ it is up to you | ▪ time is up | ▪ to be under repair |
| ▪ to pick up | ▪ to ring up | ▪ to save up |
| ▪ to sit up | ▪ to stand up | ▪ to wake up |
| ▪ up to date | ▪ up and down | ▪ hurry up |
| ▪ to be under the circumstances | ▪ to be under consideration | ▪ up to the mark |

2. Fill in the gaps with the expressions above in the appropriate form:

1. If you ___ early in the morning, you will be able to do a lot.
2. They were going along the forest ___ mushrooms on their way.
3. Children, ___ please because we have little time.
4. John ___ and left the room.
5. You must solve this problem yourself, ___.
6. Will you ___ me ___ when he brings the papers?
7. This is ___ technology and we are going to use it.

3. Fill in the correct prepositions:

1. She is always late ___ her lessons because she is very absent minded.
2. My twins are so much alike that sometimes I cannot tell them ___ each other.
3. ___ his point of view Charlie is not right.
4. We always take ___ consideration all her remarks.

5. Polly works ___ morning ___ night and looks so exhausted.
6. Henry has just recovered ___ pneumonia and is still rather weak.
7. They are so proud ___ their children.

4. Choose the correct word to complete the sentences:

1. You are too late. This information is ___ date now.
a) *over*; b) *out of*; c) *into*.
2. We like to go ___ a walk when the weather is warm.
a) *for*; b) *on*; c) *at*.
3. He came to that place day ___ day but he never saw this girl again.
a) *on*; b) *at*; c) *by*.
4. Father prevented the child ___ falling down.
a) *from*; b) *at*; c) *on*.
5. They got too tired and decided to lie _____.
a) *up*; b) *down*; c) *after*.
6. She was named ___ her aunt and she didn't like her name.
a) *after*; b) *over*; c) *into*.
7. Let's divide the bun ___ halves. It's too big for one person.
a) *onto*; b) *in*; c) *into*.
8. The squirrel looked so funny that children started to laugh ___ it.
a) *at*; b) *over*; c) *on*.
9. We always like to play ___ the open air.
a) *on*; b) *at*; c) *in*.

5. Explain the meaning of the following words and phrases in English:

Computer engineers; information technology; software; hardware.

6. Choose the correct word to fill the gaps:

1. As with all modern scientific and technological endeavours, computers and software ___ an increasingly important role.

plays play played was playing

2. Computer models of designs ___ be checked for flaws without having to make expensive and time-consuming prototypes.

may can must should

3. Computer Engineering ___ a discipline encompassing electronic engineering and computer science.

are am is was

4. Electronic equipment today relies heavily ___ computer technology.

to on at in

5. There is a high demand ____ engineers who are able to design and manage all forms of computer systems in industry.

for in with on

6. The computer ____ an integral part of modern everyday life.
will become has become became to become

7. As the computer became very accessible, the sphere of its use ____ widened.

significant significantly insignificant insignificantly

8. The use of computers as bases ____ the storage of tremendous volume of information are probably used the most widely used function.

for in with at

9. It is now ____ to convert a tremendous quantity of pictures and copies of unique documents which were, in former times, inaccessible for most researchers.

unimportant possible impossible important

10. The use of the computer will become ____ because it allows us to accustom children to the world of knowledge in forms which are very comfortable to them and yet provide programmes with important content.

less important most important unimportant more important

7. BRAINSTORMING. What associations do the following words and phrases call to mind? Make a list of ideas and compare your notes with those of your partners.

scientific and technological progress; personal computers; computer technology; installation of computer hardware; rapid advances in computer technology; programming skills.

WORD BUILDING

8. Translate the following derivative words. Work with a partner and see how many words of the same word formation model you can add to this list.

noun or verb + -ive → adjective

to conserve – conservative; progress – progressive; effect – effective; mass – massive; to react – reactive

noun + -ful → adjective

use – useful; power – powerful; skill – skillful; success – successful

9. Translate the following complex words:

Software; electromagnetic; hardware; microprocessor; keyboard; computer-related; network; read-only; full-fledged; motherboard; chipset; breathtaking; northbridge; southbridge; self-test; battery-operated; multi-core; sky-rocket; checkpoint; typewrite.

10. Translate the following terms analyzing their word-formation model:

Prototype; supercomputer; subsystem; installation; compiler; intranet; marketing; transistor; adjustment; controller; biometric; updating; supermarket; computerize; enforcement; programmer; user; competitor.

11. Guess the meaning of the words in bold type:

Science – **scientist** – **scientific**; technology – **technological** – **technologically**; to increase – **increasingly**; important – **unimportant**; accurate – **accurately**; to compute – **computer**; translate – **translation**; to suit – **suitable**; to fabricate – **fabrication**; design – **designer**; to develop – **development**; use – **usage**; finite – **infinite**; to avail – **available**; to install – **installation**; to equip – **equipment**; to research – **researcher**; quick – **quickly**; to specialize – **specialization**; to use – **to reuse**.

ACTIVE VOCABULARY

12. Read and memorize the following words and word combinations:

advance – прогресс
to apply – применять
available – доступный
chip – чип , микросхема
circuit – схема
to convert – преобразовывать
digital – цифровой
endeavour – попытка, стремление
to encompass – охватывать
hardware – аппаратное обеспечение
to implement – выполнять, осуществлять
to install – устанавливать;
to integrate – объединять

keyboard – клавиатура
to maintain – поддерживать, обслуживать
modem – модем
to predefine – предопределить
programming languages – языки программирования
to retain – сохранить
software – программное обеспечение
time-consuming – требующий больших затрат времени
user – пользователь
utility programme – сервисная программа

13. Read Text 9A to learn about computer use and computer engineering. The words and word combinations below will help you to understand the text; memorize these words:

CAD – computer-aided design – автоматизированное проектирование

VLSI – very large-scale integration – интеграция сверхвысокого уровня

CNC – computer numerical control – компьютерное числовое программное управление

FEA – finite-element analysis – анализ с использованием метода конечных элементов

PCB – Printed Circuit Board – печатная плата

circuit board – монтажная плата

COBOL – common business-oriented language – язык программирования КОБОЛ

Fortran – ФОРТРАН (алгоритмический язык)

C++, C – языки программирования

Java – язык Java – машиннезависимый объектно-ориентированный язык, разработанный фирмой Sun Microsystems для создания распределённых прикладных Web-систем

Intranet – 1) технология создания корпоративной локальной сети повышенной надёжности с ограниченным доступом, использующей сетевые стандарты и сетевые программно-аппаратные средства, аналогичные Internet; 2) внутрисетевой

customization – подгон под потребителя (приспособление товара к конкретным требованиям клиентов; выполнение по индивидуальному заказу; подгонка, оформление в соответствии с требованиями заказчика)

Text 9 A

Computer Use and Computer Engineering

As with all modern scientific and technological endeavours, computers and software play an increasingly important role. Numerical methods and simulations can help predict design performance more accurately than previous approximations.

Using computer-aided design (CAD) software, engineers are able to create more easily drawings and models of their designs. Computer models of designs can be checked for flaws without having to make expensive and time-consuming prototypes. The computer can automatically translate some models to instructions suitable for automatic machinery (e.g., CNC) to fabricate a design.

The computer also allows increased reuse of previously developed designs, by presenting an engineer with a library of predefined parts ready to be used in designs. Of late, the use of finite element method analysis

(FEM analysis or FEA) software to study stress, temperature, flow as well as electromagnetic fields has gained importance. In addition, a variety of software is available to analyze dynamic systems. Electronics engineers make use of a variety of circuit schematics software to aid in the creation of circuit designs that perform an electronic task when used for a printed circuit board (PCB) or a computer chip.

Computer Engineering is a discipline encompassing electronic engineering and computer science. This hybrid of electronic engineering and computer science allows the computer engineer to work on both software and hardware, and to integrate the two. Computer engineers are involved in all aspects of computing, from the design of individual microprocessors, personal computers, and supercomputers, to the integration of computer systems into other kinds of systems, e.g. a motor vehicle has a number of subsystems that are computer and digitally oriented. Electronic equipment today relies very heavily on computer technology and so electronic engineers and computer engineers may work together to design and manufacture electronic equipment which requires both hardware and software design. Common computer engineering tasks include writing embedded software for real-time microcontrollers, designing VLSI chips, working with analog sensors, designing mixed signal circuit boards, and designing operating systems.

The high demand for engineers who are able to design and manage all forms of computer systems in industry has led to tertiary institutions around the world to implement a new bachelor's degree generally called computer engineering. Both computer engineering and electronic engineering programmes include analog and digital circuit design into their curriculums. Computer hardware engineers research, design, develop, test, and oversee the installation of computer hardware and supervise its manufacture and installation. Hardware refers to computer chips, circuit boards, computer systems, and related equipment such as keyboards, modems, and printers. Computer software engineers design and develop the software systems that control computers. The work of computer hardware engineers is very similar to that of electronics engineers, but, unlike electronics engineers, computer hardware engineers work exclusively with computers and computer-related equipment. The rapid advances in computer technology are largely a result of the research, development, and design efforts of computer hardware engineers.

The explosive impact of computers and information technology on our everyday lives has generated a need to design and develop new computer software systems and to incorporate new technologies into a rapidly growing range of applications. The tasks performed by workers known as computer software engineers evolve quickly, reflecting new

areas of specialization or changes in technology, as well as the preferences and practices of employers.

Computer software engineers apply the principles and techniques of computer science, engineering, and mathematical analysis to the design, development, testing, and evaluation of the software and systems that enable computers to perform their many applications.

Software engineers working in applications or systems development analyze users' needs and design, construct, test, and maintain computer applications software or systems. Software engineers can be involved in the design and development of many types of software, including software for operating systems and network distribution, and compilers, which convert programmes for execution on a computer. In programming, or coding, software engineers instruct a computer, line by line, how to perform a function. They also solve technical problems that arise. Software engineers must possess strong programming skills, but are more concerned with developing algorithms and analyzing and solving programming problems than with actually writing code.

Computer applications software engineers analyze users' needs and design, construct, and maintain general computer applications software or specialized utility programmes. These workers use different programming languages, depending on the purpose of the programme. The programming languages most often used are C, C++, and Java, with Fortran and COBOL used less commonly. Some software engineers develop both packaged systems and systems software or create customized applications. Computer systems software engineers coordinate the construction and maintenance of a company's computer systems and plan their future growth. Working with the company, they coordinate each department's computer needs – ordering, inventory, billing, and payroll recordkeeping, for example – and make suggestions about its technical direction. They also might set up the company's intranets—networks that link computers within the organization and ease communication among the various departments.

Systems software engineers work for companies that configure, implement, and install complete computer systems. These workers may be members of the marketing or sales staff, serving as the primary technical resource for sales workers and customers. They also may be involved in product sales and in providing their customers with continuing technical support. Since the selling of complex computer systems often requires substantial customization for the purchaser's organization, software engineers help to explain the requirements necessary for installing and operating the new system in the purchaser's computing environment. In addition, systems software engineers are responsible for ensuring security across the systems they are configuring.

Computer software engineers often work as part of a team that designs new hardware, software, and systems. A core team may comprise engineering, marketing, manufacturing, and design people, who work together until the product is released.

Notes on the text

payroll recordkeeping – ведение записей платежной ведомости

billing – составление счетов, накладной

TEXT AND VOCABULARY EXERCISES



14. Find in the text the words or phrases which mean the same as:

- | | |
|-----------------------------|------------------------|
| ▪ повторно использовать | ▪ predetermined |
| ▪ вычислительная техника | ▪ subsystems |
| ▪ программное обеспечение | ▪ specialization |
| ▪ потребности пользователей | ▪ programming language |
| ▪ аппаратное обеспечение | ▪ servicing |
| ▪ объединять | ▪ transforming |

15. Find in the text the synonyms to the following words:

- | | | |
|----------------------------|------------------------|--------------------------|
| ▪ to attempt , to try | ▪ sketch | ▪ to change |
| ▪ to perform | ▪ to carry into effect | ▪ to fulfil, to complete |
| ▪ to carry out, to execute | | |

16. Give Russian equivalents to the following word combinations:

Scientific and technological endeavours; numerical methods; time-consuming prototypes; to be suitable; to reuse previously developed designs; digitally oriented; electronic equipment; to rely on; hardware and software design; high demand; analog and digital circuit design; rapid advances in computer technology; users' needs; to install complete computer systems; to design new hardware.

17. Match each word in A with the correct Russian equivalent in B:

- | A | B |
|-----------------|-----------------------------|
| 1. accurately | a. создавать |
| 2. suitable | b. отнимающий много времени |
| 3. reuse | c. изготавливать |
| 4. to be used | d. точно |
| 5. to fabricate | e. сеть |
| 6. network | f. преобразовывать |

- | | |
|-------------------|----------------------------|
| 7. to create | g. поддержка |
| 8. commonly | h. обычно |
| 9. time-consuming | i. использоваться |
| 10. to convert | j. повторное использование |
| 11. support | k. подходящий |

18. Choose among the words in parentheses the one that corresponds to the text above to complete the sentences:

- As with all modern scientific and technological endeavours, computers and software play an increasingly ___ role.
(a. *negligible*; b. *insignificant*; c. *important*)
- Numerical methods and simulations can help predict design performance more accurately than ___ approximations.
(a. *previous*; b. *future*; c. *recent*)
- Using computer-aided design software, engineers are ___ create more easily drawings and models of their designs.
(a. *able to*; b. *allow to*; c. *have to*)
- The use of finite element method analysis software to study stress, temperature, flow as well as electromagnetic fields ___ importance.
(a. *will gain*; b. *has gained*; c. *gained*)
- Computer Engineering ___ a discipline encompassing electronic engineering and computer science.
(a. *was*; b. *are*; c. *is*)
- Electronic ___ today relies very heavily on computer technology.
(a. *equipment*; b. *production*; c. *goods*)
- The rapid ___ in computer technology are largely a result of the research, development, and design efforts of computer hardware engineers.
(a. *backwardness*; b. *development*; c. *advances*)

19. Fill in the gaps with the words from the box:

store camcorders drives computer to tape power
--

Nearly every desktop **1** ___ and server in use today contains one or more hard-disk **2** ___. Every mainframe and supercomputer is normally connected **3** ___ hundreds of them. You can even find VCR-type (*VCR – Video Cassette Recorder – кассетный видеомagnetofон*) devices and **4** ___ that use hard disks instead of **5** ___. These billions of hard disks do one thing well – they **6** ___ changing digital information in a relatively permanent form. They give computers the ability to remember things when the **7** ___ goes out.

Check your answers on p. 280.

20. Read the following text and render it according to the following scheme:

- the title of the text is ...
- the text tells/ runs about .../ the main/central idea is .../ to put it in a few words .../ the aim of the article/the text is to tell the reader about...
- according to the text...
- to all appearances (по всей видимости)...
- needless to say (не нужно говорить)...
- then I'm going to add...
- I want to point out the following facts that were new to me...
- in conclusion I'd like to say...

Early History of Computer (Part 1)

The development of the modern day computer was the result of advances in technologies and man's need to quantify. Papyrus helped early man to record language and numbers. Some of the earlier counting machines lacked the technology to make the design work.

The abacus was one of the first counting machines. Its only value is that it aids the memory of the human performing the calculation. A skilled abacus operator can work on addition and subtraction problems at the speed of a person equipped with a hand calculator (multiplication and division are slower).

The abacus is often wrongly attributed to China. In fact, the oldest surviving abacus was used in 300 B.C. by the Babylonians. The abacus is still in use today. A modern abacus consists of rings that slide over rods, but the older one dates from the time when pebbles were used for counting (the word "calculus" comes from the Latin word for pebble).

In 1617 an eccentric Scotsman named John Napier invented logarithms, which are a technology that allows multiplication to be performed via addition. The magic ingredient is the logarithm of each operand, which was originally obtained from a printed table. But Napier also invented an alternative to tables, where the logarithm values were carved on ivory sticks which are now called Napier's Bones.

Napier's invention led directly to the slide rule, first built in England in 1632 and still in use in the 1960's by the NASA engineers of the Mercury, Gemini, and Apollo programmes which landed men on the moon. The first gear-driven calculating machine to actually be built was probably the calculating clock, so named by its inventor, the German professor Wilhelm Schickard in 1623. This device got little publicity because Schickard died soon afterward in the bubonic plague.

In 1642, Blaise Pascal invented the Pascaline as an aid for his father who was a tax collector. Pascal built 50 of this gear-driven one-function calculator (it could only add) but couldn't sell many because of their exorbitant cost and because they really weren't that accurate (at that time it was not possible to fabricate gears with the required precision). Up until the present age when car dashboards went digital, the odometer portion of a car's speedometer used the very same mechanism as the Pascaline to increment the next wheel after each full revolution of the prior wheel. Pascal was a child prodigy. At the age of 12, he was discovered doing his version of Euclid's thirty-second proposition on the kitchen floor. Pascal went on to invent probability theory, the hydraulic press, and the syringe.

Just a few years after Pascal, the German Gottfried Wilhelm Leibniz (co-inventor with Newton of calculus) managed to build a four-function (addition, subtraction, multiplication, and division) calculator that he called the stepped reckoner because, instead of gears, it employed fluted drums having ten flutes arranged around their circumference in a stair-step fashion. Although the stepped reckoner employed the decimal number system (each drum had 10 flutes), Leibniz was the first to advocate use of the binary number system which is fundamental to the operation of modern computers. Leibniz is considered one of the greatest of the philosophers but he died poor and alone.

In 1801, the Frenchman Joseph Marie Jacquard invented a power loom that could base its weave (and hence the design on the fabric) upon a pattern automatically read from punched wooden cards, held together in a long row by rope. Descendents of these punched cards have been in use ever since (remember the "hanging chad" from the Florida presidential ballots of the year 2000?).

21. Consult the TEXTS FOR SUPPLEMENTARY READING and learn about the contribution electrical engineering has made to the development of electronics and computer sciences (Text 28). Be ready to discuss the information you have read.

22. Read the text below to find answers to the given questions. The words and word combinations below which you should memorize will help you to understand the text:

Read-only memory – постоянная память, постоянное запоминающее устройство, ПЗУ

Hard drive – накопитель на жестких дисках, НМД

Initial programme load – начальная загрузка программы

Boot up – программа начального пуска, **to boot up** – загрузить

Random access memory – память (запоминающее устройство) с произвольной выборкой, ЗУПВ; оперативное запоминающее устройство, ОЗУ

Integrated circuit – интегральная схема

Text 9 B
Computer Inside

1. What kinds of things get stored in read-only memory, as opposed to those stored on the hard drive?

When you first turn on a typical computer, it must run an initial programme that sets up the operating system. This initial programme has to run even before the computer is able to interact with its hard drive, so the programme must be available at the very instant the computer's power becomes available. Read-only memory is used for this initial boot up operation. Unlike normal random access memory, which is usually "volatile" and loses its stored information when power is removed, read-only memory retains its information without power. When you turn on the computer, this read-only memory provides the instructions the computer uses to begin loading the operating system from the hard drive.

2. How does an integrated circuit perform computations?

The transistors used in digital integrated circuits, including microprocessors, act primarily as electronically controlled switches. These transistor switches permit the electric charge on or electric current in one wire to control the electric charge on or current in another wire. In digital electronics, a wire's charge or current state is used to represent a single binary digit – either a 1 or a 0. By combining transistors in modestly complicated arrangements, the states of several wires together can control the states of several other wires.

This increased complexity allows for simple functions such as binary addition to be performed – for example, the charges on two wires can be used to control the charges on two other wires so that the charges on the second pair of wires represent the single binary sum of the two individual numbers represented by charges on the first pair of wires. More complicated adders can be assembled from more transistors and finally multipliers can be assembled from a collection of adders. Overall, it only takes a few arrangements of electrically controlled switches to form the primitive elements from which incredibly complicated digital processors can be built.

3. How does a computer chip work?

A computer chip is also known as a digital integrated circuit. It is typically a thin wafer of silicon, cut from a single crystal of that element.

The surface of the wafer has been chemically modified and it has had intricate patterns of aluminum wires and other structures cut and deposited photographically on its surface to form enormous numbers of transistors and other special structures. Each of these transistors is an electronically controllable switch. A tiny adjustment in the electric charge on the control element of one of these transistors – its gate – can dramatically alter that transistor's current carrying ability. These transistors work together to perform task that range from remembering one bit of information to multiplying two huge numbers together. The millions of transistors on a typical computer chip are able to perform extremely complicated tasks, as we see everyday in modern computers.

4. How does an integrated circuit store so much information?

An integrated circuit is formed by using photographic techniques to sculpt the surface of a silicon crystal, to add chemicals to the silicon, and to deposit layers of other materials on top of the silicon. As part of this sculpting and coating process, a typical computer chip will have tiny memory cells formed on it. These cells usually consist of a tiny pad of aluminum on which a small amount of electric charge can be stored. To store one piece of information, a “bit”, on one of these pads, electronic devices called MOSFETs* – built right into the silicon surface – are used to control the flow of charge onto the pad. The amount of charge on the pad determines the bit's value. The charge remains on the pad, thus storing the bit, until it's time to recall the bit. At that time, the MOSFETs allow the charge to flow off the pad and into electronic devices that determine what the stored value is.

5. Is it possible to have memory in a computer monitor?

In fact, many modern monitors do have memory in them. However, this memory isn't used for the same information that's handled in the computer itself. Instead, the monitor's memory is used to control the monitor's behavior.

Many sophisticated monitors are equipped with digital controllers that are almost full-fledged computers themselves. These controllers can adjust the size and position of the screen image and the manner in which that image is built. This work by the controller allows the monitor to respond properly when the computer changes the screen resolution or the refresh rate (the frequency with which the image you see is rebuilt).

The controller requires memory to operate and it also needs to store data that it can expect to recover next time you turn the monitor on. On a sophisticated monitor, you adjust the image size by pushing buttons under the screen and the monitor uses special memory to record your button presses. When the monitor is turned on, it recalls its record of your

adjustments and uses them to return the image size to what it was last time the monitor was on.

6. How do notebook monitors work?

These displays use liquid crystals, liquids that contain long chain or disk-shaped molecules. These molecules can be aligned by external electric fields or by their own interactions with one another to form very orderly arrays; hence the name “liquid crystals”. The extent to which these molecules are oriented determines their optical properties.

A notebook computer uses electric fields to orient or disorient the liquid crystals and control their optical properties. With some help from other optical devices, the notebook computer can make these liquid crystals block or unblock light to appear dark or light.



Adding colour filters allows them to produce coloured images on their screens. Not until recent times did people understand how this prophecy could possibly come to pass. There was simply no way that anyone could control the buying and selling activities on such a large scale. Certainly it will be a monumental task to keep track of all men, and their financial transactions, all across the globe.

Advances in computer technology have placed the world on the verge of an identification system capable of monitoring virtually every human transaction. Modern technology has created a new electronic world without borders. With modern computer technology, satellites, and devices like the Global Positioning System device can track anyone within 3 feet anywhere in the world. And new developments in biometric and smart card technology make such a feat seem more plausible as well. Since originally writing about these emerging technologies more than six years ago, the advancements in recent years have been breathtaking.

Notes on the text

**MOSFET (metal-oxide-semiconductor field-effect transistor) –*
канальный полевой униполярный МОП-транзистор
full-fledged – окончательно готовый, полностью отработанный
(напр., о разработанной системе программного обеспечения)



TEXT AND VOCABULARY EXERCISES

23. Find in the text the words or phrases which mean the same as:

- | | |
|----------------------------|-----------------------------|
| ■ взаимодействовать | ■ сохраненная информация |
| ■ цифровая электроника | ■ один бит информации |
| ■ контролер; регулятор | ■ разрешение экрана |
| ■ исполнять сложные задачи | ■ регулировать; настраивать |
| ■ жидкие кристаллы | ■ захватывающий дух |

24. Compose your own sentences with each English equivalent of the words given in exercise 23. Compare your variants with the sentences of your partner.

25. Match each word in A with the Russian equivalent in B:

- | A | B |
|------------------------|------------------------------|
| 1. memory | a. систематизация |
| 2. multiplier | b. доступный |
| 3. hard drive | c. множитель |
| 4. available | d. электрическое поле |
| 5. arrangement | e. оптические устройства |
| 6. electric field | f. компьютерная технология |
| 7. optical devices | g. память |
| 8. computer technology | h. накопитель жестких дисков |
| 9. coloured images | i. цветные изображения |
| 10. small amount | j. заряд |
| 11. charge | k. маленькое количество |

26. Work in pairs and decide whether these statements are true or false:

1. When you first turn on a typical computer, it must run an initial programme that sets up the operating system.
2. Read-only memory is never used for this initial boot up operation.
3. When you turn off the computer, this read-only memory provides the instructions the computer uses to begin loading the operating system from the hard drive.
4. The transistors used in digital integrated circuits, including microprocessors, act primarily as electronically controlled switches.
5. A computer programme is also known as a digital integrated circuit.
6. The millions of transistors on a typical computer chip are able to perform extremely complicated tasks, as we see everyday in modern computers.
7. None of modern monitors have memory in them.

8. Many sophisticated monitors are equipped with digital controllers that are almost full-fledged computers themselves.

9. Notebook computer displays use liquid crystals, liquids that contain long chain or disk-shaped molecules.

27. Guided summary. Use the information from the text below to complete this paragraph. You are free to make any changes:

First of all ... Then ... It should be noted that ... That's why ... But...

Of course ... It is interesting to mention

Early History of Computer (Part 2)

By 1822 the English mathematician Charles Babbage was proposing a steam driven calculating machine the size of a room, which he called the Difference Engine. This machine would be able to compute tables of numbers, such as logarithm tables. He obtained government funding for this project due to the importance of numeric tables in ocean navigation. By promoting their commercial and military navies, the British government had managed to become the Earth's greatest empire. But in that time frame the British government was publishing a seven volume set of navigation tables which came with a companion volume of corrections which showed that the set had over 1000 numerical errors.

It was hoped that Babbage's machine could eliminate errors in these types of tables. But construction of Babbage's Difference Engine proved exceedingly difficult and the project soon became the most expensive government funded project up to that point in English history. Ten years later the device was still nowhere near complete, acrimony abounded between all involved, and funding dried up. The device was never finished.

Babbage was not deterred, and by then was on to his next brainstorm, which he called the Analytic Engine. This device, large as a house and powered by 6 steam engines, would be more general purpose in nature because it would be programmable, thanks to the punched card technology of Jacquard. But it was Babbage who made an important intellectual leap regarding the punched cards. In the Jacquard loom, the presence or absence of each hole in the card physically allows a coloured thread to pass or stops that thread. Babbage saw that the pattern of holes could be used to represent an abstract idea such as a problem statement or the raw data required for that problem's solution. Babbage saw that there was no requirement that the problem matter itself physically pass through the holes.

Furthermore, Babbage realized that punched paper could be employed as a storage mechanism, holding computed numbers for future

reference. Because of the connection to the Jacquard loom, Babbage called the two main parts of his Analytic Engine the «Store» and the «Mill», as both terms are used in the weaving industry. The Store was where numbers were held and the Mill was where they were «woven» into new results. In a modern computer these same parts are called the memory unit and the central processing unit (CPU). The Analytic Engine also had a key function that distinguishes computers from calculators: the conditional statement. A conditional statement allows a programme to achieve different results each time it is run. Based on the conditional statement, the path of the programme (that is, what statements are executed next) can be determined based upon a condition or situation that is detected at the very moment the programme is running.

Babbage befriended Ada Byron, the daughter of the famous poet Lord Byron. Though she was only 19, she was fascinated by Babbage's ideas and through letters and meetings with Babbage she learned enough about the design of the Analytic Engine to begin fashioning programmes for the still unbuilt machine. While Babbage refused to publish his knowledge for another 30 years, Ada wrote a series of "Notes" wherein she detailed sequences of instructions she had prepared for the Analytic Engine. The Analytic Engine remained unbuilt (the British government refused to get involved with this one) but Ada earned her spot in history as the first computer programmer. Ada invented the subroutine and was the first to recognize the importance of looping. Babbage himself went on to invent the modern postal system, cowcatchers on trains, and the ophthalmoscope, which is still used today to treat the eye.

28. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about the application of computers (Text 29, 30, 31). Be ready to discuss the information you have read.

29. Read the text and give its brief summary:

Text 9 C
The Motherboard

If you've ever taken the case off of a computer, you've seen the one piece of equipment that ties everything together – the motherboard. A motherboard allows all the parts of your computer to receive power and communicate with one another. Motherboards have come a long way in the last twenty years. The first motherboards held very few actual components. The first IBM* PC* motherboard had only a processor and card slots. Users plugged components like floppy drive controllers and memory into the slots. Today, motherboards typically boast a wide variety of built-in

features, and they directly affect a computer's capabilities and potential for upgrades.

The motherboard's main job is to hold the computer's microprocessor chip and let everything else connect to it. Everything that runs the computer or enhances its performance is either part of the motherboard or plugs into it via a slot or port. The shape and layout of a motherboard is called the form factor.

The form factor affects where individual components go and the shape of the computer's case. There are several specific form factors that most PC motherboards use so that they can all fit in standard cases. The form factor is just one of the many standards that apply to motherboards. Some of the other standards include:

- The socket for the microprocessor determines what kind of Central Processing Unit (CPU) the motherboard uses.
- The chipset is part of the motherboard's logic system and is usually made of two parts – the northbridge and the southbridge. These two “bridges” connect the CPU to other parts of the computer.
- The Basic Input/Output System (BIOS) chip controls the most basic functions of the computer and performs a self-test every time you turn it on. Some systems feature dual BIOS, which provides a backup in case one fails or in case of error during updating.
- The real time clock chip is a battery-operated chip that maintains basic settings and the system time.
- The slots and ports found on a motherboard include:
 - Peripheral Component Interconnect (PCI) – connections for video, sound and video capture cards, as well as network cards.
 - Accelerated Graphics Port (AGP) – dedicated port for video cards.
 - Integrated Drive Electronics (IDE) – interfaces for the hard drives.
 - Universal Serial Bus or Firewire – external peripherals.
 - Memory slots.
 - Some motherboards also incorporate newer technological advances:
 - Redundant Array of Independent Discs (RAID*) controllers allow the computer to recognize multiple drives as one drive.
- PCI Express is a newer protocol that acts more like a network than a bus. It can eliminate the need for other ports, including the AGP port.

Rather than relying on plug-in cards, some motherboards have on-board sound, networking, video or other peripheral support. The CPU is the first thing that comes to mind when many people think about a computer's speed and performance. The faster the processor, the faster the computer can think. In the early days of PC computers, all processors had the same set of pins that would connect the CPU to the motherboard, called

the Pin Grid Array (PGA). These pins fit into a socket layout called Socket 7. This meant that any processor would fit into any motherboard.

Today, however, CPU manufacturers Intel and AMD* use a variety of PGAs, none of which fit into Socket 7. As microprocessors advance, they need more and more pins, both to handle new features and to provide more and more power to the chip.

Anyone who already has a specific CPU in mind should select a motherboard based on that CPU. For example, if you want to use one of the new multi-core chips made by Intel or AMD, you will need to select a motherboard with the correct socket for those chips. CPUs simply will not fit into sockets that don't match their PGA.

The chipset is the "glue" that connects the microprocessor to the rest of the motherboard and therefore to the rest of the computer. All of the various components of the computer communicate with the CPU through the chipset. Chipset selection and CPU selection go hand-in-hand, because manufacturers optimize chipsets to work with specific CPUs. The chipset is an integrated part of the motherboard, so it cannot be removed or upgraded. This means that not only must the motherboard's socket fit the CPU; the motherboard's chipset must work optimally with the CPU.

Notes on the text

*IBM – Компания IBM – производитель аппаратного и программного обеспечения, а также принадлежащая ей торговая марка

*PC – персональный компьютер, ПК

*RAID – *Redundant Array of Independent Disks* – матрица независимых дисковых накопителей с избыточностью

*AMD – компания AMD – производитель микропроцессоров и принадлежащая ей торговая марка



TEXT AND VOCABULARY EXERCISES

30. Find in the text the words or phrases which mean the same as:

- | | |
|------------------------|-----------------------------|
| ▪ системная плата | ▪ микропроцессор компьютера |
| ▪ форма и расположение | ▪ гнездо, углубление |
| ▪ набор микросхем | ▪ дублирующий; резервный |
| ▪ логическая система | ▪ внешний |
| ▪ самопроверка | ▪ периферийное устройство |
| ▪ удалить | ▪ модернизировать |

31. Make up situations using the English equivalents of the words given above.

32. Find in the text the right words to complete the sentences:

1. If you've ever taken the case off of a computer, you've seen the one piece of equipment that ties everything together – the ____.
2. A motherboard allows all the parts of your computer ____ power and ____ with one another.
3. The motherboard's main job is to hold the computer's ____ and let everything else connect to it.
4. The shape and layout of a motherboard is called the ____ factor.
5. There are several specific form factors that most PC motherboards use so that they can all ____ in standard cases.
6. The CPU is the first thing that comes to mind when many people think about a computer's ____ and performance.
7. The faster the processor, the ____ the computer can think.
8. The chipset is the “glue” that connects the microprocessor to the rest of the motherboard and therefore to the rest of the ____.
9. Chipset selection and CPU selection go hand-in-hand, because manufacturers optimize ____ to work with specific CPUs.
10. The chipset is an ____ part of the motherboard, so it cannot be removed or upgraded.

33. Work in pairs and decide whether these statements are true or false:

1. A motherboard does not allow all the parts of your computer to receive power and communicate with one another.
2. The first IBM PC motherboard had only a processor and card slots.
3. Today, motherboards typically boast a wide variety of built-in features, and they directly affect a computer's capabilities and potential for upgrades.
4. The motherboard's main job is to load the computer.
5. The Basic Input/Output System (BIOS) chip controls the most basic functions of the computer but never performs a self-test every time you turn it on.
6. Some systems feature dual BIOS, which provides a backup in case one fails or in case of error during updating.
7. The chipset is the «glue» that connects the microprocessor to the rest of the motherboard and therefore to the rest of the computer.

34. Render the following text into Russian and think of a suitable title for it:

The smart card – a piece of plastic with a computer chip on its face – is becoming entrenched in the United States with uses from defense and health care to retailing and transportation. It looks and acts like your average bank card, but it knows a lot more about you than you may think. The cards have replaced food stamps and meal tickets for students in college. Marines and peanut farmers are whipping them out for boot polish and crop reports.

For businesses, the card is a shortcut to valuable market research. With your card in its computer, a company could learn your ZIP code, shoe size, what magazines you subscribe to, or the date of your sporty sedan's last oil change, and respond accordingly. Already, the Vision marketing system for supermarkets is tailoring coupons to U.S. shoppers who use smart cards. Customers insert their Vision cards into computers at the checkout line. Then the card tracks purchases and supplies the customer with product coupons, allowing the store to collect marketing data and pitch its products more effectively.

New computerized systems are being implemented for drivers' licenses. Instead of the cumbersome Polaroids, the new system will use a special camera that will store the photographic image that is on the card on a computer instead. Weight, eye colour, and signature will be stored on a magnetic strip on the card as well as to a computer data base. Copies will be shared with the Kansas Bureau of Investigation (KBI), giving agents quick access to photographs of suspects and victims.

The KBI will share copies with other law enforcement agencies. Smart card acceptance in the U.S. has skyrocketed in recent years. The U.S. State Department is switching over to new passports that will be fitted with chips using radio frequency identification technology (RFID). Reader devices at borders and customs checkpoints will be able to read the information stored on the chip, including the person's name, address and digital photo. To increase use, card makers are forming alliances with companies that are closer to consumers. Micro Card Technologies Inc. supplies cards to Copicard Inc., which worked with the University of Calgary to convert student and staff IDs to smart cards and is doing the same at several U.S. colleges.

"The average American who has a dozen pieces of plastic in their pocket probably doesn't even know what a smart card is", said Nicolas Samaras, a technology analyst at Dataquest Inc. in San Jose, California. Unlike today's financial cards, the smart card doesn't need a magnetic stripe on the back. Instead, it's equipped with a wiry silicon chip, often

displayed at left center but sometimes hidden in the plastic. Smart cards may also have embossed account numbers, holograms, graphics and photos on the front or back. Like a bank card, the smart card is slipped into a computer. Then the owner enters a four – or five-digit ID number and uses the card to make purchases, convey information, or both.

The card can hold three pages worth of typewritten data, compared to one line of type for a magnetic-stripe card. That means several accounts could be loaded onto one smart card. For example, the same card that checks out library books and buys clothes on credit could give an emergency-room clerk a patient's blood type insurance data and doctor's name. Each account would have a separate ID (*identification card – удостоверение личности*) number, so the librarian couldn't see your blood type.

35. Fill in the gaps with the words from the box:

control information electronic to replace privacy consumers

The U.S. government plans to use smart cards **1** ____ food stamps and reduce fraud. A national Electronic Benefits transfer system (EBT) will reduce “waste, fraud and abuse”, and cut red tape. With EBT there will be an **2** ____ audit trail for every transaction, making fraud much easier to detect and prosecute.

One concern about the smart card is **3** _____. Even though manufacturers are confident that accounts on the same card would remain separate, some are still unsettled that so much personal **4** _____ could be stored on one little computer chip. What if the librarian could look up someone's doctor bills?

Could using smart cards as national IDs give the government more **5** _____ over citizens at employment agencies or highway checkpoints? What if the government denied a job or benefits to someone based on personal tidbits gleaned from the card? Manufacturers are optimistic that **6** _____ will warm up to smart cards as they become more prevalent because it looks and feels like a credit card and people already know how to use it.

Check your answers on p. 280.

36. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about computer and computer technology (Texts 32, 33) and about the informational environment in the sphere of education of Russia (Text 34). Be ready to discuss the information you have read.

37. Read the text to learn about the educational purposes of computer use in Russia:

Text 9 D

The Educational Purposes of Computer Use in Russia

The computer has become an integral part of modern everyday life. The computer has settled comfortably down in its many spheres. While the computer remained an expensive and thus not a fully accessible artifact to the mass consumer, it couldn't spread broadly in those spheres of human knowledge where complicated calculation was not a vital necessity. But as the computer became very accessible, the sphere of its use significantly widened. With the rapidly developing possibility to store not only texts but graphic information as well, it is now possible to convert a tremendous quantity of pictures and copies of unique documents which were, in former times, inaccessible for most researchers.

Additionally computer technologies permit us to structure the information and to provide easy and free access. Rationally structured easily accessible databases in their turn much increase the possibilities for many people. Most of the higher schools in Moscow, e.g. Moscow State University, have their own computer nets which allow the students to get information and to publish their scholarly research as well as to exchange ideas with that additional important element which the computer provides us – the Internet. Of course due to the well-known limitations of the financial capacities of the country in general and of the sciences in particular, the Internet development in Russia is still limited. But the process is going on.

It is not impossible to note an additional sphere in which the computer is being used in Russia. As is true throughout the world, the ability of multimedia to educate and entertain schoolchildren and students is important. In simple and, which is important, easily memorizable form, we can visualize on the monitor with the help of advanced multimedia technologies the whole process of the development of mankind and its separate stages accompanied by fascinating pictures and intelligible texts.

In addition, the use of the computer will become even more important because it allows us to accustom children and young people to the world of knowledge in forms which are very comfortable to them and yet provide programmes with important content.

There are many original Russian multimedia programmes, from games to popular encyclopedias dedicated to significant educational themes. So, as it was mentioned above, it is impossible to recount in detail all spheres of the educational purposes of computer use in Russia.

TEXT AND VOCABULARY EXERCISES



38 Work in pairs, think of some questions to review the contents of the text and ask each other. Use the word combinations below:

- | | |
|---------------------------|------------------------|
| ▪ integral part | ▪ accessible artifact |
| ▪ mass consumer | ▪ graphic information |
| ▪ additional sphere | ▪ memorizable form |
| ▪ multimedia technologies | ▪ educational purposes |

39. Find in the text the words or phrases which mean the same as:

- | | |
|-------------------------|------------------------|
| ▪ доступный | ▪ массовый потребитель |
| ▪ человеческое знание | ▪ сложное вычисление |
| ▪ жизненная потребность | ▪ хранение |
| ▪ база данных | ▪ компьютерные сети |
| ▪ финансовые мощности | ▪ дополнительная сфера |
| | ▪ обучать |
| ▪ развлекать | ▪ приучать |
| ▪ обеспечить | ▪ важное содержание |

40. Read the above text once more. In pairs, discuss the statements below. Say what you think about them and ask your partner if he/she agrees or disagrees with you. Use the following phrases to help you:

<i>Agreeing</i>	<i>Disagreeing politely</i>
I agree with you.	Yes, but do not you think...?
Yes, that is what I think too.	True, but I think...
You are right!	I see what you mean, but...
That's right	That's wrong
Undoubtedly	I don't think so
Exactly	Quite the opposite
That's true	I am not sure

1. The computer has become an integral part of modern everyday life.
2. While the computer remained an expensive and thus not a fully accessible artifact to the mass consumer, it couldn't spread broadly in those spheres of human knowledge where complicated calculation was not a vital necessity.
3. The only possibility of computer is to store only texts but not graphic information.
4. Rationally structured easily accessible databases increase the possibilities for people.

5. The ability of multimedia to educate and entertain schoolchildren and students is not important at all.

6. The use of the computer will become even more important because it allows us to accustom children and young people to the world of knowledge in forms which are very comfortable to them and yet provide programmes with important content.

7. There are no original Russian multimedia programmes, different games and popular encyclopedias dedicated to significant educational themes.

41. Render Text 9D using the expressions below:

- The aim of this text is to ...
- It is based on ...
- This text is intended to ...
- This text describes ...
- According to ...
- In the words of ...
- In general / On the whole / In the main
- To sum up / To summarize / On balance / In short

42. Render the following text into English:

Компьютер – машина для проведения вычислений, а также приёма, переработки, хранения и выдачи информации по определённым алгоритмам (компьютерной программе). На заре эры компьютеров считалось, что основная функция компьютера – вычисление. Однако в настоящее время полагают, что основная их функция – управление. Слово компьютер является производным от английских слов *to compute*, *computer*, которые переводятся как «вычислять», «вычислитель» (английское слово, в свою очередь, происходит от латинского *computo* – «вычисляю»).

Первоначально в английском языке это слово означало человека, производящего арифметические вычисления с привлечением или без привлечения механических устройств. В дальнейшем его значение было перенесено на сами машины, однако современные компьютеры выполняют множество задач, не связанных напрямую с математикой.

Впервые трактовка слова компьютер появилась в 1897 году в Оксфордском английском словаре. Его составители тогда понимали компьютер как механическое вычислительное устройство.

Первые компьютеры создавались исключительно для вычислений. Даже самые примитивные компьютеры в этой области во много раз превосходят людей. Не случайно первым

высокоуровневым языком программирования был Фортран, предназначенный исключительно для выполнения расчётов.

Вторым крупным применением были базы данных. Прежде всего, они были нужны правительствам и банкам. Базы данных требуют уже более сложных компьютеров с развитыми системами ввода-вывода и хранения информации. Для этих целей был разработан язык Кобол. Позже появились базы данных со своими собственными языками программирования.

Третьим применением было управление всевозможными устройствами. Здесь развитие шло от узкоспециализированных устройств (часто аналоговых) к постепенному внедрению стандартных компьютерных систем, на которых запускаются управляющие программы. Кроме того, всё большая часть техники начинает включать в себя управляющий компьютер.

Наконец, компьютеры развились настолько, что стали главным информационным инструментом, как в офисе, так и дома. Почти любая работа с информацией осуществляется через компьютер – будь то набор текста или просмотр фильмов. Это относится и к хранению информации, и к её пересылке по каналам связи.

Наиболее сложным и слабо развитым применением компьютеров является искусственный интеллект – применение компьютеров для решения таких задач, где нет чётко определённого простого алгоритма. Примеры таких задач – игры, машинный перевод текста, экспертные системы.

CONVERSATIONAL PRACTICE

43. Speak about your own experience of the computer use. You should use in your statements the expressions below:

- | | |
|--|---|
| ▪ I (don't) think we should ... | ▪ It would be better to ... |
| ▪ I (don't) agree | ▪ I like .../ I quite like .../ I really like ... |
| ▪ I (don't) think it's a good idea to | ▪ It is important to ... |
| ▪ A good way to ... is to ... /The best way to ... is to ... | ▪ I don't mind ... |
| ▪ Well anyway.../ I mean .../ Frankly .../ At least ... | ▪ I've never heard of it. I haven't read/seen it. |
| ▪ I/we think it's a mistake to ... | ▪ It's not worth it / It's worth ...ing |
| ▪ I don't like .../ I don't like ... at all | ▪ I quite liked it. I didn't think much of it. |
| ▪ There's nothing wrong in ...ing | |

44. Speak about the role of computers in our life. Try to touch on as many fields of their application as you can.

45. Learn the information about business letters:

?

THE BUSINESS LETTER

Деловая переписка на английском языке осуществляется в соответствии с определенными правилами, закрепленными традициями. Основными требованиями к стилю делового письма на английском языке являются ясность, сжатость, вежливость, а также стандартизованность, официальность и точность.

Деловое письмо на английском языке обычно содержит следующие обязательные части:

LETTER LAYOUT

1. The Letterhead – Заголовок (включающий место написания письма)
 2. The Reference Line – Указание на ссылку
 3. The Date – Дата отправления письма
 4. The Inside Address – Внутренний адрес
 5. The Greeting/Salutation – Обращение/приветствие
 6. The Body of the Letter – Содержание письма
 7. The Ending – Заключительная формула
 8. The Signature Block – Блок подписи
- По мере необходимости в письме указываются дополнительные четыре элемента:
9. The Attention Line (if any) – Указание на конкретное лицо (если есть)
 10. The Subject Line (if any) – Указание на общее содержание письма (если есть)
 11. The Enclosure (if any) – Приложение (если есть)
 12. CC Notation (if any) – Указание на рассылку копий (если есть)

ТЕКСТ ПИСЬМА

Начальные фразы письма

Благодарности:

- *(We) thank you for the letter of ... / dated.../ which we received...* – Спасибо за письмо о .../от.../ которое мы получили...
- *We are obliged for your letter of...* – Весьма благодарны за Ваше письмо...

Подтверждения:

- *We wish to inform you that...* – Сообщаем Вам, что...
- *I am writing to acknowledge receipt of your letter* – я пишу, чтобы подтвердить получение вашего письма
- *We acknowledge your letter of...* – Подтверждаем получение Вашего письма
- *We are in receipt of your letter of...* – Мы получили Ваше письмо от...
- *In connection with our letter...* – В связи с нашим письмом...
- *In confirmation of your cable of.../ of our telephone conversation...* – В подтверждение Вашей телеграммы.../нашего телефонного разговора...
- *In reply/ answer/ response to your letter of ...* – В ответ на Ваше письмо...
- *With reference/ Referring to our letter of ... we wish to inform you...* – В соответствии с нашим письмом ... мы сообщаем Вам, что...
- *With further reference to...* – Далее в соответствии с
- *We learn from your letter that ...* – Из Вашего письма нам известно, что...

Информация:

- *Your letter enclosing/stating that .../ asking us to do ... has been (considered/given proper attention)* – Ваше письмо, включающее.../утверждающее.../ с просьбой... было (рассмотрено/ рассмотрено с надлежащим вниманием)
- *We are pleased/glad to inform/advise you that...* – Мы с удовольствием сообщаем Вам, что...
- *We have pleasure in informing/offering you...* – Мы с удовольствием сообщаем/ предлагаем Вам...
- *We have to remind you that...* – Хотелось бы Вам напомнить, что...

Извинения:

- *We offer apologies in answering your letter/ We apologize for a delay with the answer* – Просим извинения за задержку с ответом...
- *Please, accept our apologies for* – Примите, пожалуйста, наши извинения за...
- *We are sorry we are unable to meet your request* – К сожалению, мы не можем удовлетворить Ваши требования...

Завершающие фразы письма

- *We are looking forward to hearing from you* – Ждем ответа от вас...
- *We would appreciate your cooperation on this matter* – Мы будем благодарны за сотрудничество по этому вопросу...
- *Thank you in advance for your cooperation* – Заранее благодарим вас за помощь...
- *Awaiting your prompt reply* – В ожидании скорейшего ответа.
- *We assure you that...* – Заверяем Вас, что...
- *Please, inform us / let us know in the shortest possible time* – Известите нас / Дайте нам знать/ как можно скорее...

Заключительные формулы вежливости

- *Sincerely* – искренне ваш

46. Read and translate the following samples of business letters:

Sample 1

April 2001

Japan Center for Michigan Universities
110 MSU International Center
E. Lansing, MI 48824

To Whom It May Concern:

Please accept this letter as verification that Mr. and Mrs. Smith are preferred clients at America Bank. Their account balances are in excess of \$5000.

If additional information is needed, please contact America Bank Customer Services at 1-888-999-0000.

Sincerely,
Alan Greenspan
America Bank Customer Service

Sample 2

6123 Farrington Road

Apt. B11

Chapel Hill, NC 27514

January 11, 2005

Taylor, Inc.

694 Rockstar Lane

Durham, NC 27708

Dear Human Resources Director:

I have just read an article in the News and Observer about Taylor's new computer center just north of Durham. I would like to apply for a position as an entry-level programmer at the center.

I understand that Taylor produces both in-house and customer documentation. My technical-writing skills, as described in the enclosed resume, are well suited to your company. I am a recent graduate of DeVry Institute of Technology in Atlanta with an Associate's Degree in Computer Science. In addition to having taken a broad range of courses, I served as a computer consultant at the college's computer center where I helped train computer users on new systems. I will be happy to meet with you at your convenience and discuss how my education and experience match your needs. You can reach me at my home address, at (919) 233-1552, or at krock@devry.alumni.edu.

Sincerely,

Raymond Krock



WRITING PRACTICE

47. Compose your own samples of business letters. Use the following phrases:

- We would like to know whether ...
- Please inform us ...
- We shall/should be obliged if you will/would kindly inform us ...
- We shall appreciate it if you (will) inform us ...
- We would ask you to inform us ...
- We are interested to know whether you have considered ...
- Would you please send us ...
- Could you please send us ...
- We should be obliged if you would confirm that ...
- Would you kindly send us ...
- We have pleasure in enclosing our Order No ..., and would ask you to return the duplicate to us, duly signed, as an acknowledgment.

To sound more persuasive, use one of the following phrases:

- We must ask you to open a letter of credit not later than ... with the (London Bank) ...
- It is absolutely essential that you open a Letter of Credit not later than ...

48. Compose your own samples of business letters using the phrases of appreciation:

- We look forward to receiving your reply/hearing from you soon.
- Your cooperation will be appreciated.
- Your cooperation will be truly/greatly appreciated.
- Your cooperation and understanding will be appreciated.
- Your prompt reply will be appreciated.
- We will appreciate receiving this information as soon as possible.
- We will appreciate receiving these data by 30 March.

49. Translate from Russian into English:

1. Мы получили Ваше письмо, датированное 10 февраля.
2. Подтверждаем получение Вашего письма от 26 сентября, посланное электронной почтой.
3. Мы искренне ценим то, что Вы разместили Ваш заказ у нас.
4. Благодарим Вас за Ваше письмо от 15 мая, с которым Вы послали нам Ваш каталог электронного оборудования.

5. Мы хотели бы информировать Вас о том, что продукция, заказанная Вами по Контракту № 347/SL, готова к погрузке на борт корабля.

6. Нам приятно сообщить Вам, что теперь мы открыли филиал нашей компании в Вашем городе по адресу: ...

7. Пожалуйста, отсылайте все Ваши запросы менеджеру филиала, господину Д. Стюарту.

50. All the parts in this letter are mixed up. Put them in order:

▪ Yours sincerely	▪ Re: Enquiry for National Dresses
▪ Attention: Mr N. Conshiwan	▪ International Trading Company
▪ Please send us your catalogue with sizes and colours of female and male national clothes of Thailand.	▪ We are opening a shop of national Asian dresses and fabrics in one of our hotels.
▪ 3 August, 2003	▪ Thailand
▪ P. Morgan Your Ref:	▪ Dear Mr N. Conshiwan
▪ Intercontinental Hotel Group	▪ Manager Our Ref: PM/ma
▪ Bangkok	▪ Telephone: 487-6591
▪ Telex: 79436	▪ Telefax: (039) 3673

51. Imagine that you are Managing Director of the Philips Company. Write a letter introducing your company, organization, etc. Advertise your goods and/or your services. Persuade your partner that the goods manufactured by Philips meet the demands of the customers and the prices you sell them at are in line with the world prices.

52. Write letters of about 70 to 100 words on each of the topics given below:

1. You are President of a university's Friendship Club. You're planning to organize a scientific conference on cross-cultural communication. Write invitations to some famous experts in Culture Science asking them to give talks on customs and traditions of indigenous peoples of Siberia.

2. You are planning your visit to Britain. Write a letter inquiring about a hotel/room reservation. The name of the hotel has been given you by the Hotel Association. You need one double room with a bathroom and one single room. Do not forget to ask them about the cost of accommodation or for a booklet specifying inclusive terms of full board, and remember to indicate the time of your arrival in London.

UNIT 10

Pre-Text Exercises

Word Building

Active Vocabulary

Text 10 A. *What is Electricity?*

Text 10 B. *Electric Power Generation*

Text 10 C. *More Facts About Electricity*

Text 10 D. *Electric Motors*

Text and Vocabulary Exercises

Conversational Practice

The Business Letter

Writing Practice

PRE-TEXT EXERCISES

1. Choose the correct word to fill the gaps:

1. She left ____ the afternoon without saying good bye.
a) *in*; b) *on*; c) *at*.
2. Monty arrived ____ a cold winter day and we were very glad to see him.
a) *at*; b) *on*; c) *in*.
3. ____ last he remembered all the facts and wrote them down not to forget them again.
a) *in*; b) *on*; c) *at*.
4. They went to Paris ____ train because they liked it.
a) *by*; b) *on*; c) *in*.
5. The weather was rather warm and we decided to go ____ a walk.
a) *at*; b) *on*; c) *for*.
6. He knew a lot of poems and liked to recite them ____ memory.
a) *for*; b) *from*; c) *on*.
7. We didn't know what to do ____ these circumstances and asked him for advice.
a) *under*; b) *at*; c) *by*.
8. They always keep everything ____ secret.
a) *on*; b) *at*; c) *in*.
9. He was going along the forest picking ____ all the mushrooms he saw.
a) *on*; b) *at*; c) *up*.
10. Ring me ____ when you come home. I'll be waiting for your call.
a) *up*; b) *on*; c) *over*.
11. This face was strange ____ me and I couldn't recall it at all.
a) *on*; b) *to*; c) *at*.

2. Explain the meaning of the following words and phrases in English:

- electricity
- electric current
- generator

3. Fill in the gaps with a suitable word to complete the sentences:

1. Maxwell defines electricity as a ____ physical quantity.
measuring measurable immeasurable measure
2. The properties of charged bodies ____ such that the charge of one body may be equal to that of another.
were is are was
3. Faraday investigated the nature of electricity and frequently used the ____ “quantity of electricity” to refer to quantities of electric charge.
term word pronouncement name
4. The nucleus contains positively charged particles ____ protons and uncharged particles called neutrons.
call is calling called had called
5. Power is a basic part of nature and it is one of our ____ widely used forms of energy.
most more less least
6. An electric power station uses either a turbine, engine, water wheel, or other similar machine ____ an electric generator or a device that converts mechanical or chemical energy to power.
drives drove to drive had driven
7. Dictionaries often define electricity as “a fundamental entity ____ nature consisting of negative and positive kinds.”
of in with within
8. If a charged particle moves through a constant magnetic field, its speed stays the same, but its direction is ____ changing.
constantly constant inconstant inconstantly

WORD BUILDING

4. Translate the following words analyzing their word-formation model:

Completely, impossible, mysterious, different, communication, conductor, magnetism, magnetic, generator, arrangement, endlessly, remarkably, fundamental, longer, harder

5. Guess the meaning of the words in bold type:

Progress – **progressive**, direction – **directionless**, simple – **simplicity**, importance – **important**, technology – **technological** – **technologically**, to construct – **construction** – **to deconstruct** – **deconstructive**, to limit – **to delimit**, certain – **uncertainty**, security – **insecurity**

6. Translate the following complex words:

Fireplace; postcard; meanwhile; well-established; post-graduate; undergraduate; multi-coloured; straightforward, full-time; waterpower; hydroelectric; high-pressure; fan-like; electromagnetic; electromagnet; windmill; sunlight; semiconductor; doorbell; single-phase

ACTIVE VOCABULARY

7. Read and memorize the following words and word combinations:

cell – батарея (solar cell – солнечная батарея)	level – уровень
charge – заряд	to measure – измерять
circuit – цепь (electrical circuit – электрическая цепь)	power – мощность, энергия
coil – катушка	to push – выталкивать
to conduct – проводить	repulsion – отталкивание
current – ток (alternating current – переменный ток; direct current – постоянный ток)	pressure – давление
device – устройство	resistance – сопротивление
frequency – частота	source – источник (source of electricity – источник электричества)
insulator – изолятор	to transmit – передавать
to generate – производить	voltage – напряжение
	wire – провод

8. Read the text below to learn about electricity, conductors and electrical circuits:

Text 10 A What is Electricity?

Electricity completely surrounds us. For most of us modern life would be impossible without it. Here are just a few examples:

- Throughout your house, you probably find electric outlets where you can plug in all sorts of electrical appliances.
- Most portable devices contain batteries, which produce varying amounts of electricity depending on their size.

- During a thunderstorm, there are huge bolts of electricity called lightning that shoot down from the sky.

- On a much smaller scale, you can get a shock from static electricity on dry winter days.

- It is easy to create electricity from sunlight using a solar cell; or you can create electricity from the chemical energy in hydrogen and oxygen using a fuel cell.

So what is this mysterious stuff that we call electricity? Where does it come from, and why is it able to do so many different things? The electricity that we get from power outlets and batteries can power all different kinds of devices. The fact is that electricity can be used in a thousand different ways. For example:

- Electric motors turn electricity into motion.
- Light bulbs, fluorescent lamps and LEDs* turn electricity into light.
- Computers turn electricity into information.
- Telephones turn electricity into communication.
- TVs turn electricity into moving pictures.
- Speakers turn electricity into sound waves.
- Stun guns turn electricity into pain.
- Toasters, hair dryers and space heaters turn electricity into heat.
- Radios turn electricity into electromagnetic waves that can travel millions of miles.
- X-rays machines turn electricity into X-rays.

It is hard to imagine modern people living without electricity. In electricity's absence, we end up reverting back to fireplaces for heat, wood-fired stoves for cooking, candles for light and the slide rules for computation. To talk over long distances we are left with smoke signals and postcards. Electricity starts with electrons. You know that every atom contains one or more electrons; you also know that electrons have a negative charge. The electrons are tightly bound to the atoms. Wood, glass, plastic, ceramic, air, cotton ... These are all examples of materials in which electrons stick with their atoms.

Because the electrons don't move, these materials cannot conduct electricity very well, if at all. These materials are electrical insulators. But most metals have electrons that can detach from their atoms and move around. These are called free electrons. Gold, silver, copper, aluminum, iron, etc., all have free electrons. The loose electrons make it easy for electricity to flow through these materials, so they are known as electrical conductors. They conduct electricity.

The moving electrons transmit electrical energy from one point to another. Electricity needs a conductor in order to move. There also has to be something to make the electricity flow from one point to another

through the conductor. One way to get electricity flowing is to use a generator. A generator uses a magnet to get electrons moving.

There is a definite link between electricity and magnetism. If you allow electrons to move through a wire, they will create a magnetic field around the wire. Similarly, if you move a magnet near a wire, the magnetic field will cause electrons in the wire to move. A generator is a simple device that moves a magnet near a wire to create a steady flow of electrons.

One simple way to think about a generator is to imagine it acting like a pump pushing water along. Instead of pushing water, however, a generator uses a magnet to push electrons along. This is a slight oversimplification, but it is nonetheless a very useful analogy.

There are two things that a water pump can do with water:

- A water pump moves a certain number of water molecules.
- A water pump applies a certain amount of pressure to the water molecules.

In the same way, the magnet in a generator can:

- push a certain number of electrons along
- apply a certain amount of “pressure” to the electrons

In an electrical circuit, the number of electrons that are moving is called the amperage or the current, and it is measured in amps. The “pressure” pushing the electrons along is called the voltage and is measured in volts. So you might hear someone say, “If you spin this generator at 1,000 rpm, it can produce 1 amp at 6 volts”.

One amp is the number of electrons moving (1 amp physically means that 6.24×10^{18} electrons move through a wire every second), and the voltage is the amount of pressure behind those electrons. Whether you are using a battery, a fuel cell or a solar cell to produce electricity, there are three things that are always the same:

- The source of electricity will have two terminals: a positive terminal and a negative terminal.
- The source of electricity (whether it is a generator, battery, etc.) will want to push electrons out of its negative terminal at a certain voltage.
- The electrons will need to flow from the negative terminal to the positive terminal through a copper wire or some other conductor. When there is a path that goes from the negative to the positive terminal, you have a circuit, and electrons can flow through the wire.
- Electrical circuits can get quite complex. But at the simplest level, you always have the source of electricity (a battery, etc.), a load (a light bulb, motor, etc.), and two wires to carry electricity between the battery and the load. Electrons move from the source, through the load and back to the source.

Moving electrons have energy. As the electrons move from one point to another, they can do work. In an incandescent light, for example, the energy of the electrons is used to create heat, and the heat in turn creates light. In an electric motor, the energy in the electrons creates a magnetic field, and this field can interact with other magnets (through magnetic attraction and repulsion) to create motion. Each electrical appliance harnesses the energy of electrons in some way to create a useful side effect.

Notes on the text

**LED – light-emitting diode – светодиод, светоизлучающий диод, СИД*

TEXT AND VOCABULARY EXERCISES



9. Find in the text the words or phrases which mean the same as:

- | | |
|----------------------------|----------------------------|
| ▪ электрические приборы | ▪ портативные устройства |
| ▪ меньший масштаб | ▪ солнечная батарея |
| ▪ отсутствие электричества | ▪ отрицательный заряд |
| ▪ электрические изоляторы | ▪ электрические проводники |
| ▪ связь между... | ▪ вообразать |
| ▪ сила тока | ▪ напряжение |

10. Compose your own sentences with each English equivalent of the words and phrases given in Exercise 9. Compare your variants with the sentences of your partner.

11. Find in the text the synonyms to the following words:

- | | | |
|----------------|--------------|---------------|
| ▪ absolutely | ▪ to produce | ▪ various |
| ▪ contemporary | ▪ to return | ▪ to comprise |
| ▪ easy | ▪ helpful | ▪ mobile |

12. Find in the text the antonyms to the following words:

- | | | |
|--------------|-----------|------------|
| ▪ to destroy | ▪ ancient | ▪ presence |
| ▪ positive | ▪ complex | ▪ negative |

13. Give Russian equivalents to the following word combinations:

electric outlets; electrical appliances; static electricity; solar cell; chemical energy; sound waves; hair dryer; space heater; negative charge; electrical conductor; magnetic field; water pump; electrical circuit; to create heat

14. Choose among the words in parentheses the one that corresponds to the text above to complete the sentences:

1. Throughout your house, you probably find ____ outlets where you can plug in all sorts of electrical appliances.
(a. *electric*, b. *electricity*, c. *electrical*)
2. It is easy to create electricity from sunlight ____ a solar cell.
(a. *utilizing*, b. *using*, c. *exercising*)
3. Electric motors turn electricity into ____.
(a. *motion*, b. *movement*, c. *traffic*)
4. It is ____ to imagine modern people living without electricity.
(a. *easy*, b. *hard*, c. *possible*)
5. There is a definite link ____ electricity and magnetism.
(a. *in*, b. *within*, c. *between*)
6. The electricity that we get from power outlets and batteries ____ power all different kinds of devices.
(a. *can*, b. *may*, c. *must*)
7. A generator is a simple ____ that moves a magnet near a wire to create a steady flow of electrons.
(a. *set*, b. *device*, c. *apparatus*)

15. Read text 10A once more. In pairs, discuss the statements below. Say what you think about them and ask your partner if he/she agrees or disagrees with you. Use the following phrases to help you:

<i>Agreeing</i>	<i>Disagreeing politely</i>
I agree with you.	Yes, but don't you think...?
Yes, that is what I think too.	True, but I think...
You are right!	I see what you mean, but...

1. Only for some of us modern life is impossible without electricity.
2. The electricity that we get from power outlets and batteries can power all different kinds of devices.
3. The fact is that electricity can be used in a thousand different ways.
4. It is easy to imagine modern people living without electricity.
5. The moving electrons transmit electrical energy from one point to another.
6. If you allow electrons to move through a wire, they will create a magnetic field around the wire.
7. In an electrical circuit, the number of electrons that are moving is called the voltage.
8. The electrons will need to flow from the negative terminal to the positive terminal through a copper wire or some other conductor.

9. In an electric motor, the energy in the electrons creates a magnetic field, and this field can interact with other magnets (through magnetic attraction and repulsion) to create motion.

16. Fill in the gaps with the words from the box:

field electrons produces electricity forces produce

How can you make electricity with magnets?

You can make **1** ____ by moving a magnet past a wire. The magnet has a magnetic **2** ____ around it – something that exerts forces on magnetic poles. If you move the magnet and its magnetic field, you create an electric field – something that exerts **3** ____ on electric charges. That's because whenever a magnetic field changes with time, it creates an electric field. This electric field will push on the mobile **4** ____ in a wire.

So when you move a magnet past a wire, you are producing a changing magnetic field in the wire. This changing magnetic field **5** ____ an electric field and the electric field makes the electrons in the wire accelerate. The moving electrons are electricity. Generators move magnets past wires (or wires past magnets) to **6** ____ electricity.

Check your answers on p. 280.

17. Translate the following sentences into English:

1. Термин электричество был введён английским естествоиспытателем Вильямом Гилбертом в 1600 году.

2. Свойство электризации при трении тела о шерсть было известно ещё древним грекам, но только после становления физики как экспериментальной науки, заложенной Галилео Галилеем, это явление стало изучаться как средство для исследования и использования свойств физических тел.

3. В начале XVIII века английский учёный Стефан Грэй обнаружил, что существуют вещества (металлы), которые проводят электричество от одного тела к другому.

4. В 1820 году Эрстед и Ампер открыли связь между электричеством и магнетизмом.

5. Фарадей в 1831 году открыл электромагнитную индукцию и в 1834 году – законы электролиза, а также ввел понятие электрического и магнитного полей.

18. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about electricity (Texts 34, 35, 36, 37). Be ready to discuss the information you have read.

19. Read the following text and give its brief summary:

History of Electricity Use

Thales of Miletus (640–546 B.C.) is credited with the discovery that amber when rubbed acquire the property of attracting light objects. The word electricity comes from “elektron” the Greek word for amber. Otto von Guericke invented the first static electric generator in 1675, while the first current generator was made by Alosio Galvani in 1780. But except for some supposed medicinal applications, electricity had little use.

Communication, the first of the great uses for electricity, began with the telegraph invented by Samuel Morse around 1840, to be followed by the telephone, radio and television. Thomas Edison added lighting in 1880, which was soon followed by working electric motors and electric heating. Most recently has the electronics and computer revolution come. In all electricity has fundamentally transformed the way we live.

As the practical uses for electricity grew and multiplied, so did the demand for its production. Edison built the first central power station and many power companies still bear his name. Growth in distribution leads to high voltage transmission and the interconnection of the modern power grid, with power plants sometimes located over a thousand miles from consumers. Quite recently the monopoly structure of the industry has begun to be dismantled in favor of competition among generators.

Coal-fired steam and water power were the first sources of energy used to make electricity commercially, later gas and oil were also burned to make steam, as well as fueling reciprocating engines. In the late 1960's gas and oil fired combustion turbines, similar to jet engines, were introduced, as was nuclear power. Fossil fuel still accounts for most production of electricity, about 70%, with coal powering about 75% of the fossil fraction.

20. Translate the following text into Russian:

Text 10 B

Electric Power Generation

Generators and motors are very closely related and many motors that contain permanent magnets can also act as generators. If you move a permanent magnet past a coil of wire that is part of an electric circuit, you will cause current to flow through that coil and circuit. That's because a

changing magnetic field, such as that near a moving magnet, is always accompanied in nature by an electric field.

While magnetic fields push on magnetic poles, electric fields push on electric charges. With a coil of wire near the moving magnet, the moving magnet's electric field pushes charges through the coil and eventually through the entire circuit. A convenient arrangement for generating electricity endlessly is to mount a permanent magnet on a spindle and to place a coil of wire nearby. Then as the magnet spins, it will turn past the coil of wire and propel currents through that coil.

If you take a common DC* motor out of a toy and connect its two electrical terminals to a 1.5 V light bulb or a light emitting diode (try both directions with an LED because it can only carry current in one direction), you'll probably be able to light that bulb or LED by spinning the motor's shaft rapidly. A DC motor has a special switching system that converts the AC* produced in the motor's coils into DC for delivery to the motor's terminals, but it's still a generator. So the easiest answer to your question is: "find a nice DC motor and turn its shaft".

There is no fundamental limit to how much current a generator can handle, however, the characteristics of the generator's wiring, its magnetic fields, and the machinery turning it all tend to limit its current capacity. A generator's wires aren't perfect and, as the current passing through the generator increases, its wires waste more and more power.

Like any wiring, a generator's wires convert electric power into thermal power in proportion to the square of the current. Thus if you double the current in the generator, you quadruple the power loss. While this power loss and the resulting heat are trivial at low currents, they become serious problems at high currents. Increasing the current in the generator also affects its magnetic fields because currents are magnetic.

At a low current, the current's magnetism can be ignored. But when a generator is handling a very large current, the magnetic fields associated with that current are no longer small perturbations on the generator's normal magnetic fields and the generator may not perform properly any more.

Finally, a generator's job is to transfer energy from a mechanical system to the electric current passing through it. As the amount of current in the generator increases, the amount of work that the mechanical system provides must also increase – the generator becomes harder to turn. There will always be a limit to how much torque an engine or crank can exert on the generator to keep it spinning and thus there will be a limit to how much current the generator can handle.

As for how the current varies with load: the more current the load permits to pass through it, the more current will pass through the generator.

Assuming that the generator is well built and has very little electric resistance, the load will serve to limit the current. The generator will then deliver just as much current as the load will permit. If the load permits more current, the generator will deliver more. As a result, the wires in the generator will waste more power as heat, the magnetic fields in the generator will become more complicated, and the device powering the generator will have to work harder to keep the generator turning.

Notes on the text

DC – direct current – постоянный ток

AC – alternating current – переменный ток



TEXT AND VOCABULARY EXERCISES

21. Find in the text the words or phrases which mean the same as:

- | | |
|---------------------|----------------------|
| ▪ содержать | ▪ в конечном счете |
| ▪ катушка | ▪ ограничивать |
| ▪ бесконечно | ▪ серьезные проблемы |
| ▪ удобный | ▪ двигатель |
| ▪ вращающий момент | ▪ сопротивление |
| ▪ электрический ток | ▪ провод |

22. Match each word in A with the Russian equivalent in B:

- | A | B |
|---------------|-----------------|
| 1. charge | a. полюс |
| 2. pole | b. производство |
| 3. circuit | c. заряд |
| 4. generating | d. поставлять |
| 5. to deliver | e. цепь |
| 6. power | f. энергия |

23. Work in pairs and decide whether these statements are true or false:

1. Generators and motors are very closely related and many motors that contain permanent magnets can also act as generators.
2. A changing magnetic field is never accompanied in nature by an electric field.
3. There is no fundamental limit to how much current a generator can handle.
4. A generator's wires do not convert electric power into thermal power in proportion to the square of the current.
5. At a low current, the current's magnetism can be ignored.

6. A generator's job is to transfer energy from a mechanical system to the electric current passing through it.

7. As the amount of current in the generator increases, the amount of work that the mechanical system provides must also increase – the generator becomes harder to turn.

8. Wires in the generator will waste more power as heat, the magnetic fields in the generator will become more complicated, and the device powering the generator will have to work harder to keep the generator turning.

24. Fill in the gaps with the words from the box:

form homes power distances transformer industry

To solve the problem of sending power over long **1** ____, George Westinghouse developed a device called a **2** _____. The transformer allowed power to be efficiently transmitted over long distances. This made it possible to supply power to **3** ____ and businesses located far from the electric generating plant. Despite its great importance in our daily lives, most of us rarely stop to think how life would be like without power. Yet like air and water, we tend to take power for granted. Everyday, we use **4** ____ to do many functions for us – from lighting and heating/cooling our homes, to being the power source for televisions and computers. Power is a controllable and convenient **5** ____ of energy used in the applications of heat, light and power. Today, the United States (U.S.) electric power **6** ____ is organized to ensure that an adequate supply of power is available to meet all demand requirements at any given instant.

Check your answers on p. 280.

25. Give situations from Text 10B in which the following are used:

Changing magnetic field; generating electricity; generator's wires; generator's work

26. Look through the text about the electricity production in the USA. Fill in the gaps with the prepositions from the box:

in (4) to at (2) from by (4) for of (5)

Electricity Production in the USA

There are several thousand power generating and supply organizations including investor owned utilities, government – especially municipal – utilities, rural electric cooperatives and independent power

producers. Utilities and cooperatives sell the electricity ____ consumers, so do power marketers ____ some states, where consumers can now choose their supplier. The electric power industry is changing ____ a big way, called deregulation. Competition is being added ____ many levels. The future, including the role ____ fossil fuel, is hard to predict.

About 30% of all fossil fuel consumed ____ the United States is used to make electricity. Conversely, most electricity, about 70%, produced ____ the US is generated using fossil fuels, especially coal. Typically, the coal ____ one or more mines is transported ____ railroad or barge to a steam generating plant. Turbine generators utilize the steam to generate electricity ____ high voltage. This electricity is transformed a higher voltage ____ transmission over a power network to industrial, commercial and residential users. Near the users it is transformed again, down to a low voltage, where it is distributed to the users via the familiar distribution system ____ poles and overhead wires.

Electricity is distributed ____ 3 kinds of utilities – investor owned, municipal and cooperative. Many IOUs and municipals generate some ____ the electricity they sell. Electricity is also generated by “generation and transmission (G&T)” coops that are owned ____ groups of distribution coops. Power is also generated ____ the federal government, especially from dams, and by an increasing number ____ independent power producers. Since deregulation began in 1992, a number ____ independent power marketing firms have emerged as well.

27. Read the following text, think of a suitable title for it and render it according to the following scheme:

- | |
|--|
| <ul style="list-style-type: none">▪ the text tells/ runs about .../ the main/central idea is .../ in brief .../ to put it in a few words /text is to tell the reader about...▪ according to the text...▪ to all appearances (по всей видимости)...▪ needless to say (не нужно говорить)...▪ then I'm going to add...▪ I want to point out the following facts that were new for me...▪ in conclusion I'd like to say...▪ I like...because.../ I dislike...because... |
|--|

By “waterpower” we assume that one means hydroelectric power. In that case, water from an elevated source enters a pipe and travels downhill to a generating plant. As the water descends, its gravitational potential energy (the stored energy associated with height and the Earth’s gravity) becomes pressure potential energy (the stored energy associated with

pressure) and kinetic energy (the energy of motion). By the time the water reaches the generating plant, it has enormous pressure and a modest speed.

This moving, high-pressure water is then sent through a fan-like turbine. As the water moves toward the low pressure beyond the turbine, it does work on the turbine's rotating blades and its energy is transferred to those blades. The water gives up its energy and the turbine takes away this energy in its rotary motion. The turbine is attached to an electric generator, which uses moving magnets and wire coils to turn the turbine's rotary energy into electric energy. The electric energy is carried away on wire to be used elsewhere. Overall, the water's gravitational potential energy has become electric energy. How does an internal voltage regulator type auto alternator work and are they any better than an external regulator type?

An alternator is a device that uses rotary motion to generate electricity. As the car engine turns, it spins a magnet (the rotor) in the alternator and this spinning magnet induces electric currents in a set of stationary wire coils (the stator). The alternator's ability to generate electric currents by spinning a magnet past stationary wires is an example of electromagnetic induction. Induction is a general phenomenon in which a moving or changing magnetic field creates an electric field, which in turn pushes electric charges through a conducting material. Overall, some of the engine's mechanical energy is converted into electric energy.

The amount of energy given to each electric charge that flows through the wires in the stator depends on the speed with which the magnet turns and the strength of that magnet. Whether it's internal or external, the voltage regulator monitors this energy per charge – also known as the voltage – to make sure that it's correct. If not, it adjusts the strength of the alternator's magnet. It can do this because the alternator's magnet is actually an electromagnet and its strength depends on how much current is flowing through its wire coils.

The voltage regulator carefully adjusts the current flowing through the electromagnet in order to obtain the proper output voltage from the alternator. Actually, the alternator itself produces alternating current, so a set of solid-state diodes converts this alternating current into direct current. A car's electric system, particularly its battery, operates on direct current. Since the alternator's operation is the same whether the voltage regulator is inside it or external to it, neither version should be better than the other.

How efficient are solar energy cells and windmills in producing energy for everyday use?

There are several ways to measure their efficiencies. One way is to compare the energy these devices extract from sunlight or from the wind to the electric energy they produce. By that measure, solar cells are roughly 15% efficient and windmills are roughly 50% efficient. However, you're

probably most interested in their cost efficiency – in how much power these devices can produce for a given operating cost. By that measure, both devices are somewhat more expensive to build and operate than conventional fossil-fuel power plants.

As a result, the United States continues to rely on fossil-fuel plants because they cost less for each kilowatt-hour of electric energy produced. Nonetheless, solar cells are gradually becoming cheaper and they may become cost effective in the next decade or two. Windmills are already cost effective in some countries that rely entirely on imported fossil fuels. Denmark, for example, uses windmills extensively for electric power. While windmill power plants do exist in the United States, they are largely the results of regulation rather than market forces. But that, too, may change in the next decade or two.

28. Read the text below to find answers to the given questions:

Text 10 C
More Facts about Electricity

1. What does a transformer do?

A transformer transfers power between two or more electrical circuits when each of those circuits is carrying an alternating electric current. Transfers of this sort are important because many electric power systems have incompatible circuits – one circuit may use large currents of low voltage electricity while another circuit may use small currents of high voltage electricity. A transformer can move power from one circuit of the electric power system to another without any direct connections between those circuits.

2. How does a transformer change voltage and how does it regulate the amperage?

A transformer's current regulation involves a natural feedback process. To begin with, a transformer consists of two coils of wire that share a common magnetic core. When an alternating current flows through the primary coil (the one bringing power to the transformer), that current produces an alternating magnetic field around both coils and this alternating magnetic field is accompanied by an alternating electric field (recall that changing magnetic fields produce electric fields).

This electric field pushes forward on any current passing through the secondary coil (the one taking power out of the transformer) and pushes backward on the current passing through the primary coil. The net result is that power is drawn out of the primary coil current and put into the secondary coil current.

3. How does a transformer reduce voltage?

When you send an alternating current through the primary coil of wire in a transformer, that current produces a magnetic field in the transformer. Because the current in the primary coil is changing with time – it's an alternating current – this magnetic field is changing and changing magnetic fields are accompanied by electric fields. In the transformer, this electric field pushes electric charges around the secondary coil of wire in the transformer.

Since these electric charges are pushed in the direction they are travelling, work is being done on them and their energies are increasing. However, in the transformer the secondary coil of wire has fewer turns in it than the primary coil of wire. As a result, the charges don't receive as much energy per charge (as much voltage) as the charges in the primary coil are giving up. This type of transformer, in which the secondary coil has fewer turns of wire than the primary coil, is called a step-down transformer and reduces the voltage of an alternating current.

4. What is the purpose of the iron core in a transformer?

The iron core of a transformer stores energy as power is being transferred from the primary circuit to the secondary circuit. This energy is stored as the magnetization of that iron. The transformer needs to store that energy for roughly one half cycle of the alternating current or about 1/120th of a second. The more iron there is in the transformer, the more energy it can store and the more power the transformer can transfer from the primary circuit to the secondary circuit.

Without any iron, the energy must be stored directly in empty space, again as a magnetization. But space isn't as good at storing magnetic energy as iron is so the iron increases the power-handling capacity of a transformer. Without the iron, the transformer must operate at much higher frequencies of alternating current in order to transfer reasonable amounts of power.

5. What is the difference between current and voltage?

Current is the measure of how many charges are flowing through a wire each second. A 1-ampere current involves the movement of 1 Coulomb of charge (6,250,000,000,000,000 elementary charges) per second. Voltage is the measure of how much energy each charge has. A 1-volt charge carries 1 Joule of energy per Coulomb of charge. To use water in a pipe as an analogy, current measures the amount of water flowing through the pipe and voltage measures the pressure (or energy per liter) of that water.

6. What is resistance?

Resistance is the measure of how much an object impedes the flow of electricity. The higher an object's resistance, the less current will flow

through it when you expose it to a particular voltage drop. To use the water analogy, resistance resembles a constriction in a pipe. The narrower the pipe (higher the resistance), the harder it is to push water through that pipe. If you keep the water pressure constant (constant voltage drop) as you narrow the pipes (increase the resistance), then less water will flow (the current will drop).

7. What causes large electric resistances?

Thin wires or wires made of poor conductors. Some metals are simply better at carrying current without wasting energy than other metals. It has to do with how often a charge bounces off of a metal atom and loses energy. Copper, silver, and aluminum are good conductors while stainless steel and lead are poor conductors.

Metals tend to become better conductors as you cool them and worse as you heat them. Semiconductors such as carbon (graphite) are poor conductors but have the reverse temperature effect. At low temperature they are poor conductors but become good conductors at high temperature.

8. How does hydroelectric power work?

Hydroelectric power begins with water descending from an elevated reservoir, such as a lake in the mountains. While it's in the elevated reservoir, this water has stored energy – in the form of gravitational potential energy. As this water flows downward through a pipe, its gravitational potential energy becomes either kinetic energy or pressure potential energy or both.

By the time the water arrives at the hydroelectric power plant, it is either travelling very quickly or has an enormous pressure or both. In the power plant, the water flows past the blades of a huge turbine and does work on those blades. The blades are shaped somewhat like airplane wings and they “fly” through the moving water.

Since the blades are attached to a central hub, they cause this hub to rotate and allow it to turn the rotor of a huge electric generator. The rotor of the generator typically contains a giant electromagnet. The electromagnet turns within a collection of stationary wire coils and it induces electric currents in those coils. These electric currents carry power out of the generator to the homes or business that needs it.

Notes on the text

natural feedback process – естественный процесс обратной связи

TEXT AND VOCABULARY EXERCISES



29. Find in the text the words or phrases which mean the same as:

- | | |
|----------------------|----------------------------|
| ▪ электростанция | ▪ низкое напряжение |
| ▪ серебро | ▪ регулировать |
| ▪ железо | ▪ частота |
| ▪ давление | ▪ сопротивление |
| ▪ проводник | ▪ углерод |
| ▪ полупроводники | ▪ медь |
| ▪ высокое напряжение | ▪ не трата впустую энергию |
- электричества

30. Translate into Russian the following words and word combinations:

incompatible circuits; low voltage electricity; direct connections; secondary coil; primary circuit; power-handling capacity; frequencies of alternating current; resistance; water descending from an elevated reservoir; to store energy; hub; wire coils; to turn the rotor

31. Find in the text the synonyms to the following words:

- | | | |
|------------|------------|-----------|
| ▪ variable | ▪ straight | ▪ rule |
| ▪ initial | ▪ diminish | ▪ enlarge |
| ▪ start | ▪ revolve | ▪ require |

32. Choose among the words in parentheses the one that corresponds to the text above to complete the sentences:

1. A transformer transfers power ____ two or more electrical circuits.
(a. *between*; b. *in*; c. *within*)
2. A transformer ____ move power from one circuit of the electric power system to another without any direct connections between those circuits.
(a. *may*; b. *can*; c. *must*)
3. The type of transformer, in which the secondary coil has ____ turns of wire than the primary coil, is called a step-down transformer.
(a. *smaller*; b. *greater*; c. *fewer*)
4. The transformer needs to ____ the energy for roughly one half cycle of the alternating current.
(a. *store*; b. *pass*; c. *deliver*)
5. Resistance is the measure of how much an object impedes the flow of ____.
(a. *gravity*; b. *electricity*; c. *magnetism*)
6. Copper, silver, and aluminum are ____ conductors.
(a. *good*; b. *poor*; c. *bad*)

7. Hydroelectric power begins with water ____ from an elevated reservoir, such as a lake in the mountains.

(a. *ascending*; b. *climbing*; c. *descending*)

8. The electromagnet turns ____ a collection of stationary wire coils and it induces electric currents in those coils.

(a. *beneath*; b. *within*; c. *above*)

33. Read the following text, think of a suitable title for it and render it according to the following scheme:

- the text tells/ runs about .../ the main/central idea is .../ in brief .../ to put it in a few words .../ the aim of the article/text is to tell the reader about...
- according to the text...
- to all appearances (по всей видимости)...
- then I'm going to add...
- I want to point out the following facts that were new for me...
- in conclusion I'd like to say...

The electricity you receive comes from a distant power plant. A generator in that power plant produces a substantial electric current of medium high voltage electric charge. This current is alternating, meaning that its direction of flow reverses many times a second – 120 reversals per second or 60 full cycles of reversal (over and back) in the United States. This alternating electric current flows through the primary coil of wire in a huge transformer at the power plant, where it produces an intense alternating magnetic field. When a magnetic field changes with time, it produces an electric field and, in the transformer, this electric field pushes electric charges around a second coil of wire in the transformer, the secondary coil.

The effect of this transformer is to transfer power from the current in the primary coil of the transformer to the current in the secondary coil of the transformer. Thus the generator's electric power moves along to the current passing through the secondary coil of the transformer. However, the secondary coil has far more turns of wire than the primary coil and this gives each charge passing through that coil far more energy than the charges had in the primary coil. Although the current passing through that secondary coil is relatively small, it acquires an enormous voltage by the time it leaves the secondary coil. The transformer has produced this high voltage power needed for efficient power transmission to a distant city.

This high voltage electric current passes through the countryside on high voltage transmission wires. The value of using a small current of high

voltage charges is that wires waste power in proportion to the square of the electric current they are carrying. Since the current in the transmission wires is small, they waste relatively little power. When this current reaches your town, it passes through a second transformer, which transfers its power to yet another electric current.

This current is large and, because it passes through a coil that has few turns of wire, it acquires only a medium high voltage when it flows through the secondary coil of the new transformer. Electricity from this second transformer flows toward your neighborhood through medium high voltage wires.

Finally, near your home there is a third and final transformer that extracts power from the medium high voltage current and transfers that power to a very large current that acquires a low voltage when it flows through the secondary coil of the final transformer. It is this very large current of low voltage charges that flows through appliances in your home and those of your neighbors. That final transformer is often visible as a large gray drum on a utility pole or a green box in someone's yard.

34. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about the generation of electricity (Texts 38, 39, 40, 41). Be ready to discuss the information you have read.

35. Fill in the gaps with the prepositions/conjunctions from the box:

in of (8) to (2) for or (2) over in by (2) if

Measuring Electricity

Electricity is measured ___ units ___ power called watts. It was named ___ honor James Watt, the inventor ___ the steam engine. One watt is a very small amount ___ power. It would require nearly 750 watts to equal one horsepower. A kilowatt represents 1,000 watts. A kilowatthour (kWh) is equal ___ the energy ___ 1,000 watts working ___ one hour.

The amount ___ electricity a power plant generates ___ a customer uses ___ a period ___ time is measured ___ kilowatthours (kWh). Kilowatthours are determined ___ multiplying the number ___ kW's required ___ the number of hours of use. For example, ___ you use a 40-watt light bulb 5 hours a day, you have used 200 watts ___ power, ___ 0.2 kilowatthours of electrical energy.

36. Read the text below to find answers to the given questions:

Text 10 D Electric Motors

1. How does an electric motor work?

An electric motor uses the attractive and repulsive forces between magnetic poles to twist a rotating object (the rotor) around in a circle. Both the rotor and the stationary structure (the stator) are magnetic and their magnetic poles are initially arranged so that the rotor must turn in a particular direction in order to bring its north poles closer to the stator's south poles and vice versa.

The rotor thus experiences a twist (what physicists call a torque) and it undergoes an angular acceleration – it begins to rotate. But the magnets of the rotor and stator are not all permanent magnets. At least some of the magnets are electromagnets. In a typical motor, these electromagnets are designed so that their poles change just as the rotor's north poles have reached the stator's south poles. After the poles change, the rotor finds itself having to continue turning in order to bring its north poles closer to the stator's south poles and it continues to experience a twist in the same direction.

2. How does electric current create magnetic poles in metal? When the current goes through the metal, what makes it positive and negative?

An electric current is itself magnetic – it creates a structure in the space around it that exerts forces on any magnetic poles in that space. The magnetic field around a single straight wire forms loops around the wire – the current's magnetic field would push a magnetic pole near it around in a circle about the wire. But if you wrap the wire up into a coil, the magnetic field takes on a more familiar shape.

The current-carrying coil effectively develops a north pole at one end of the coil and a south pole at the other. Which end is north depends on the direction of current flow around the loop. If current flows around the loop in the direction of the fingers of your right hand, then your thumb points to the north pole that develops at one end of the coil.

3. In a three-phase induction motor, there is a rotating magnetic field in the stator, which induces a rotating magnetic field in the rotor. Those two magnetic fields will interact together to make the rotor turn. Is the interaction attractive or repulsive?

The magnetic interaction between the stator and the rotor is repulsive – the rotor is pushed around in a circle by the stator's magnetic field; it is not pulled. To see why this is so, imagine unwrapping the curved motor so that instead of having a magnetic field that circles around a circular metal rotor you have a magnet (or magnetic field) that moves along a flat metal

plate. As you move this magnet across the plate, it will induce electric currents in that plate and the plate will develop magnetic poles that are reversed from those of the moving magnet – the two will repel one another. That choice of pole orientation is the only one consistent with energy conservation and is recognized formally in “Lenz’s Law”.

For reasons having to do with resistive energy loss and heating, the repulsive forces in front of and behind the moving magnet don’t cancel perfectly, leading to a magnetic drag force between the moving magnet and the stationary plate. This drag force tends to push the plate along with the moving magnet. In the induction motor, that same magnetic drag force tends to push the rotor around with the rotating magnetic field of the stator. In all of these cases, the forces involved are repulsive – pushes not pulls.

4. How does a fan motor work?

A fan motor is an induction motor, with an aluminum rotor that spins inside a framework of stationary electromagnets. Aluminum is not a magnetic metal and it only becomes magnetic when an electric current flows through it. In the fan, currents are induced in the aluminum rotor by the action of the electromagnets. Each of these electromagnets carries an alternating current that it receives from the power line and its magnetic poles fluctuate back and forth as the direction of current through it fluctuates back and forth.

These electromagnets are arranged and operated so that their magnetic poles seem to rotate around the aluminum rotor. These moving/changing magnetic poles induce currents in the aluminum rotor, making that rotor magnetic, and the rotor is dragged along with the rotating magnetic poles around it. After a few moments of starting, the spinning rotor almost keeps up with the rotating magnetic poles. The different speed settings of the fan correspond to different arrangements of the electromagnets, making the poles rotate around the aluminum rotor at different rates.

5. How does an electromagnetic doorbell work?

When you press the button of an electromagnetic doorbell, you complete a circuit that includes a source of electric power (typically a low voltage transformer) and a hollow coil of wire. Once the circuit is complete, current begins to flow through it and the coil of wire becomes magnetic. Extending outward from one end of the coil of wire is an iron rod. When this coil of wire – also called a solenoid – becomes magnetic, so does the iron rod. The iron rod becomes magnetic in such a way that it’s attracted toward and into the solenoid, and it accelerates toward the solenoid. The attractive force diminishes once the rod is all the way inside the solenoid, but the rod then has momentum and it keeps on going out the

other side of the solenoid. It travels so far out of the solenoid that it strikes a bell on the far side – the doorbell!

The rod rebounds from the bell and reverses in motion. It has traveled so far out the other side of the solenoid that it's attracted back in the opposite direction. The rod overshoots the solenoid again and, in some doorbells, strikes a second bell having a somewhat different pitch from the first bell. After this back and forth motion, the rod usually settles down in the middle of the solenoid and doesn't move again until you stop pushing the button. Once you release the button, the current in the circuit vanishes and the solenoid and the rod stop being magnetic. A weak spring then pulls the rod back to its original position at one end of the solenoid.

6. How do electric/magnetic linear drives work?

Linear electric motors are very much like rotary electric motors – they use the forces between magnetic poles to push one object relative to another. But while a rotary motor uses these forces to twist a rotor around in a circle, a linear motor uses these forces to push a carriage along a track.

Both the carriage and the track must contain magnets and at least some of these magnets must be electromagnets that can be turned on and off, or reversed. By timing the operations of the electromagnets properly, the linear motor pushes or pulls the carriage along the track smoothly and continuously.

7. What is the difference between a single-phase electric motor and a three-phase motor?

To keep the center component or “rotor” of an electric motor spinning, the magnetic poles of the electromagnets surrounding the rotor must rotate around it. That way, the rotor will be perpetually chasing the rotating magnetic poles. With single-phase electric power, producing that rotating magnetic environment isn't easy. Many single-phase motors use capacitors to provide time-delayed electric power to some of their electromagnets. These electromagnets then produce magnetic poles that turn on and off at times that are delayed relative to the poles of the other electromagnets.

The result is magnetic poles that seem to rotate around the rotor and that start it turning. While the capacitor is often unnecessary once the rotor has reached its normal operating speed, the starting process is clearly rather complicated in a single phase motor. In a three phase motor, the complicated time structure of the currents flowing through the three power wires makes it easy to produce the required rotating magnetic environment. With the electromagnets surrounding the rotor powered by three-phase electricity, the motor turns easily and without any starting capacitor. In general, three-phase motors start more easily and are somewhat more energy efficient during operation than single-phase motors.

8. *Does the monorail at Disneyland and the metro in D.C. run on the idea of direct current motors?*

Those trains probably run on AC motors, because then they can use transformers to transfer power between circuits. Most likely, these trains use induction motors. To reverse the direction of the train, the engineer reverses the direction in which magnetic poles in the motors' stators circle the motors' rotors. When the poles reverse directions, the rotor has to reverse its direction, too, so that it chases those poles around in a circle.

TEXT AND VOCABULARY EXERCISES



37. Find in the text words or phrases which mean the same as:

- | | |
|--------------------------|-------------------------|
| ▪ постоянная структура | ▪ вращать |
| ▪ направление | ▪ вращающий момент |
| ▪ постоянный магнит | ▪ энергия сопротивления |
| ▪ металлическая пластина | ▪ взаимодействие |
| ▪ магнитный полюс | ▪ пружина |
| ▪ вентилятор | ▪ колебаться |

38. Make up situations using the English equivalents of the words given above.

39. Give Russian equivalents to the following word combinations:

repulsive forces; stationary structure; particular direction; in order to...; angular acceleration; permanent magnets; familiar shape; resistive energy; induction motor; alternating current; changing magnetic poles; electromagnetic doorbell; to complete a circuit; coil of wire; inside the solenoid; a weak spring; to twist a rotor; to push a carriage; to rotate around the rotor; magnetic environment; to transfer power; to reverse the direction

40. Work in pairs, think of some questions to review the contents of the text and ask each other. Use the word combinations below:

- | | |
|-----------------------------|--------------------|
| ▪ electric motor | ▪ magnetic poles |
| ▪ rotor | ▪ stator |
| ▪ magnetic interaction | ▪ resistive energy |
| ▪ to provide electric power | ▪ capacitor |

41. Read Text 10D once more. In pairs, discuss the statements below. Say what you think about them and ask your partner if he/she agrees or disagrees with you. Use the following phrases to help you:

<i>Agreeing</i>	<i>Disagreeing politely</i>
I agree with you.	Yes, but do not you think...?
Yes, that is what I think too.	True, but I think...
You are right!	I see what you mean, but...
Undoubtedly	I don't think so
Exactly	Quite the opposite
That's true	I am not sure

1. An electric motor uses only repulsive force between magnetic poles to twist a rotating object (the rotor) around in a circle.

2. An electric current is itself magnetic – it creates a structure in the space around it that exerts forces on any magnetic poles in that space.

3. If current flows around the loop in the direction of the fingers of your right hand, then your thumb points to the north pole that develops at one end of the coil.

4. The magnetic interaction between the stator and the rotor is not repulsive.

5. A fan motor is an induction motor, with an aluminum rotor that spins inside a framework of stationary electromagnets.

6. When you press the button of an electromagnetic doorbell, you complete a circuit that includes a source of electric power.

7. Linear electric motors are not like rotary electric motors – they do not use the forces between magnetic poles to push one object relative to another.

8. To keep the center component or “rotor” of an electric motor spinning, the magnetic poles of the electromagnets surrounding the rotor must rotate around it.

42. Fill in the gaps with the words from the box:

plant	device	dangerous	delivery	transferred	possible
charges	transformer	distant	direct		

The genius of George Westinghouse and Nikola Tesla in the late 1800's was to realize that producing alternating current made it **1** ___ to transfer power easily from one electric circuit to another with the help of an electromagnetic **2** ___ called a transformer. When an alternating electric current passes through the primary wire coil of a transformer, the changing magnetic and electric fields that this current produces transfer power from that primary current to the current passing through another coil of wire – the secondary coil of the **3** ___. While no electric **4** ___ move between these two wires, electric power does. With the help of a transformer, it's possible for a generating **5** ___ to move power from a large current of

relatively low energy electric charges – low voltage charges – to a small current of relatively high-energy electric charges – high voltage charges. This small current of high voltage electric charges can move with relatively little power loss through miles and miles of high voltage transmission lines and can go from the generating plant to a 6 ____ city without wasting much power.

Upon arrival at the city, this current can pass through the primary coil of another transformer and its power can be 7 ____ to a large current of relatively low voltage charges flowing through the secondary coil of that transformer. The latter current can then deliver this electric power to your neighborhood. A transformer can't transfer power between two circuits if those circuits operate with 8 ____ current. Edison tried to use direct current in his power 9 ____ systems. Edison even invented the electric chair to "prove" that alternating current was much more 10 ____ than direct current. Still, Westinghouse and Tesla won out in the end because they had the better idea.

Check your answers on p. 280.

CONVERSATIONAL PRACTICE

43. Speak about the system of power supply in our country using the Active Vocabulary and the expressions below:

- | | |
|--|---|
| ▪ I think we should ... | ▪ It would be better to ... |
| ▪ I (don't) agree | ▪ I like .../ I quite like .../ I really like ... |
| ▪ I (don't) think it's a good idea to ... | ▪ It is important to ... |
| ▪ A good way to ... is to ... /The best way to ... is to ... | ▪ I don't mind ... |

44. Read the information about electricity use in the USA. Add the the facts about the use of electricity which you know. Discuss them with your partner.

About 30% of the fossil fuel consumed in the US is used in the form of electricity. Of this about 75% is coal. Most people do not realize that whenever they use electricity they are probably also using coal. Electricity use is the foundation for much of our way of life. Most communication is based on it. Most machines, other than vehicles, are powered by electric motors. Lighting is universally electric. Less visible are the myriad industrial processes that use electricity. Most recent is the rising tide of electronic devices, including computers, as essential elements of living.

45. ROLE-PLAY. Disagree with the following statements. Give your reasons. Use the formulas of disagreement.

*Far from it...
You are wrong...*

*I don't think so...
Quite the opposite...*

1. It is quite possible for most modern people to live without electricity.
2. The electricity that we get from power outlets and batteries cannot power all different kinds of devices.
3. During a thunderstorm, there are huge bolts of electricity called thunder.
4. You can never get a shock from static electricity on dry winter days.
5. Most portable devices do not contain any batteries, which produce varying amounts of electricity depending on their size.
6. Throughout your house, you never find electric outlets where you can plug in all sorts of electrical appliances.
7. It is impossible to create electricity from sunlight using a solar cell.
8. It is unreal to create electricity from the chemical energy in hydrogen and oxygen using a fuel cell.
9. Because the electrons move fast all the materials can conduct electricity very well.
10. A generator does not use a magnet to get electrons moving.



WRITING PRACTICE

46. Read the following text carefully in order to discover the main line of thought and make a plan for writing a summary:

Transformers on the Electrical Grid

Let's look at the electricity that comes to your home. When electricity moves from a power plant it is put into a very high voltage to be able to travel long distances. The high voltage lines can be as high as 155,000 to 765,000 volts to travel many hundreds of miles.

In order for your home or a store to use the electricity, it has to be at a lower voltage than on the long-distance lines. So, the electricity is "stepped-down" to a lower level using a transformer. This lower voltage electricity is put into the local electric wires at a substation.

The substation breaks the larger amount of power down into smaller pieces at lower voltage. It then is stepped down again and again. Once smaller transformers take that voltage down to usually 7,200, the power leaves this substation. In your neighborhood, a transformer on top of a utility pole, or one connected to underground wires, transforms the 7,200

volts into 220–240 volts. This is then sent into your home over three wires. The three wires go through the electric meter, which measures how much electricity you use. One of the three wires is the ground, and the other two are the positives. Some of the electrical appliances in your home use the 220–240 volts. These are things like a water heater, stove and oven, or air conditioner. They have very special connections and plugs.

Other devices, like your TV or computer, only use one-half of the electricity – 110–120 volts. In a toy train set, the voltage is reduced even more from 110–120 and is changed from alternating current into direct current. Some businesses use higher voltage power to run big machines. So, they don't need to have the voltage reduced as much.

THE BUSINESS LETTER

?

47. Read and translate the following sample of business letters:

6123 Farrington Road
Apt. G11
Chapel Hill, NC 27514
January 11, 2005
Taylor, Inc.
694 Rockstar Lane
Durham, NC 27708

Dear Ms. Jones:

I am seeking a position in your engineering department where I may use my training in computer sciences to solve engineering problems. Although I do not know if you have a current opening, I would like to be a part of the department that developed the Internet Selection System.

I expect to receive a Bachelor of Science degree in Engineering from North Carolina State University in June, when I will have completed the Computer Systems Engineering Programme. Since September 2000, I have been participating, through the University, in the Professional Training Programme at Computer Systems International in Raleigh. In the programme I was assigned to several staff sections as an apprentice. Most recently, I have been a programmer trainee in the Engineering Department and have gained a great deal of experience in computer applications. Details of the academic courses I have taken are contained in the enclosed resume.

I look forward to hearing from you soon. I can be contacted at my office (919–866–4000 ext. 232) or via email (Brock@aol.com).

*Sincerely,
Rebecca Brock*

48. Remember the following recommended binding phrases used in business letters:

- *Apart from the above (said) ...* – Помимо вышесказанного
- *In view of the above (said)* – Учитывая вышеуказанное...
- *As a matter of fact / In fact.../* – Действительно / На самом деле/ фактически...
- *It goes without saying...* – Само собой разумеется, без сомнения...
- *In this connection...* – В связи с этим...
- *In connection with your request...* – В связи с Вашей просьбой...
- *In connection with the above (said) ...* – В связи с вышесказанным...
- *The point is... / The matter is ...* – Дело в том, что...
- *In our opinion* – По нашему мнению...
- *I would like to note ...* – Хотелось бы отметить...

49. Compose a business letter using the phrases above.

50. Choose the correct answer:

1. *What should you put at the top of a business letter?*

- Your address (full), their address (short), the date (full)
- Your address (short), their address (full), the date (short)
- Your address (short), their address (short), the date (short)
- Just 'Dear Sir/Madam

2. *If you don't know the person to whom you are writing, with which of the following should you sign off a business letter?*

- Yours sincerely,
- Yours faithfully,
- Best wishes,
- Hugs and kisses,

3. *If you know the person to whom you are writing, with which of the following should you sign off a business letter?*

- Yours sincerely,
- Yours faithfully,
- Best wishes,
- Hugs and kisses,

4. *Which of the following is an example of very formal language?*

- Hi there!
- Hope you're OK.
- Your attendance is requested at...
- Gotta run. See you soon.

5. *You're writing a letter to a company, you know the department you wish to write to, but don't know the name of the contact person. How should you start the letter?*

- 'FAO: Personnel Manager
- 'Dear Personnel Manager,'
- (new line) Dear Sir/Madam,'
- 'For the Personnel Manager,'
- 'To whoever the Personnel Manager is'

UNIT 11

Pre-Text Exercises

Word Building

Active Vocabulary

Text 11 A. *Oil Extraction*

Text 11 B. *Natural Gas*

Text 11 C. *Gas and Power Generation*

Text 11 D. *Natural Gas Crisis in the USA*

Text and Vocabulary Exercises

Conversational Practice

The Memorandum

Writing Practice

PRE-TEXT EXERCISES

1. Fill in the gaps with the correct prepositions:

1. We always refer ____ works in our articles.
a) *on*; b) *to*; c) *of*
2. This scientist is known ____ everybody in his country.
a) *at*; b) *for*; c) *to*
3. Her brother has been ____ work for three months.
a) *out on*; b) *out of*; c) *all over*
4. They were listening ____ the music attentively.
a) *on*; b) *at*; c) *to*
5. You can never rely ____ him. He is so oblivious.
a) *on*; b) *at*; c) *of*
6. The mountains were covered ____ snow and looked very beautiful.
a) *over*; b) *after*; c) *with*
7. The scientists are satisfied ____ the results of their work.
a) *with*; b) *on*; c) *under*
8. The kittens jumped ____ and children were laughing happily.
a) *out of*; b) *from under*; c) *up and down*
9. He says that he has traveled ____ for the last twenty years.
a) *over again*; b) *all over the world*; c) *on the world*

2. Explain the meaning of the following words and phrases in English:

- raw material
- oil recovery
- fossil fuel

3. Fill in the gaps with a suitable word to complete the sentences:

1. Geology is the study of the planet Earth, its rocky ____, its history, and the processes that act upon it.

outer external interior exterior

2. With increased emphasis on protecting the ____, many mining engineers work to solve problems related to water and air pollution.

environment environmental environments

3. Only a small proportion of oil and gas ____ a reservoir flows out under natural forces.

with on in within

4. Geology is an important way of ____ the world around us.

understand understandably understandable understanding

5. As the human population grows, more and more people ____ in areas exposed to natural geologic hazards.

live lives lived living

6. The field of geology includes subfields that examine all of the ____ systems.

Earths' Earth's Earths Earth

7. Success in geometry, trigonometry, and calculus is a key to success in an engineering ____.

instruction enlightenment education upbringing

8. Petroleum is the raw material for ____ chemical products.

greatly very much many

9. Natural gas is important as a major source for electricity ____.

generation generate generated generally

4. BRAINSTORMING. What is your understanding of the words below? Give examples.

- petroleum ▪ geologists ▪ natural gas ▪ reservoir

WORD BUILDING

5. Guess the meaning of the words in bold type. Analyze their word-formation model.

green – **greenish**; large – **largely**; pure – **purity** – **purify**; geology – **geologist** – **geological**; nature – **natural**; compress – **compression**; migrate – **migration**; react – **reaction**; produce – **production** – **producer**; general – **generally**; history – **historically**; arrange – **arrangement**; economy – **economical** – **economist**; extract – **extraction**; profit – **profitable** – **profitably**; inject – **injection**; gas – **gaseous**; significance – significant – significantly; place – **displace**; concentrate – **concentration**

6. Find the derivatives of the words in italics in the left-hand columns:

- | | | | | |
|--------------------|--------------|------------|---------------|------------------|
| 1. <i>geology</i> | a) geography | b) science | c) geologist | d) specialist |
| 2. <i>discover</i> | a) degree | b) develop | c) discovery | d) determine |
| 3. <i>ordinary</i> | a) obtain | b) outside | c) often | d) extraordinary |
| 4. <i>furnish</i> | a) finish | b) turn | c) furnishing | d) furniture |
| 5. <i>land</i> | a) among | b) landing | c) last | d) later |
| 6. <i>simple</i> | a) steamer | b) ship | c) site | d) simplicity |
| 7. <i>soon</i> | a) closer | b) near | c) sooner | d) same |

7. Define to what parts of speech the following words belong and translate them. Define which words in the list are complex words:

Composition; purity; fertilizer; geologist; natural; compression; geological; prehistoric; organic; sedimentary; layer; underground; reaction; eventually; arrangement; network; pipeline; storage; lifetime; insufficient; economical; low-pressure; submersible; reinjection; typical; different; location; breakdown; to ensure; gaseous; profitably; cogeneration; recovery; landfill; organosulfur; impurity; unlike; hazardous; liquefaction; gasification; end-use; wasteful

ACTIVE VOCABULARY

8. Read and memorize the following words and word combinations:

adjacent – смежный	to pump – работать насосом, качать
appearance – внешний вид	purity – чистота
to deplete – истощать, исчерпывать	raw material – сырье
depth – глубина	remains – остатки
to drill – бурить	reservoir – бассейн; резервуар
to ensure – обеспечивать	solvent – растворитель
layer – слой (sedimentary layers – осадочные слои)	surface – поверхность
oil – нефть (crude oil – сырая нефть)	to trap – поглощать, улавливать
porous – пористый	to vary – меняться
	viscosity – вязкость
	waxy – воскообразный

9. Read and translate the text below concentrating on oil extraction problems:

Text 11 A Oil Extraction

Petroleum (from Greek *petra* – rock and *elaion* – oil or Latin *oleum* – oil), crude oil, sometimes colloquially called black gold or “Texas Tea”, is a thick, dark brown or greenish liquid. Petroleum exists in the upper strata of some areas of the Earth’s crust. It consists of a complex mixture of various hydrocarbons, largely of the alkane series, but may vary much in appearance, composition, and purity. Petroleum is used mostly, by volume, for producing fuel oil, which is an important “primary energy” source. Petroleum is also the raw material for many chemical products, including solvents, fertilizers, pesticides, and plastics.

Most geologists view crude oil, like coal and natural gas, as the product of compression and heating of ancient vegetation over geological time scale. According to this theory, it is formed from the decayed remains of prehistoric marine animals and terrestrial plants. Over many centuries this organic matter, mixed with mud, is buried under thick sedimentary layers of material. The resulting high levels of heat and pressure cause the remains to metamorphose, first into a waxy material known as kerogen, and then into liquid and gaseous hydrocarbons in a process known as catagenesis. These then migrate through adjacent rock layers until they become trapped underground in porous rocks called reservoirs, forming an oil field, from which the liquid can be extracted by drilling and pumping. 150 m is generally considered the “oil window”. Though this corresponds

to different depths for different locations around the world, a 'typical' depth for an oil window might be 4–5 km. Three conditions must be present for oil reservoirs to form: a rich source rock, a migration conduit, and a trap (seal) that forms the reservoir.

The reactions that produce oil and natural gas are often modeled as first order breakdown reactions, where kerogen breaks down to oil and natural gas by a large set of parallel reactions, and oil eventually breaks down to natural gas by another set of reactions. Generally the first stage in the extraction of crude oil is to drill a well into the underground reservoir. Historically, in the USA some oil fields existed where the oil rose naturally to the surface, but most of these fields have long since been depleted, except for certain remote locations in Alaska.

Often many wells will be drilled into the same reservoir, to ensure that the extraction rate will be economically viable. Also, some wells (secondary wells) may be used to pump water, steam, acids or various gas mixtures into the reservoir to raise or maintain the reservoir pressure, and so maintain an economic extraction rate.

If the underground pressure in the oil reservoir is sufficient, then the oil will be forced to the surface under this pressure. Gaseous fuels or natural gas are usually present, which also supplies needed underground pressure. In this situation it is sufficient to place a complex arrangement of valves on the well head to connect the well to a pipeline network for storage and processing. This is called primary oil recovery. Usually, only about 20% of the oil in a reservoir can be extracted this way.

Over the lifetime of the well the pressure will fall, and at some point there will be insufficient underground pressure to force the oil to the surface. If economical, and it often is, the remaining oil in the well is extracted using secondary oil recovery methods. Secondary oil recovery uses various techniques to aid in recovering oil from depleted or low-pressure reservoirs. Sometimes pumps, such as beam pumps and electrical submersible pumps (ESPs), are used to bring the oil to the surface.

Other secondary recovery techniques increase the reservoir's pressure by water injection, natural gas reinjection and gas lift, which injects air, carbon dioxide or some other gas into the reservoir. Together, primary and secondary recovery allow 25 to 35% of the reservoir's oil to be recovered. Tertiary oil recovery reduces the oil's viscosity to increase oil production. Tertiary recovery is started when secondary oil recovery techniques are no longer enough to sustain production, but only when the oil can still be extracted profitably. This depends on the cost of the extraction method and the current price of crude oil. When prices are high, previously unprofitable wells are brought back into production and when they are low, production is curtailed. Thermally-enhanced oil recovery

methods (TEOR) are tertiary recovery techniques that heat the oil and make it easier to extract. Steam injection is the most common form of TEOR, and is often done with a cogeneration plant.

In this type of cogeneration plant, a gas turbine is used to generate electricity and the waste heat is used to produce steam, which is then injected into the reservoir. This form of recovery is used extensively to increase oil production in the San Joaquin Valley, which has very heavy oil, yet accounts for 10% of the United States' oil production. In-situ burning is another form of TEOR, but instead of steam, some of the oil is burned to heat the surrounding oil. Occasionally, detergents are also used to decrease oil viscosity. Tertiary recovery allows another 5 to 15% of the reservoir's oil to be recovered.



TEXT AND VOCABULARY EXERCISES

10. Find in the text the words or phrases which mean the same as:

- | | |
|---|----------------------------|
| ▪ черное золото | ▪ сдавливание (уплотнение) |
| ▪ жидкость | ▪ нагревание |
| ▪ в значительной степени | ▪ выводной канал |
| ▪ по объему | ▪ бурить скважину |
| ▪ жизнеспособный | ▪ хранение (накопление) |
| ▪ обработка | ▪ существующая цена |
| ▪ первичный и вторичный методы разработки | |

11. Find in the text the synonyms to the following words:

- | | | | |
|--------------|-----------------|-------------|---------------|
| ▪ petroleum | ▪ to consider | ▪ to differ | ▪ a number of |
| ▪ ultimately | ▪ able to exist | ▪ enough | ▪ putting in |
| ▪ assemblage | ▪ to help | | order |

12. Find in the text the antonyms to the following words:

- | | | | |
|----------------|----------------|----------|------------|
| ▪ thin | ▪ low | ▪ simple | ▪ shallow |
| ▪ poor | ▪ insufficient | ▪ rise | ▪ decrease |
| ▪ unprofitable | ▪ to prohibit | ▪ | ▪ |

13. Give Russian equivalents to the following word combinations:

Complex mixture; to vary in appearance, composition, and purity; primary energy; over many centuries; organic matter; thick sedimentary layer; different locations; the extraction of crude oil; underground reservoir; extraction rate; economically viable; to be under the pressure; oil recovery; to generate electricity; to produce steam; ancient vegetation

14. Give English equivalents to the following word combinations:

удобрение; осадочные слои материала; месторождение нефти; бурение и перекачка; извлечение сырой нефти; методы восстановления нефти; вторичное восстановление нефти; различные методы; увеличивать производство нефти

15. Choose among the words in parentheses the one that corresponds to the text above to complete the sentences:

1. Petroleum, crude oil, is a thick, dark brown or ____ liquid.
(a. *blackish*; b. *grayish*; c. *greenish*)
2. Petroleum ____ of a complex mixture of various hydrocarbons, but may vary much in appearance, composition, and purity.
(a. *consists*; b. *includes*; c. *forms*)
3. Most geologists view ____ oil as the product of compression and heating of ancient vegetation over geological time scales.
(a. *hard*; b. *soft*; c. *crude*)
4. Over many centuries this organic matter, mixed with mud, is buried under ____ layer of material.
(a. *thick*; b. *thin*; c. *sedimentary*)
5. The reactions that produce oil and natural gas are often ____ as first order breakdown reactions.
(a. *thought*; b. *imagined*; c. *modeled*)
6. Generally the first stage in the ____ of crude oil is to drill a well into the underground reservoir.
(a. *mining*; b. *extraction*; c. *producing*)
7. If the underground pressure is ____ the oil will be forced to the surface under this pressure.
(a. *large*; b. *weak*; c. *sufficient*)
8. Secondary oil recovery uses various ____ to aid in recovering oil from depleted or low pressure reservoirs.
(a. *techniques*; b. *tools*; c. *equipment*)

16. Read text 11A once more. In pairs, discuss the statements below. Say what you think about them and ask your partner if he/she agrees or disagrees with you. Use the following phrases to help you:

<i>Agreeing</i>	<i>Disagreeing politely</i>
I agree with you.	Yes, but do not you think...?
Yes, that is what I think too.	True, but I think...
You are right!	I see what you mean, but...
That's right	I don't think so
That's true	I am not sure

1. Petroleum, crude oil, sometimes colloquially called black gold or “Texas Tea” is a thick, dark brown or greenish liquid.

2. Petroleum is also the raw material for many chemical products, including solvents, fertilizers, pesticides, and plastics.

3. Gaseous hydrocarbons migrate through adjacent rock layer, forming an oil field, from which the liquid can be extracted by drilling and pumping.

4. Four or five conditions must be present for oil reservoir to form.

5. Usually, only about 10 % of the oil in a reservoir can be extracted by primary oil recovery.

6. If economical, the remaining oil in the well is extracted using secondary oil recovery methods.

7. Together, primary and secondary recovery allow 10 % to 20 % of the reservoir’s to be recovered.

8. Tertiary recovery depends on the cost of the extraction method and the current price of crude oil.

9. Steam injection is a very rare form of thermally-enhanced oil recovery methods.

10. Occasionally, detergents are also used to decrease oil viscosity.

17. Divide text 11A into logical parts and give each a suitable title.

18. Fill in the gaps with the words from the box:

technology	injecting	flows	profitable
drilling	discovered	reservoirs	

Petroleum engineers search the world for **1** ____ containing oil or natural gas. Once these resources are **2** ____, petroleum engineers’ aim is to determine the **3** ____ methods to be used and monitor drilling and production operations.

They design equipment and processes to achieve the maximum **4** ____ recovery of oil and gas. Because only a small proportion of oil and gas in a reservoir **5** ____ out under natural forces, petroleum engineers develop and use various enhanced recovery methods.

These include **6** ____ water, chemicals, gases, or steam into an oil reservoir to force out more of the oil. Petroleum engineers research and develop **7** ____ and method to increase recovery and lower the cost of drilling and production operations.

Check your answers on p. 280.

19. Translate into English:

Добыча нефти ведется человечеством с древних времен. Сначала применялись примитивные способы: сбор нефти с поверхности водоемов, обработка песчаника или известняка, пропитанного нефтью, при помощи колодцев.

Началом развития нефтяной промышленности принято считать время появления механического бурения скважин на нефть в 1859 году в США, и сейчас практически вся добываемая в мире нефть извлекается посредством буровых скважин.

За сотню с лишним лет развития истощились одни месторождения, были открыты другие, повысилась эффективность добычи нефти. В России первые скважины были пробурены на Кубани в 1864 г. и в 1866 г.

Механизация добычи тогда была слабая, поэтому с целью получения максимальной прибыли разрабатывались наиболее перспективные в экономическом плане залежи. В начале 20 века Россия занимала первое место по добыче нефти.

20. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about the history of oil extraction (Text 42). Be ready to discuss the information you have read.

21. Read the following text and give a brief summary of it:

Classification of Crude Oil

Crude oil usually consists of a mixture of hydrocarbons having varying molecular weights and differing from one another in structure and properties. These various species are separated into groups, or fractions, by a process of distillation called refining. The oil is first heated to a vapor, and then passed upward through a tower containing trays at various levels. The vapors are very hot at the bottom, but become cooler as they rise, so that different fractions condense in the trays at different heights. The lighter the fraction the higher up it condenses.

In an average crude oil the fractions, beginning with the lightest, are: (1) dissolved gases, (2) petroleum ether, (3) gasoline, (4) kerosene, (5) gas oil, (6) lubricating oils, (7) fuel oils, and (8) asphalt.

Because so much gasoline is needed, ways were developed to break down the larger molecules of the heavier fractions to produce it. This process is called "cracking" and may be accomplished by subjecting these fractions to high temperature and pressure, or by employing a chemical catalyst.

The oil industry classifies “crude” by the location of its origin (e.g., “West Texas Intermediate, WTI” or “Brent”) and often by its relative weight or viscosity (“light”, “intermediate” or “heavy”); refiners may also refer to it as “sweet”, which means it contains relatively little sulphur, or as “sour”, which means it contains substantial amounts of sulphur and requires more refining in order to meet current product specifications. Each crude oil has unique molecular characteristics which are understood by the use of crude oil assay analysis in petroleum laboratories.

Barrels from an area in which the crude oil’s molecular characteristics have been determined and the oil has been classified are used as pricing references throughout the world. These references are known as Crude oil benchmarks:

Brent Crude, comprising 15 oils from fields in the Brent and Ninian systems in the East Shetland Basin of the North Sea. The oil is landed at Sullom Voe terminal in the Shetland. Oil production from Europe, Africa and Middle Eastern oil flowing West tends to be priced off the price of this oil, which forms a benchmark.

West Texas Intermediate (WTI) for North American oil.

Dubai, used as benchmark for Middle East oil flowing to the Asia-Pacific region.

Tapis (from Malaysia, used as a reference for light Far East oil)

Minas (from Indonesia, used as a reference for heavy Far East oil)

The OPEC Reference Basket, a weighted average of oil blends from various OPEC (The Organization of the Petroleum Exporting Countries) countries.

22. Read the text below to find answers to the given questions:

Text 11 B Natural Gas

- 1. What does a gaseous fossil fuel primarily consist of?*
- 2. Why do you think that methane is an extremely efficient greenhouse gas?*
- 3. What is known about ethane, propane and butane?*
- 4. What are the properties of natural gas?*
- 5. How is liquefied natural gas transported?*
- 6. Why is flaring illegal in many countries now?*
- 7. How is natural gas stored?*

Natural gas, commonly referred to as gas, is a gaseous fossil fuel consisting primarily of methane. It is found in oil fields and natural gas fields, and in smaller quantities, coal beds. When methane-rich gases are produced by the anaerobic decay of non-fossil organic material, these are

referred to as biogas. Sources of biogas include swamps, which produce swamp gas; marshes, which produce marsh gas; landfills, which produce landfill gas, as well as sewage sludge and manure, by way of anaerobic digesters, in addition to Enteric fermentation particularly in cattle.

Methane is an extremely efficient greenhouse gas which may contribute to enhanced global warming when free in the atmosphere, and such free methane, would then be considered a pollutant rather than a useful energy resource. However, methane in the atmosphere is oxidised, producing carbon dioxide and water, so that the greenhouse effect of released methane is relatively short-lived. Also, natural gas, when burned, produces much less carbon dioxide than more carbonaceous fuel sources, such as coal. Significant biological sources of methane are termites, ruminants and cultivation. Estimated emissions are 15, 75 and 100 million tons per year respectively. The primary component of natural gas is methane, the shortest and lightest hydrocarbon molecule. It may also contain heavier gaseous hydrocarbons such as ethane, propane and butane, as well as other sulphur containing gases, in varying amounts.

Organosulfur compounds and hydrogen sulfide are common contaminants, which must be removed prior to most uses. Gas with a significant amount of sulfur impurities is termed “sour”. Natural gas is tasteless and odorless. However, before gas is distributed to end-users, it is odorized by adding thiols, to assist in leak detection. Natural gas is, in itself, harmless to the human body – unlike carbon monoxide, for instance, it is not a poison.

However, natural gas is a simple asphyxiant and can kill if it displaces air to the point where the oxygen content will not support life. Natural gas can also be hazardous to life and property through an explosion. Natural gas is lighter than air, and so tends to dissipate into the atmosphere. But when natural gas is confined, such as within a house, gas concentrations can reach explosive mixtures and, if ignited, result in blasts that could destroy buildings. Methane has a lower explosive limit of 5% in air, and an upper explosive limit of 15%. Explosive concerns with compressed natural gas used in vehicles are almost nonexistent, due to the escaping nature of the gas, and the need to maintain concentrations between 5% and 15% to trigger explosions.

LNG carriers can be used to transport liquefied natural gas (LNG) across oceans, while tank trucks can carry liquefied or compressed natural gas (CNG) over shorter distances. They may transport natural gas directly to end-users or to distribution points, such as pipelines for further transport. These may have a higher cost requiring additional facilities for liquefaction or compression at the production point, and then gasification or decompression at end-use facilities or into a pipeline.

In the past, the natural gas which was recovered in the course of recovering petroleum could not be profitably sold, and was simply burned at the oil field (known as flaring). This wasteful practice is now illegal in many countries, especially since it adds greenhouse gas pollution to the Earth's atmosphere. Additionally, companies now recognize that value for the gas may be achieved with LNG, CNG, or other transportation methods to end-users in the future. The gas is now re-injected back into the formation for later recovery. This also assists oil pumping by keeping underground pressures higher. In Saudi Arabia, in the late 1970s, a "Master Gas System" was created, ending the need for flaring.

The natural gas is used to generate electricity and heat for desalinization. Similarly, some land-fills that also discharge methane gases have been set-up to capture the methane and generate electricity. Natural gas is often stored in underground caverns formed inside depleted gas reservoirs from previous gas wells, salt domes, or in tanks as liquefied natural gas. The gas is injected during periods of low demand and extracted during periods of higher demand. Storage near the ultimate end-users helps to best meet volatile demands, but this may not always be practical.



TEXT AND VOCABULARY EXERCISES

23. Find in the text the words or phrases which mean the same as:

- | | |
|------------------------|----------------------------------|
| ▪ ископаемое топливо | ▪ без вкуса и запаха |
| ▪ угольный пласт | ▪ рассеивать |
| ▪ захоронение отходов | ▪ воспламенять(ся), зажигать(ся) |
| ▪ взрывчатое вещество | ▪ загрязняющее вещество |
| ▪ взрывы | ▪ сжиженный природный газ |
| ▪ конечный потребитель | ▪ горение ярким пламенем |

24. Make up situations using the English equivalents of the words given above.

25. Work in pairs and decide whether these statements are true or false:

1. Natural gas is found in oil fields and natural gas fields, and in greater quantities, coal beds.
2. Sources of biogas include mines, oil fields and oil wells.
3. Methane is an extremely efficient greenhouse gas which may contribute to enhanced global warming when free in the atmosphere.
4. Natural gas, when burned, produces much less carbon dioxide than more carbonaceous fuel sources, such as coal.

5. Organosulfur compounds and hydrogen sulfide are rather rare contaminants.

6. Natural gas is lighter than air, and so tends to dissipate into the explosion.

7. Liquefied natural gas carriers cannot transport natural gas directly to end-users.

8. Natural gas is often stored in underground caverns inside depleted gas reservoirs from previous gas wells, salt domes, or in tanks as liquefied natural gas.

26. Find in the text the situations in which the following words and word combinations are used:

methane; natural gas fields; biogas; global warming; is oxidized; organosulfur compounds; explosive limit; compressed natural gas; illegal; generate electricity

27. Give Russian equivalents to the following word combinations:

gaseous fossil fuel; organic material; swamp gas; marsh gas; landfill gas; anaerobic digesters; useful energy resource; to be tasteless and odorless; to be hazardous to life; liquefied natural gas; compressed natural gas; Earth's atmosphere; higher demand; volatile demands

28. Consult the TEXTS FOR SUPPLEMENTARY READING and complete the information about the possible future sources of natural gas (Text 43). Be ready to discuss the information you have read.

29. Fill in the gaps with the words from the box:

collectively exist degrees associated produced reservoir raw processing
--

Natural gas **1** ____ begins at the wellhead. The composition of the **2** ____ natural gas extracted from producing wells depends on the type, depth and location of the underground deposit and the geology of the area. Oil and natural gas are often found in the same **3** _____. The natural gas **4** ____ from oil wells is generally classified as “associated-dissolved”. It means that the natural gas is **5** ____ with or dissolved in crude oil. Most natural gas production contains to varying **6** ____ small hydrocarbon molecules in addition to methane. Although they **7** ____ in a gaseous state at underground pressures, these molecules will become liquid at normal atmospheric pressure. **8** _____, they are called condensates or natural gas liquids.

Check your answers on p. 280.

30. Work in pairs, make as many questions as possible to review the paragraph below and ask each other:

1. Many scientists believe that natural gas was created from fossil plants along with coal, as well as where there were large organic deposits that did not become coal, such as at the mouths of rivers. Some, however, have argued that methane, the principle component of gas, was created along with the Earth's crust. The study of fossils is called paleontology. The creation of natural gas is part of geology.

2. Most natural gas is processed very little to render it useable. Sometimes components called natural gas liquids, such as propane, are extracted from the gas before it is transported or delivered to the consumer. The local gas utility that delivers gas to customers is typically not the same as the pipeline company that collects the gas from the wells and brings the gas into the local area.

3. The chief deposits of "dry gas" (not associated with oil) are in Texas, Louisiana, Kansas, Oklahoma, Kentucky and West Virginia. Considering both "wet" and "dry" gas, the leading states are Texas, California, West Virginia, Louisiana, Kansas, Oklahoma, Pennsylvania, Kentucky and Ohio. Many other states have relatively large scattered supplies. So-called "proved reserves" in the US are around 160 trillion cubic feet of gas. As with oil, finding gas is the job principally of geologists and many of the same techniques are used, especially seismic studies. In fact, the discovery of gas is often a byproduct of the search for oil.

4. The history of natural gas extends to antiquity. In America it was known to the Indians, who observed it issuing from the ground in various spots, chiefly along the western side of the Appalachian Highlands. It was used for illuminating purposes in Fredonia, N.Y., as early as 1821 and the effect was so striking compared to gas made from coal that a German scientist hailed the beautiful, clear gas lights as the eighth wonder of the world. Gas associated with Pennsylvania oil was used for industrial purposes first in Pittsburgh, and its general use then spread to other industrial centers.

5. The most common method of obtaining petroleum is extracting it from oil wells found in oil fields. After the well has been located, various methods are used to recover the petroleum. Primary recovery methods are used to extract oil that is brought to the surface by underground pressure, and can generally recover about 20% of the oil present. After the oil pressure has depleted to the point that the oil is no longer brought to the surface, secondary recovery methods draw another 5 to 10% of the oil in the well to the surface. Finally, when secondary oil recovery methods are no longer viable, tertiary recovery methods reduce the viscosity of the oil in order to bring more to the surface.

31. Read the text and give its brief summary:

Text 11 C Gas and Power Generation

Natural gas is important as a major source for electricity generation through the use of gas turbines and steam turbines. Particularly high efficiencies can be achieved through combining gas turbines with a steam turbine in combined cycle mode.

Environmentally, natural gas burns cleaner than other fossil fuels, such as oil and coal, and produces fewer greenhouse gases. For an equivalent amount of heat, burning natural gas produces about 30% less carbon dioxide than burning petroleum and about 45% less than burning coal. Combined cycle power generation using natural gas is thus the cleanest source of power available using fossil fuels, and this technology is widely used wherever gas can be obtained at a reasonable cost.

Fuel cell technology may eventually provide cleaner options for converting natural gas into electricity, but as yet it is not price-competitive. Also, natural gas is said to peak around the year 2030, 20 years after the peak of oil. It is also projected that the world's supply of natural gas should finish around the year 2085.

Natural gas is commercially produced from oil field and natural gas fields. Gas produced from oil wells is called casinghead gas or associated gas. The largest two natural gas fields are probably South Pars Gas Field in Iran and Urengoy gas field in Russia, with reserves on the order of 10^{13} m³. Qatar also has 25 trillion cubic meters of natural gas (5% of the world's proven supply), enough to last 250 years at current production levels.

Town gas is a mixture of methane and other gases which can be used in a similar way to natural gas and can be produced by treating coal chemically. This is a historic technology still used as 'best solution' in some local circumstances, although coal gasification is not usually economic at current gas prices, depending upon infrastructure considerations.

Notes on the text

casinghead gas (associated gas) – нефтяной (попутный) газ (получаемый из коллектора нефти)

town gas – коммунальный (бытовой) газ

TEXT AND VOCABULARY EXERCISES



32. Find in the text the words or phrases which mean the same as:

- | | |
|-------------------------------|------------------------------------|
| ▪ комбинированный цикл | ▪ коэффициент полезного действия |
| ▪ источник тока | ▪ генерирование |
| ▪ основной источник | ▪ ископаемое топливо |
| ▪ паровая турбина | ▪ преобразование природного газа в |
| ▪ смесь метана и других газов | электричество |

33. Give Russian equivalents to the following word combinations:

major source for electricity generation; high efficiency; combined cycle mode; to produce fewer greenhouse gases; the cleanest source of power; natural gas fields; oil wells; to be at current production levels; local circumstances; to depend upon infrastructure considerations

34. Choose the correct word from Text 11C to complete the sentences:

1. Natural gas is important as a major ____ for electricity generation.
2. Particularly high ____ can be achieved through combining gas turbines with a steam turbine in combined cycle mode.
3. Combined cycle power generation using natural gas is thus the ____ source of power available using fossil fuels.
4. ____ cell technology may eventually provide cleaner options for converting natural gas into electricity but as yet it is not price-competitive.
5. Gas produced from oil wells is called casinghead gas or ____ gas.
6. ____ gas is a mixture of methane and other gases which can be used in a similar way to natural gas and can be produced by treating coal chemically.
7. Coal gasification is not usually economic at current gas prices, depending upon ____ consideration.

35. Match each word in A with the Russian equivalent in B:

- | A | B |
|----------------|--|
| 1. gas turbine | a. запасы |
| 2. steam | b. фитинг в устье скважины для отделения нефти от газа |
| 3. to burn | c. обострять |
| 4. amount | d. пригодный, имеющийся в распоряжении |
| 5. available | e. количество |
| 6. to peak | f. жечь, сжигать |
| 7. casinghead | g. пар |
| 8. reserves | h. газовая турбина |

36. Translate the following sentences into English:

1. В пределах Мирового океана установлено около 70 нефтегазоносных бассейнов.

2. Персидский залив характеризуется высокой концентрацией запасов нефти и газа в сравнительно небольшом числе гигантских месторождений.

3. В начале 20 века изучение запасов природного газа было связано только с разведкой нефти.

4. Запасы природного газа увеличились главным образом благодаря открытию месторождений в восточной части России.

5. На сегодняшний день Россия обладает 35% от мировых запасов природного газа, что составляет более 48 трлн м³.

37. Work with a partner. Take turns to ask and answer questions to text 11C. Use the words and word combinations below:

major source

the use of gas turbines

combined cycle mode

town gas

electricity generation

steam turbines

to convert gas into electricity

gas prices

38. Fill in the gaps with the prepositions from the box:

of (3) in (6) at beneath with (2) from by (2) for on
--

Natural gas is highly flammable hydrocarbon gas consisting chiefly ___ methane. Although methane is always the chief component, it may also include other gases such as oxygen, hydrogen, nitrogen, ethane, ethylene, propane, and even some helium.

The gas is found entrapped ___ the earth's crust ___ varying depths ___ impervious strata, such as limestone, and may or may not be ___ association ___ oil. If oil is present it is called wet gas, else dry gas. Deposits are fairly widely distributed, however, ___ the contiguous US only Texas and Louisiana are net exporters. All ___ the other states use more gas than they produce. The gas is drawn ___ wells, similar to oil wells, and is usually transported ___ pipelines, sometimes a thousand miles or more.

As a fuel, natural gas is convenient and efficient. It is used primarily ___ heat, ___ industrial, commercial and residential settings. ___ many homes the house and water are heated ___ gas, the food is cooked ___ it and clothes dried. It is also used to produce electricity, ___ many cases using gas fired turbines that are similar to jet engines. Gas has the great advantage ___ producing no smoke or ash ___ burning, although it is usually much more expensive than coal as a fuel.

39. Consult the TEXTS FOR SUPPLEMENTARY READING and learn about the development of Oklahoma's oil & gas industry (Text 44). Be ready to discuss the information you have read.

40. Read the text about natural gas crisis in the USA and give its brief summary:

Text 11 D
Natural Gas Crisis in the USA

Many politicians and prominent figures in North America have spoken publicly about a possible natural gas crisis. This includes former Secretary of Energy Spencer Abraham, former Chairman of the Federal Reserve Alan Greenspan, and former Ontario Minister of Energy Dwight Duncan.

The natural gas crisis is typically described by the increasing price of natural gas in the U.S. over the last few years due to the decline in indigenous supply and the increase in demand for electricity generation. Indigenous supply has not truly fallen – but it has leveled off (no matter how many new straws we put into the ground, we still get about the same amount of natural gas each year). But because of the continuing growth in demand, and the temporary but dramatic hit to production that came from Hurricanes Katrina and Rita, the price has become so high that many industrial users, mainly in the petrochemical industry, have closed their plants causing loss of jobs. Greenspan has suggested that a solution to the natural gas crisis is the importation of LNG*.

New or expanded LNG terminals create tough infrastructure problems and require high capital spending. LNG terminals require a very spacious – at least 40 feet (12.2 m) deep – harbor, as well as being sheltered from wind and waves. These “suitable” sites are thus deep in well populated seaports, which are also burdened with right-of-way concerns for LNG pipelines, or conversely, required to also host the LNG expansion plant facilities and end use (petrochemical) plants amidst the high population densities of major cities, with the associated fumes, multiple serious risks to safety.

Typically, to attain “well sheltered” waters, suitable harbor sites are well up rivers or estuaries, which are unlikely to be dredged deep enough. Since these very large vessels must move slowly and ponderously in restricted waters, the transit times to and from the terminal become costly, as multiple tugboats and security boats shelter and safeguard the large vessels. Operationally, LNG tankers are (for example, in Boston) effectively given sole use of the harbor, forced to arrive and depart during non-peak hours, and precluded from occupying the same harbor until the

first is well departed. These factors increase operating costs and make capital investment less attractive.

To substantially increase the amount of LNG used to supply natural gas to North America, not only must “re-gasification” plants be built on North American shores – difficult for the reasons stated above – someone also must put substantial, new liquefaction stations in Indonesia, the Middle East, and Africa, in order to concentrate the gas generally associated with oil production in those areas. A substantial expansion of the fleet of LNG carriers also must occur to move the huge amount of fuel needed to make up for the coming shortfall in North America.

Notes on the text

**LHG – liquefied natural gas – сжиженный природный газ*

TEXT AND VOCABULARY EXERCISES



41. Give Russian equivalents to the following word combinations:

prominent figures; natural gas crisis; the increasing price of natural gas; the decline in indigenous supply; the increase in demand for electricity generation; industrial users; well populated seaports; serious risks to safety; liquefaction stations; to be associated with; substantial expansion; to move the huge amount of fuel

42. Give English equivalents to the following word combinations:

- | | |
|------------------------------|---------------------------------------|
| ▪ количество природного газа | ▪ каждый год |
| ▪ расширенные терминалы | ▪ защищенный от ветра и волн |
| ▪ нефтехимический завод | ▪ высокий удельный вес населения |
| ▪ подходящие участки гавани | ▪ производить дноуглубительные работы |
| ▪ буксирные суда | ▪ прибывать и отбывать |

43. Give situations from the text in which the following are used:

possible natural gas crisis	growth in demand of gas
tough infrastructure problems	high capital spending

44. Guided summary. Use the sentences from Text 11D to complete this paragraph. You are free to make any changes:

First of all ... Then ... It should be noted that That's why ... But ... Of course ... It is interesting to mention

45. Read the following text and render it according to the following scheme:

- the title of the text is ...
- the text tells/ runs about .../ the main/central idea is .../in brief .../to put it in a few words .../ the aim of the article/text is to tell the reader about...
- according to the text...
- to all appearances (по всей видимости)...
- then I'm going to add...
- I want to point out the following facts that were new to me...
- in conclusion I'd like to say...
- I like...because.../ I dislike...because...

MARKET WATCH: Energy prices climb for second straight session

Feb-20-2006

by Sam Fletcher

from Madison Energy Advisors

HOUSTON, Feb. 20 – Energy prices continued to climb Feb. 17, ahead of the long Presidents' Day holiday weekend in the US, as Venezuelan President Hugo Chavez again threatened to cut off crude supplies if the US government were to "cross the line" in its relations with Venezuela. Venezuela is the fifth largest oil exporter and supplies about 15% of US energy imports via Citgo Petroleum Corp., the Houston-based subsidiary of Petroleos de Venezuela SA.

Venezuela recently expelled a US naval attache accused of spying, and Washington sent home a Venezuelan diplomat. Last week, US Sec. of State Condoleezza Rice said the Bush administration wants to curb Chavez's influence with other Latin American countries. Meanwhile, militants holding nine foreign hostages in southern Nigeria claimed Feb 20 they attacked another oil facility and blew up a military vessel (OGJ Online, Feb. 20, 2006).

The March contract for benchmark US light, sweet crudes rebounded to \$60/bbl in intraday trading Feb. 17 on the New York Mercantile Exchange before closing at \$59.88/bbl, up by \$1.42 for the day. The April contract gained \$1.16 to \$61.29/bbl. On the US spot market, West Texas Intermediate at Cushing, Okla., was up by \$1.42 to \$59.89/bbl.

Gasoline for March delivery bumped up by 9.02¢ to \$1.50/gal on NYMEX. Heating oil for the same month increased by 3.21¢ to \$1.66/gal. The March natural gas contract rose by 4.8¢ to \$7.18/MMbtu. In London, the April contract for North Sea Brent crude increased by \$1.10 to \$59.89/bbl on the International Petroleum Exchange. Gas oil for March gained \$11.25 to \$527.25/tonne. The average price for the Organization of Petroleum Exporting Countries' basket of 11 benchmark crudes was up by 75¢ to \$54.37/bbl on Feb. 17.

CONVERSATIONAL PRACTICE

46. Speak about situations concerning oil and gas production /transportation in the world using the Active Vocabulary and the expressions below:

- | | |
|--|---|
| ▪ I think we should ... | ▪ It would be better to ... |
| ▪ I (don't) agree | ▪ I like .../ I quite like .../ I really like ... |
| ▪ I (don't) think it's a good idea to ... | ▪ It is important to ... |
| ▪ A good way to ... is to ... /The best way to ... is to ... | ▪ I don't mind ... |

47. Read the information about oil use. Add the facts about the use of oil which you know. Discuss them with your partner.

Oil Use

As a fuel, oil is used primarily in the form of gasoline and diesel to power vehicles. Thus it is the source of our mobility.

Almost all cars, trucks, buses, boats, trains and planes run on oil. Significant amounts are also used to power portable devices and stationery engines.

THE MEMORANDUM



48 Read and translate the sample memorandum below in order to learn how to compose one:

MEMORANDUM

TO: Assistant Secretary – Land and Minerals Management

THROUGH: (*Name*)

Assistant Secretary – Water and Science

FROM: (*Name*)

Director, U.S. Geological Survey

SUBJECT: Memorandum Addressed to an Assistant Secretary (other than Water and Science)

Correspondence addressed to assistant secretaries other than our Assistant Secretary for Water and Science (AS/WS) should be routed through AS/WS. Correspondence directed to other departmental bureau

heads that is of a technical or routine nature need not be routed through AS/WS, but rather should be sent directly to those bureaus with copies to AS/WS when appropriate.

Omit the sender's reference ("In Reply Refer To:" block), as the Department does not want any correspondence requiring a secretarial signature, concurrence, or approval to contain this reference. Because this memorandum requires the signature of the Assistant Secretary on the "Through:" line, we have omitted the "In Reply Refer To:" block.

We have included "U.S. Geological Survey" (USGS) on the "From:" line of this memorandum, since it is addressed to an office outside the USGS. Should the "Through:" line have included additional addressee(s), "Assistant Secretary – Water and Science" would have been typed below the other addressee(s).

Attachment

(Type on file copies only)

cc: Sec Surname (Yellow letterhead with copy of incoming and attachment)

ES (White letterhead – xerox, with copy of incoming and attachment)

AS/WS (White letterhead – xerox, with copy of incoming and attachment)

Director's File – MS 114 (White letterhead – xerox with copy of incoming and attachment)

Director's Chron – MS 114 (White letterhead – xerox w/o copy of incoming and attachment)

Official File – MS xxx (Letterhead – xerox with copy of incoming and attachment)

Other File Copies (as appropriate)

USGS: Water: DTWilliams: cls: 8/12/2xxx: (703)648-xxxx: ACCN#2001xxxx: file name

49. Here is the sample of memorandum. Look through it in order to compose your own:

MEMORANDUM

DATE:

TO: Linda A. Suydam, D.P.A.
Senior Associate Commissioner
Food and Drug Administration

THROUGH: Jenny Slaughter
Team Leader, Ethics Staff
Division of Management Programmes, OHRMS

FROM: John Treacy
Director, Advisors and Consultants Staff
Center for Drug Evaluation and Research

SUBJECT: Conflict of Interest Waiver for Michael Smith, M.D.

I am writing to request a waiver for Michael Smith, M.D., a member of the Antiviral Drugs Advisory Committee, from the conflict of interest prohibitions of 18 U.S.C. section 208(a). Waivers under section 208(b)(3) may be granted by the appointing official where “the need for the individual’s services outweighs the potential for a conflict of interest created by the financial interest involved” and where the individual has made a disclosure of the financial interests at issue. We have determined that you are the appointing official for purposes of section 208. Therefore, you have the authority to grant Dr. Smith a waiver under section 208(b)(3).

Section 208(a) prohibits Federal executive branch employees, including special Government employees.

CONCURRENCE:

Jenny Slaughter Team Leader, Ethics Staff Division of Management Programmes, OHRMS	Date
--	------

DECISION:

Waiver granted based on my determination, made in accordance with section 208(b)(3), that the need for the individual’s services outweighs the potential for a conflict of interest created by the

_____ Waiver denied.

Linda A. Suydam, D.P.A. Senior Associate Commissioner Food and Drug Administration	Date
--	------



WRITING PRACTICE

50. Write a Memorandum according to the scheme:

TO:
FROM:
DATE:
RE:
STATUTES INVOLVED:
QUESTIONS PRESENTED:
STATEMENT OF FACTS:
DISCUSSION:
CONCLUSION:

51. Read the following text carefully in order to discover the main line of thought and make a plan for writing a short summary:

Gas processing equipment, whether in the field or at processing/treatment plants, assures that these tariff requirements can be met. While in most cases processing facilities extract contaminants and heavy hydrocarbons from the gas stream, in some cases they instead blend some heavy hydrocarbons into the gas stream in order to bring it within acceptable Btu* levels.

For instance, in some areas coalbed methane production falls below the pipeline's Btu standard, in which case a blend of higher btu-content natural gas or a propane-air mixture is injected to enrich its heat content (Btu) prior to delivery to the pipeline. In other instances, such as at LNG import facilities where the heat content of the regasified gas may be too high for pipeline receipt, vaporized nitrogen may be injected into the natural gas stream to lower its Btu content.

In recent years, as natural gas pricing has transitioned from a volume basis (per thousand cubic feet) to a heat-content basis (per million Btu), producers have tended, for economic reasons, to increase the Btu content of the gas delivered into the pipeline grid while decreasing the amount of natural gas liquids extracted from the natural gas stream.

Notes on the text

Btu – British thermal unit – британская тепловая единица

UNIT 12

Pre-Text Exercises

Word Building

Active Vocabulary

Text 12 A. *Water Pollution*

Text 12 B. *Water Distribution*

Text 12 C. *Water Purification*

Text 12 D. *Freezing Salt Water to Produce Fresh Water*

Text and Vocabulary Exercises

Conversational Practice

The Memorandum

Writing Practice

PRE-TEXT EXERCISES

1. Look at the following international words, guess their meaning and check the pronunciation:

Ocean, organism, toxic chemicals, defect, category, pesticides, herbicides, absorb, plankton, reproductive problems, nitrates, syndrome

2. Fill in the gaps with the correct prepositions:

1. We cannot give the answer at once. We must think it ____.
2. Where do you see him? ____ there, in the distance.
3. If you wake me ____ early I'll be grateful to you.
4. This man seemed very familiar ____ me but I couldn't recall him.
5. I subscribed ____ 'The Times' last week.
6. She filled the glass ____ cold milk and drank it.
7. My house is ____ repair and we live in this hotel.
8. It goes ____ saying that she cooks meals.
9. Look at this dress. It is ____ fashion and looks awful.
10. She apologized ____ him for stepping on his toe.

3. Explain the meaning of the following words and phrases in English:

underground water; living things; harmful microorganisms; drinking water; polluted water; to be poisonous; distillation; to purify water

4. Fill in the gaps with the suitable word to complete the sentences:

1. Fresh water is an ____ ingredient of modern life.
essential *accidental* *unessential* *immaterial*

2. In some countries where rain water is scarce, desalinated sea water is the main source of ____ water.

poisonous drinking detrimental unhealthy

3. Any extraction process that ____ water must separate water molecules from contaminating liquids, solids, or gases.

pollutes stains purifies soils

4. The major water pollutants are chemical, biological, or physical materials that ____ water quality.

improve ameliorate make better degrade

5. The world's ocean destruction is the result of man's ____ interaction with nature.

careful cautious careless solicitous

5. BRAINSTORMING. What is your understanding of the words below? Give examples:

- Water pollution ▪ Chemical materials
- Petroleum products ▪ Pesticides and herbicides

WORD BUILDING

6. Make nouns from the following verbs by adding the suffixes:

to contain	to require	to survive	to pollute
to manufacture	to produce	to collect	to concentrate
to contaminate	to estimate	to separate	to extract
to purify	to condense	to move	to present

7. Guess the meaning of the words in bold type:

Harm – **harmful** – **harmless**; pollute – **pollution**; safe – **unsafe**; ill – **illness**; lubricate – **lubrication**; accident – **accidental**; poison – **poisonous**; wanted – **unwanted**; protect – **protection**; fertilize – **fertilizer**; nature – **natural**; new – **newly**; evaporate – **evaporation**; saturate – **saturation**

8. Define to what parts of speech the following words belong and translate them. Define which words in the list are complex words:

Poisonous; addition; harmful; polychlorinated; biphenyl; unwanted; suburban; rainwater; runoff; lavishly; biodegradable; nonbiodegradable; dangerous; dichlorodiphenyltrichloroethane; concentration; biomagnification; reproductive; widespread; agricultural; environmental;

protection; fertilizer; runoff; coincidence; centrifugal; cylindrical; impeller; outward; turnstile; inward; high-pressure; incompressible; necessarily; conservation; cross-section; downhill; abruptly; imbalance; one-way; measurement; arrangement; downstream; gravitational; atmospheric; downward; impure; extraction; purify; distillation; chemical; mixture; discharge; definition; unpermitted; disordered; unfrozen; imperfection; desalination

ACTIVE VOCABULARY

9. Read and memorize the following words and word combinations:

to absorb – поглощать

to affect – подвергать физическому воздействию, поражать;

affected area – пораженная площадь

to apply – применять, использовать

to conserve – охранять, сберегать, сохранять

to contain – содержать

to contaminate – загрязнять

to consume – потреблять

to degrade – ухудшать, деградировать

to derive (from) – получать, извлекать

to estimate – оценивать

exposure – подвержение какому-л. воздействию

harmful – вредный, опасный

to harvest – пожинать плоды, расплачиваться

hazard – риск, опасность

impeller – рабочее колесо (турбины)

to ingest – глотать, проглатывать

lavish – щедрый, богатый

poisonous – ядовитый, вредный

pump – насос

to pollute – загрязнять

to purify – очищать; освобождать от примесей

quality – качество

to require – требовать

runoff – сток; объем стока

severe – тяжелый, серьезный

to suffer – страдать;

испытывать, претерпевать

well – водоем, скважина

10. Read and translate the text below concentrating on the problems of water pollution:

Text 12 A Water Pollution

Water is necessary to life on earth. All organisms contain it; some live in it; some drink it. Plants and animals require water that is moderately pure, and they cannot survive if their water is loaded with toxic chemicals or harmful microorganisms. If severe, water pollution can kill large numbers of fish, birds, and other animals, in some cases killing all members of a species in an affected area. Pollution makes streams, lakes, and coastal waters unpleasant to look at, to smell, and to swim in. Fish and

shellfish harvested from polluted waters may be unsafe to eat. People who ingest polluted water can become ill, and, with prolonged exposure, may develop cancers or bear children with birth defects. The major water pollutants are chemical, biological, or physical materials that degrade water quality. Pollutants can be classed into eight categories, each of which presents its own set of hazards.

Oil and chemicals derived from oil are used for fuel, lubrication, plastics manufacturing, and many other purposes. These petroleum products get into water mainly by means of accidental spills from ships, tanker trucks, pipelines, and leaky underground storage tanks. Many petroleum products are poisonous if ingested by animals, and spilled oil damages the feathers of birds or the fur of animals, often causing death. In addition, spilled oil may be contaminated with other harmful substances, such as polychlorinated biphenyls (PCBs).

Chemicals used to kill unwanted animals and plants, for instance on farms or in suburban yards, may be collected by rainwater runoff and carried into streams, especially if these substances are applied too lavishly. Some of these chemicals are biodegradable and quickly decay into harmless or less harmful forms, while others are nonbiodegradable and remain dangerous for a long time. When animals consume plants that have been treated with certain nonbiodegradable chemicals, such as chlordane and dichlorodiphenyltrichloroethane (DDT), these chemicals are absorbed into the tissues or organs of the animals. When other animals feed on these contaminated animals, the chemicals are passed up the food chain.

With each step up the food chain, the concentration of the pollutant increases. This process is called biomagnification. In one study, DDT levels in ospreys (a family of fish-eating birds) were found to be 10 to 50 times higher than in the fish that they ate, 600 times the level in the plankton that the fish ate, and 10 million times higher than in the water. Animals at the top of food chains may, as a result of these chemical concentrations, suffer cancers, reproductive problems, and death.

Many drinking water supplies are contaminated with pesticides from widespread agricultural use. More than 14 million Americans drink water contaminated with pesticides, and the Environmental Protection Agency (EPA) estimates that 10 percent of wells contain pesticides. Nitrates, a pollutant often derived from fertilizer runoff, can cause methemoglobinemia in infants, a potentially lethal form of anemia that is also called blue baby syndrome.

TEXT AND VOCABULARY EXERCISES



11. Find in the text the words or phrases which mean the same as:

- | | |
|----------------------------|--------------------|
| ▪ загрязнение рек, озер | ▪ вредные вещества |
| ▪ умеренно | ▪ посредством |
| ▪ протекающий | ▪ дождевая вода |
| ▪ распадаться, разлагаться | ▪ колодец |

12. Find in the text the synonyms to the following words:

- | | |
|-----------------|--------------------|
| ▪ hazardous | ▪ need |
| ▪ great numbers | ▪ to be sick |
| ▪ principal | ▪ water pollutant |
| ▪ groups | ▪ with the help of |

13. Find in the text the antonyms to the following words:

- | | |
|-------------------|------------|
| ▪ unnecessary | ▪ harmless |
| ▪ dirty | ▪ pleasant |
| ▪ wanted, desired | ▪ slowly |

14. Give Russian equivalents to the following word combinations:

To be necessary to life; toxic chemicals; affected area; to be unpleasant to look at; to be unsafe to eat; to be used for fuel; harmful substances; food chain; concentration of the pollutant; reproductive problems; agricultural use

15. Choose among the words in parentheses the one that corresponds to the text above to complete the sentences:

1. Water is ____ to life on earth.
(a. *urgent*; b. *important*; c. *necessary*)
2. Plants and animals ____ water that is moderately pure.
(a. *take*; b. *want*; c. *require*)
3. If severe, water pollution can kill large ____ of fish, birds, and animals.
(a. *numbers*; b. *quality*; c. *figures*)
4. The major water pollutants are chemical, biological, or physical materials that ____ water quality.
(a. *improve*; b. *degrade*; c. *upgrade*)
5. Oil and ____ derived from oil are used for fuel, lubrication, plastics manufacturing, and many other purposes.
(a. *substances*; b. *matter*; c. *chemicals*)

6. Many petroleum products are ____ if ingested by animals.
(a. *poisonous*; b. *necessary*; c. *useful*)
7. Many drinking water supplies are ____ with pesticides from widespread agricultural use.
(a. *contained*; b. *included*; c. *contaminated*)
8. Nitrates can cause methemoglobinemia in ____.
(a. *adults*; b. *infants*; c. *grown ups*)

16. Read text 12A once more. In pairs, discuss the statements below. Say what you think about them and ask your partner if he/she agrees or disagrees with you. Use the following phrases to help you:

<i>Agreeing</i>	<i>Disagreeing politely</i>
I agree with you.	Yes, but don't you think...?
Yes, that is what I think too.	True, but I think...
You are right!	I see what you mean, but...

- All organisms contain water, some live in it, some drink it.
- Plants and animals can survive if their water is loaded with toxic chemicals or harmful microorganisms.
- Pollution makes streams, lakes, and coastal waters unpleasant to look at, to smell, and to swim in.
- The major water pollutants degrade water quality.
- Many petroleum products are poisonous if ingested by animals.
- Some of the chemicals are biodegradable, while others are nonbiodegradable and remain dangerous for a short time.
- When the concentration of the pollutant increases this process is called biomagnification.
- More than 10 million Americans drink water contaminated with pesticides.
- Nitrates can cause a potentially lethal form of anemia that is also called blue baby syndrome.

17. Divide text 12A into logical parts and give each a suitable title.

18. Fill in the gaps with the words from the box:

food	life-ensuring	need	dependent	civilizations	adopt	components
------	---------------	------	-----------	---------------	-------	------------

Water is one of the crucial **1** ____ regulating human life and survival. Regions with either complete absence or threatening abundance of water have obliged men **2** ____ to this challenging environment and fight against acidity or flood. It is no coincidence that exactly in the cradles of the big rivers the first large agricultural **3** ____ have grown out of this challenging.

People were 4 ____ on the river waters to survive. The human 5 ____ for water is universal. Rivers are indispensable, 6 ____ natural elements. The river provides 7 ____, essential quantities of water and the possibility to travel.

Check your answers on p. 280.

19. Work in pairs, make as many questions as possible to review the contents of the text below and ask each other:

How did Our Water Get So Dirty?

In 1972, the United States legislature passed the Clean Water Act due to a crisis in the nation's water purity. The purpose of the act was to restore the chemical, biological, and physical nature of our nation's waterways that had been so damaged by pollution. The goal of the act was that, by 1985, no more pollutants would be discharged into the water supply and all of our nation's rivers, streams, and lakes would be fishable and swimmable once more.

Every city was required to install a water treatment plant, and every industry was required to use the best available technology to limit the amount of pollutants that entered water sources. Under these stringent demands, water quality began to improve slightly. Still, almost two decades after the year of supposed goal fulfillment, about a third of the nation's waterways continue to be polluted.

There is no doubt that industrial sites have cleaned up their act. They would no longer be in business today if they had not. So, why is our nation's water still so dirty? The answer is very simple. Water follows a natural cycle. It moves from the rain to the mountaintops, through streams and rivers to the sea, and then to the clouds once more.

In the United States, the natural water cycle has been changed in a number of ways. Through dredging, damming, and tampering with or eliminating the ecological niches where water is able to clean itself, we have changed the pathways that water takes through the American landscape, greatly benefiting agriculture and the American economy. In the long run, we have ended up with dirty, impure water. Water treatment remains as the best available technology we have to rectify this problem.

20. Render the following text into Russian and think of a suitable title for it:

The Clean Water Act operates from a baseline prohibition: all discharges of any pollutant by any person into the waters of the United States are illegal. Therefore, all point sources must obtain a permit through

the National Pollution Discharge Elimination System (NPDES) before discharging pollutants into water bodies. A point source is considered “any discernible, confined, or discrete conveyance”. While a typical example of a point source is a discharge pipe, the definition of point source has been interpreted broadly to cover ditches, erosion channels, gullies or even humans. A pollutant is defined as “dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water”. All unpermitted discharges constitute a violation of the Act and are subject to civil and criminal penalties.

21. Consult the TEXTS FOR SUPPLEMENTARY READING and learn about water treatment in the middle ages (Text 45) and about a great discovery in water filtration history (Text 46). Be ready to discuss the information you have read.

22. Read the text below to find answers to the given questions.

Text 12 B
Water Distribution

How does standard water pump work?

The water pumps in most cars are centrifugal pumps. These pumps work by spinning water around in a circle inside cylindrical pump housing. The pump makes the water spin by pushing it with an impeller. The blades of this impeller project outward from an axle like the arms of turnstile and, as the impeller spins, the water spins with it. As the water spins, the pressure near the outer edge of the pump housing becomes much higher than near the center of the impeller. There are many ways to understand this rise in pressure, and here is one of them:

You can view the water between the impeller blades as an object travelling in a circle. Objects don't naturally travel in a circle – they need an inward force to cause them to accelerate inward as they spin. Without such an inward force, an object will travel in a straight line and won't complete the circle. In a centrifugal pump, that inward force is provided by high-pressure water near the outer edge of the pump housing.

The water at the edge of the pump pushes inward on the water between the impeller blades and makes it possible for that water to travel in a circle. The water pressure at the edge of the turning impeller rises until it's able to keep water circling with the impeller blades.

Why do faster moving fluids have lower pressure?

Actually, faster moving fluids don't necessarily have lower pressure. For example, a bottle of compressed air in the back of a pickup truck is still high-pressure air, even though it's moving fast. The real issue here is that when fluid speeds up in passing through stationary obstacles, its pressure drops. For example, when air rushes into the open but stationary mouth of a vacuum cleaner, that air experiences not only a rise in speed, it also experiences a drop in pressure.

Similarly, when water rushes out of the nozzle of a hose, its speed increases and its pressure drops. This is simply conservation of energy: as the fluid gains kinetic energy, it must lose pressure energy. However, if there are sources of energy around – fans, pumps, or moving surfaces – then these exchanges of pressure for speed may no longer be present.

How can the volume of water passing through a weir be determined?

If the speed of the water were uniform as it passes through the opening, you could measure that speed and multiply it by the cross-section of the weir to obtain the volume of water passing through the weir each second. However, since the flow is faster near the center of the flow, it's difficult to calculate the volume flowing each second. Your best bet is probably to divide the opening into a number of regions and then to measure the water's velocity at the center of each region. Multiply each velocity by the cross-sectional area of that region and then sum up all the products to obtain the overall volume flow per second.

How does gravity powered water pump work?

While there are many possible designs for a pump, the classic version used a phenomenon called “water hammer” to lift water upward. In this technique, a column of water is allowed to accelerate downhill through a pipe until it's flowing at a good speed through the pipe.

The pump then closes a valve at the lower end of the pipe, so that the water has to stop abruptly. Since water accelerates in response to imbalances in pressure, the stopping process involves an enormous pressure surge at the lower end of the moving water column. A one-way valve at the lower end of the pipe opens during this pressure surge and allows a small fraction of the water to escape from the pipe.

The escaping water rises upward through a second pipe for delivery to a home or business. The escaping water actually enters a head tank that is normally filled with air and thus compresses that air.

The compressed air is then used to push water through the pump's outlet and provide the pumping action. This pumping scheme is apparently called a “hydraulic ram”. The only trick to operating such a pump is opening and closing the valve at the lower end of the first pipe.

This valve must open long enough for the water in the pipe to reach good speed and then it must close very suddenly to provide the pressure surge that lifts the small amount of water upward for delivery.

How does a turbine flow meter work?

There are many different types of flow meters; some specialized to handling gases and others to handling liquids. In each case, a true flow meter transfers gas from its inlet to its outlet one unit of volume at a time and it measures how many of those volumes it transfers.

There are also some flow rate meters that measure how quickly a gas or liquid is flowing. These devices normally use turbines to measure the speed of the passing fluid and measurements from these flow rate meters can be integrated over time to determine how much gas or liquid has passed through them. However, because flow rate meters don't measure each volume of gas directly, they aren't as accurate as true flow meters.

The most common of a turbine flow meter is a device that's half filled with liquid. The "turbine" is actually a set of blades that spin in a vertical plane and spend half their times immersed in the liquid. When one of the turning blades emerges from the liquid, the empty space that appears beneath it is allowed to fill with the gas being measured.

This gas flows in from the meter's inlet. Soon another blade begins to emerge from the liquid and a volume of gas is then trapped between the first blade and the second blade. Once the blades have turned almost half a turn, the first one begins to submerge again in the liquid.

The gas that was trapped between it and the next blade is then squeezed out from between those blades by the liquid and flows out the meter's outlet. A geared arrangement measures how many turns the blades make and therefore how many volumes of gas have been transferred from the meter's inlet to its outlet.

Why is there a relationship between speed and pressure? What is that relation? Why are speed and pressure inversely related?

When a fluid is flowing smoothly and steadily through a stationary environment, its energy is conserved. As long as it doesn't lose much energy to frictional effects, you can count on its total energy remaining essentially constant as it flows downstream.

Since it only has three forms for its energy: gravitational potential energy, pressure potential energy, and kinetic energy, you can expect that a decrease in one of these forms of energy will be accompanied by an increase in one of the other forms. That's when speed and pressure are inversely related. When the fluid slows down, its kinetic energy drops so its pressure potential energy (and its pressure) must rise.

TEXT AND VOCABULARY EXERCISES



23. Find in the text the words or phrases which mean the same as:

- | | |
|---|-----------------------------|
| ■ центробежный насос | ■ импеллер, крыльчатка |
| ■ лопасть, лопатка | ■ высокое и низкое давление |
| ■ объем воды | ■ водослив |
| ■ гидравлический удар | ■ точные водомеры |
| ■ осаждение | ■ равновесие, баланс |
| ■ взаимосвязь между скоростью и давлением | |

24. Make up situations using the English equivalents of the words given above.

25. Give Russian equivalents to the following word combinations:

Water pumps; spinning water; the blades of the impeller; to rise in pressure; centrifugal pump; to make possible; compressed air; water hammer; empty space; pumping action; turning blades; to provide the pressure surge; stationary environment

26. Work in pairs and decide whether these statements are true or false:

1. The water pumps in most cars are cylindrical ones.
2. As the water spins, the pressure near the outer edge of the pump housing becomes much higher than that near the center of the impeller.
3. You can also view the water as a compressible fluid, one that doesn't obey Bernoulli's equation.
4. Actually, faster moving fluids don't necessarily have higher pressure.
5. Since the flow is faster near the center of the flow, it is difficult to calculate the volume flowing each second.
6. When a column of water is allowed to accelerate downhill through a pipe until it's flowing at a good speed through the pipe, it then closes a valve at the lower end of the pipe, so that the water has to stop abruptly.
7. When the compressed air is then used to push water through the pump's outlet and provide the pumping action, this pumping scheme is called a "hydraulic ram".
8. When a fluid is flowing smoothly and steadily through a stationary environment, its energy is concerned.
9. When the fluid slows down, its kinetic energy does not drop so its pressure potential energy (and its pressure) must drop too.
10. As the water column inside the pipe grows taller, a new problem appears: gravity.

11. If water speeds up during its flow, the water's pressure or height or both must decrease.

27. Fill in the gaps with the prepositions/conjunctions from the box:

by in into at around between if

When you draw water up through a pipe (or straw) ____ removing the air inside that pipe, you are allowing the atmospheric pressure ____ the water to push the water up the pipe. The water experiences a pressure imbalance ____ the pressure around it (atmospheric pressure) and the pressure ____ the pipe (less than atmospheric pressure), so it accelerates ____ the pipe. But as the water column inside the pipe grows taller, a new problem appears: gravity. The water's weight pushes downward and begins to oppose the pressure imbalance. ____ a certain height, the two effects balance and the water stops accelerating upward. When the water's height reaches 10 m, atmospheric pressure can't overcome this weight problem, even ____ all the air has been removed from the pipe.

28. Work in pairs, make as many questions as possible to review the contents of the text below and ask each other:

History of Drinking Water Treatment

Humans have been storing and distributing water for centuries. Before, when people lived as hunters/collectors, river water was applied for drinking water purposes. When people permanently stayed in one place for a long period of time, this was usually near a river or lake. When there were no rivers or lakes in an area, people used groundwater for drinking water purposes. This was pumped up through wells. When the human population started growing extensively, the water supply was no longer sufficient. Drinking water needed to be extracted from a different source.

About 7000 years ago, Jericho stored water in wells that were used as sources. People also started to develop drinking water transport systems. The transport took place through simple channels, dug in the sand or in rocks. Later on one also started using hollow tubes. Egypt used hollow palm trees and China and Japan used bamboo strunks. Eventually one started using clay, wood and even metal.

In Perzia people searched for underground rivers and lakes. The water went through holes in rocks into the wells on the plains.

Around 3000 B.C., the city of Mohenjo-Daro (Pakistan) used a very extensive water supply. In this city there were public bathing facilities with water boiler installations and bathrooms.

In ancient Greece spring water, well water, and rainwater were used very early on. Because of a fast increase in urban population, Greece was

forced to store water in wells and transport it to the people through a distribution network. The water that was used was carried away through sewers, along with the rainwater. When valleys were reached, the water was lead through hills under pressure. The Greek were among the first to gain an interest in water quality. They used aeration basins for water purification. The Romans were the greatest architects and constuctors of water distribution networks in history. They used river, spring or groundwater for provisioning. The Romans built dams in rivers, causing lakes to form. The lake water was aerated and then supplied. Mountain water was the most popular type of water, because of its quality. For water transport the aquaducts were built. Through these aquaducts water was transported for tens of miles. Plumbing in the city was made of concrete, rock, bronze, silver, wood or lead. Water winnings were protected from foreign pollutants.

After the fall of the Roman Empire, the aquaducts were no longer used. From 500 to 1500 A.D. there was little development in the water treatment area. In the Middle Ages countless cities were manifested. In these cities wooden plumbing was used. The water was extracted from rivers or wells, or from outside the city. Soon, circumstances became highly unhygenic, because waste and excrements were discharged into the water. People that drank this water fell ill and often died. To solve the problem people started drinking water from outside the city, where rivers were unpolluted. This water was carried to the city by so-called water-bearers.

The first drinking water supply that supplied an entire city was built in Paisley, Scotland in 1804 by John Gibb, in order to supply his bleachery and the entire city with water. Within three years, filtered water was transported to Glasgow. In 1806 Paris operated a large water treatment plant. The water settled for 12 hours, before it was filtered. Filters consisted of sand and charcoal were replaced every six hours.

In 1827, the Englishman James Simpson built a sand filter for drinking water purification. Today, we still call this the number one tribute to public health.

29. Consult the TEXTS FOR SUPPLEMENTARY READING and learn about early attempts to find or get clean water (Text 47). Be ready to discuss the information you have read.

30. Read the text and give its brief summary:

Text 12 C

Water Purification

Fresh water is an essential ingredient of modern life. Though it's often available as the result of natural processes, there are times when it must be extracted from impure water, typically salt water. In some countries where rain water is scarce, desalinated sea water is the main source of drinking water. Any extraction process that purifies water must separate water molecules from contaminating liquids, solids, or gases. You can purify water in your own kitchen. If you boil salt water in a pot, you'll create steam and will see mist forming above the water as that steam condenses into water droplets in the air. If you place a cold surface in the steam, the steam will condense on that surface. The condensed steam is nearly pure water – distilled water. While the water in the pot contained salt, the distilled water does not. However, before you taste the distilled water, make sure that the water in the pot contained only non-toxic additives. Distillation isn't perfect at removing contaminants and it can even concentrate them in some situations.

One way to purify water is by distillation. Distillation is a general technique for separating various chemicals from one another. The chemicals are heated to form a vapor and that vapor is condensed to form a new mixture of chemicals. Because the various chemicals have different tendencies to form vapors at a particular temperature, the newly formed mixture has a different balance of the chemicals from the original mixture. In some cases, the condensed liquid contains primarily a single chemical – all of the other chemicals are left behind in the original liquid. To understand how distillation can purify water, let's remember the phases of water. At any temperature above absolute zero, there's a possibility of finding gaseous water molecules above the surface of ice or water. These water molecules have acquired enough thermal energy to break free of the solid or liquid and become a gas.

If you place some water in an enclosed container, water molecules will evaporate until there are enough of them in the gas phase that they return to the liquid's surface as often as they leave it. At that point the two phases, liquid and gas, are in phase equilibrium. Although molecules constantly shift back and forth between the two phases, neither phase grows at the expense of the other. Overall, there's no net movement of molecules from one phase to the other.

At this phase equilibrium, the relative humidity is 100% – the water vapor has reached its saturated vapor pressure. But we have forgotten to pay attention to temperature. Since water's vapor pressure depends on temperature, the present balance of gas and liquid in the container is ideal only at its current temperature. If you warm up the container, more water molecules will enter the gas phase and the amount of liquid water will decrease. If you cool down the container, more water molecules will enter

the liquid phase and the amount of gaseous water will decrease. This connection between temperature and vapor pressure is the central principle behind distillation. What happens if there is air inside the container, along with the water and water vapor? Surprisingly, the air doesn't matter. The density of water molecules in the gas phase is the same, whether the air is there or not. This interesting observation makes it possible to perform distillation with or without air around, although air's presence affects the total pressure on the water and thus its boiling temperature.

TEXT AND VOCABULARY EXERCISES



31. Find in the text words or phrases which mean the same as:

- | | |
|---------------------|---------------------------|
| ▪ пресная вода | ▪ опреснение |
| ▪ добавки | ▪ питьевая вода |
| ▪ в фазе равновесия | ▪ зависеть от температуры |
| ▪ связь | ▪ перегонка, дистилляция |

32. Find the correct words in the text above to complete the sentences:

1. Fresh water is an ____ ingredient of modern life.
2. In some countries where rain water is ____, desalinated sea water is the main source of drinking water.
3. The condensed steam is nearly ____ water – distilled water.
4. ____ is a general technique for separating various chemicals from one another.
5. In some cases, the ____ liquid contains primarily a single chemical – all of the other chemicals are left behind in the original liquid.
6. Although molecules constantly shift ____ and ____ between the two phases, neither phase grows at the expense of the other.
7. Since water's vapor pressure ____ on temperature, the present balance of gas and liquid in the container is ideal only at its current temperature.
8. The ____ between temperature and vapor pressure is the central principle behind distillation.
9. The density of water molecules in the ____ phase is the same, whether the air is there or not.
10. This interesting observation ____ it possible to perform distillation with or without air around.

33. Match each word in A with the Russian equivalent in B:

- | A | B |
|----------------|--------------|
| 1. fresh water | a. ПЛОТНОСТЬ |

- | | |
|----------------|----------------------------|
| 2. solids | b. влажность |
| 3. to purify | c. твердые тела |
| 4. to condense | d. достигать, приобретать |
| 5. above | e. выше |
| 6. to acquire | f. конденсировать, сгущать |
| 7. humidity | g. очищать |
| 8. density | h. пресная вода |

34. Render Text 12C using the expressions below:

- The aim of this text is to ...
- It is based on ...
- This text is intended to ...
- This text looks at/describes ...
- According to ...
- In the words of ...
- In general / On the whole / In the main
- Interestingly/Curiously/Strangely /Surprisingly/It is interesting that ...
- To sum up / To summarize /In short

35. Fill in the gaps with the words from the box:

friendly accidents skills rational conservation responsible

The problems of the **1** ____ use of natural resources, energy **2** ____, and protection of the environment, prevention of technological **3** ____, and risk management all require the active participation of engineers, with their particular knowledge and **4** ____.

So the goal of engineering education must be to train specialists within a holistic life paradigm, so that they can be **5** ____ citizens. The special role of engineer should be mentioned, because environmentally **6** ____ technologies and green chemistry could provide real help in the transition to sustainability.

Check your answers on p. 280.

36. Work in pairs, make as many questions as possible to review the contents of the text below and ask each other:

History of Drinking Water Disinfection

The link between water quality and health has been known since the early ages. Clear water was considered clean water. Swamp areas were associated with fever.

Disinfection has been applied for centuries. Two basic rules dating back to 2000 B.C. state that water must be exposed to sunlight and filtered with charcoal and that impure water must be purified by boiling the water and then dipping a piece of copper in the water seven times, before filtering the water. Descriptions of ancient civilisations were found about boiling water and water storage in silver jugs. To realize water purification copper, silver and electrolysis were applied.

Disinfection has been applied for several decades. However, the mechanism has been known for only one hundred years.

In 1680 Anthony van Leeuwenhoek developed the microscope. His discovery of microorganisms was considered a curiosity. It took scientists another two hundred years before they started using the microscope to distinguish microorganisms and other pathogens.

The first multiple filter was developed in 1685 by the Italian physician Lu Antonio Porzo. The filter consisted of a settling unit and a sand-filtration unit. In 1746 the French scientist Joseph Amy received the first patent for a filter design, which was applied in households by 1750.

The filters consisted of wool, sponges and charcoal. For the past centuries humans have suffered from diseases such as cholera and the plague. The origin of these diseases was misinterpreted. It was said that the diseases were a divine punishment or were caused by impure air or the alignment of the planets.

In 1854 a cholera epidemic caused many deaths in the city of London. John Snow, an English doctor, discovered that the cholera epidemic was caused by a contaminated water pump. He prevented a spread of the epidemic by closing down the contaminated water pump. After that scientists have performed bacteriological studies to research the development, existence and identification of microorganisms and the removal of microorganisms from drinking water.

In the nineteenth century the effect of disinfectants, such as chlorine, was discovered. Since 1900 disinfectants are largely applied by drinking water companies to prevent the distribution of diseases and to improve water quality.

37. Consult the TEXTS FOR SUPPLEMENTARY READING and learn about the advent of municipal water treatment (Text 48). Be ready to discuss the information you have read.

38. Read the text to learn about producing fresh water by freezing salt water:

Text 12 D

Freezing Salt Water to Produce Fresh Water

Boiling isn't the only change of phase that's used to purify water. The ice that forms when sea water freezes is essentially pure fresh water, a phenomenon that Eskimos have used to obtain potable water for thousands of years. This purification effect results from a balance between energy and disorder. Physical systems tend to minimize their potential energies. For example, a ball tends to roll down hill to minimize its gravitational potential energy. Similarly, a mixture of ice and water tends to minimize its potential energy by excluding contaminants from the ice and leaving them in the water.

Water is disordered already and having solids, liquids, or gases dissolved in it isn't a problem. Ice, on the other hand, is a highly ordered crystal that is seriously disrupted by the presence of dissolved chemicals. The water molecules in an ice crystal pack more neatly and obtain a lower overall potential energy when the ice contains no contaminants.

So a contaminated mixture of water and ice reaches its lowest overall potential energy when all of the contaminants stay in the water and the ice contains only water molecules. As long as the water freezes slowly, the ice crystal it forms will have very little contamination in it and the unfrozen water will end up with a relatively high concentration of contaminants.

By separating pure from impure water, this process reduces the water's disorder so that, to avoid violating the second law of thermodynamics, additional disorder must be created somewhere else.

This additional disorder is created in the low temperature region that freezes the salt water. As the salt water freezes, which it does well below water's ordinary freezing temperature, the salt water releases heat to the low temperature region and introduces considerable disorder into that region. This rise in the low temperature region's entropy more than makes up for any decrease in entropy in the water as it freezes.

However, disorder appears whenever it can and so the ice crystals that form always contain imperfections. Even if there are no impurities around, the crystals will probably have minor defects. These defects include flaws in the stacking of molecules or empty spots in the otherwise orderly arrays of molecules. Truly perfect crystals are extremely hard or even impossible to grow.

When you freeze a bucket of salt water, the ice that forms first contains very little salt. The salt is in the remaining salt water, which becomes more and more concentrated as additional water molecules are

bound up in the ice. By the time there is only a small amount of water remaining, that salt water has a very high concentration of salt and salt crystals begin to form. These salt crystals can easily become trapped in the ice so care must be taken to remove the ice from the concentrated salt solution before salt crystals begin to form. In sea ice, the salt is carried away by the sea water so only pure ice is formed. When you freeze ice cubes, the outer surface freezes first and the impurities become concentrated near the middle of the cube.

One of the main impurities is dissolved air, which eventually comes out of solution and forms tiny air bubbles in the ice. These air bubbles appear as a white cloudy region inside the ice cube. One way to reduce this clouding is to boil the water before you freeze it.

Boiling the water drives most of the air out of solution so that no air bubbles form in the resulting ice. Freezing salt water to form pure ice works best in cold climates where low temperatures are available directly.

Active refrigeration can also freeze salt water to obtain fresh water, but it's expensive. Because of water's latent heat of melting, you must remove a large amount of heat from salt water to freeze it. Although refrigerated water desalination plants have been built, they have proven to be less economical than distillation plants.

TEXT AND VOCABULARY EXERCISES



39. Find in the text the words or phrases which mean the same as:

- | | |
|-----------------------|----------------------------|
| ▪ кипячение | ▪ замораживать |
| ▪ чистая пресная вода | ▪ пригодная для питья вода |
| ▪ загрязненная смесь | ▪ беспорядок |
| ▪ избегать | ▪ примеси |
| ▪ сконцентрированный | ▪ охлаждение |
| ▪ таяние | ▪ удалять |

40. Make up situations using the English equivalents of the words given above.

41. Find in the text the synonyms to the following words:

- | | | | |
|------------|---------------|-------------|-------------|
| ▪ to chill | ▪ to belittle | ▪ important | ▪ useful |
| ▪ clean | ▪ combination | ▪ soundly | ▪ confusion |

42. Find in the text the antonyms to the following words:

- | | | | |
|-------------|---------------|-----------|----------|
| ▪ imbalance | ▪ to maximize | ▪ absence | ▪ higher |
| ▪ order | ▪ impure | ▪ quickly | ▪ frozen |

43. Give Russian equivalents to the following word combinations:

To purify water; pure fresh water; potable water; potential energy; contaminated mixture; unfrozen water; low temperature; freezing temperature; salt water; ice cube; desalination plant; to be less economical

44. Find the correct words in Text 12D to complete the sentences:

1. The ice that forms when sea water ____ is essentially pure fresh water.
2. Purification effect results from a ____ between energy and disorder.
3. As long as the water freezes slowly, the ice crystal it forms will have very little ____ in it.
4. When you freeze a bucket of salt water, the ice that forms first contains very ____ salt.
5. When you freeze ice cubes, the outer surface freezes first and the ____ become concentrated near the middle of the cube.

45. Work with a partner. Take turns to ask and answer questions to text 12D. Use the words and word combinations below:

- | | |
|--------------------------------------|--------------------------------------|
| ▪ boiling | ▪ to purify water |
| ▪ pure fresh water | ▪ to obtain potable water |
| ▪ to minimize the potential energies | ▪ a highly ordered crystal |
| ▪ a contaminated mixture of water | ▪ to separate pure from impure water |
| ▪ to contain imperfections | ▪ impurities |
| ▪ perfect crystals | ▪ hard to grow. |
| ▪ to contain salt | ▪ to freeze |
| ▪ to obtain fresh water | ▪ to be expensive |

46. Fill in the gaps with the prepositions from the box:

from to (2) by (2) of (7) in (7) for (2) into

Water Treatment

____ ancient times ____ the present, water filters have evolved out of necessity, first to remove materials that affect appearance, then to improve bad tastes and finally to remove contaminants that can cause disease and illness. Wells, canals, aqueducts, reservoirs and distribution pipes were built as a community effort to bring water ____ a central supply. These

waterworks were built ____ the Egyptians, Babylonians, Mesopotamians, Persians and Phoenicians centuries before the birth of Christ.

The earliest record ____ the beginnings ____ water treatment is linked to Hippocrates (known as the “Father of Medicine”) ____ the 4th century B.C. He advised boiling water to improve taste and then filtering through a cloth bag. Pliny the Elder (23–79 A.D.), ____ his *Historia Naturalis*, discusses the characteristics ____ potable water. ____ Egypt and China they put alum ____ tubs to clarify the water. ____ 1935, Sir Henry Doulton, ____ the Royal Doulton china company ____ London ____ the UK, invented the ceramic cartridge ____ removing bacteria from water.

In more recent times, treatment ____ water to remove pathogenic organisms began around 1892 after Dr. Robert Koch traced the cholera epidemic in Hamburg, Germany, to its unfiltered water supply. Since 1855, ____ London, England, a parliamentary statute required its water supply to be filtered through slow sand filters. Slow sand filters were introduced ____ the United States around 1870 and a modern rapid-sand filtration plant was built ____ 1902 at Little Falls, NJ. In 1909, liquid chlorine was developed ____ disinfection ____ water supplies.

47. Consult the TEXTS FOR SUPPLEMENTARY READING and learn about the use of chlorine to purify water (Text 49), about water filtration at present (Text 50) and the future of water filtration (Text 51). Be ready to discuss the information you have read.

CONVERSATIONAL PRACTICE

48. Speak about water pollution, water purification and water usage in your own town. Use in your statements the expressions below:

- | | |
|--|---|
| ▪ I (don't) think we should ... | ▪ It would be better to ... |
| ▪ I (don't) agree | ▪ It is important to ... |
| ▪ I (don't) think it's a good idea to ... | ▪ I like .../ I quite like .../ I really like ... |
| ▪ A good way to ... is to ... /The best way to ... is to ... | ▪ I don't mind ... |
| ▪ Well anyway.../ I mean .../ Frankly .../ At least ... | ▪ I've never heard of it. |
| ▪ I/we think it's a mistake to ... | ▪ I haven't read/seen it. |
| ▪ I don't like ... | ▪ I didn't think much of it. |
| ▪ There's nothing wrong in ...ing | ▪ It's not worth it / It's worth ...ing |



WRITING PRACTICE

49. Read and translate the following memorandum.

MEMORANDUM

To: District Maintenance Engineers

Copy: District Directors of Operations, Bill Albaugh

From: Sharon E. Holmes, P.E.

State Maintenance Engineer

Date: December 18, 2005

Re: Asset Management Contracting and Handling of MRP Data

This memo is provided to further clarify the coordination of Maintenance Rating data involving asset management contracts. Items 1–4 were originally included in the previous memo dated May 22, 2005 on Asset Management Contracting.

This information is provided again for your reference. Item 2 has been updated to modify the period for requesting an MRP adjustment to 2 weeks after the end of the rating period. Item 5 has been added, and contains additional details concerning requests to modify MRP data within Asset Management Contracts.

1. Maintenance Rating Programme (Mrp) Administration: For the purposes of administering asset management contracts involving the MRP, the State Maintenance Office (SMO) will provide the Districts with 30 sample sites, or a minimum of 3 sites per mile for systems less than 10 miles in length, per facility type per cost center, for each asset management contract during the MRP rating period.

This will ensure a more reasonable number of samples to evaluate contractor maintenance efforts. The SMO will supplement the MRP samples generated naturally by the MRP programme in order to obtain 30 samples, or a minimum of 3 sites per mile, per facility type per cost center, for each asset management contract. The naturally generated MRP samples will be included in the unit, district and statewide MRP rating.

The supplemental samples will only be used for contract administration purposes. The State Maintenance Office has updated the MRP procedure to provide for the distribution of MRP samples during the rating period, in order to make the time allowed for MRP sample evaluation commensurate with the number of samples to be evaluated.

In addition, a Quality Assurance Review of each MRP team (including contract teams) by the State Maintenance Office will be

required annually. Compliance with the updated procedure is a requirement of all existing and future asset management contracts.

2. Mrp Quality Assurance by the District: The Districts have the contractual authority to perform an independent MRP within the contract limits. The District must invite the contractor to observe the quality assurance review, in order to improve the overall consistency and coordination between the District and the contractor MRP teams.

The asset management contract allows the District to adjust the contractor's MRP rating to the District determined MRP rating, plus 2 points. This adjustment can be made to the characteristic, element and/or overall MRP, as warranted. Any District adjustment to the MRP must be provided to the State Maintenance Office for inclusion within the Statewide MRP within 2 weeks after the end of the MRP rating period.

From time to time, the District may perform an informal review of field conditions to get a sense of what is actually happening on the job. The District may perform this review independently, but if problems or concerns are suspected or found, the District must notify the Contractor as soon as possible and invite the contractor to jointly review field conditions, in order to resolve the concerns, and improve the overall consistency and coordination between the District and the contractor.

3. Mrp and Contract Performance Assessment: There will be instances when the quantity of any individual characteristic existing within the samples for a facility type may fall below 10, making a fair and reasonable determination of contractor performance using only the MRP difficult. Prior to assessing contract penalties, when this occurs, the District must attempt to increase the sample size to a minimum of 10 sites containing that characteristic, for each facility type.

If a minimum of 10 sites cannot be identified within the facility type, an on-site review of all existing sites must be conducted. The District must invite the Contractor to participate in an on-site review to assess the overall maintenance condition of the characteristic, taking into consideration evidence of contractor activity to maintain the system, and other conditions including weather, impact and sensitivity to adjacent property owners, remaining useful life of the characteristic, etc.

The District may reduce or eliminate a penalty based upon sound engineering judgement, to be fair and reasonable. When this occurs, the District must document the circumstances and outcome of the review to the Contractor, and retain all documentation within the contract file.

4. Retainage and Penalties: The MRP is a useful tool for evaluating performance, and administering asset management contracts. When used to assess retainage and penalties, the District must ensure that the action is fair and reasonable. Since penalties are calculated based upon the point

deficiency of an individual characteristic, element or overall MRP rating, an item having a small number of samples, or a characteristic of less relative significance, can result in an excessive penalty.

The Districts are authorized, and responsible for ensuring that any penalty assessed is fair and reasonable. The reasonableness of any punitive action must be reviewed by the District and discussed with the Contractor. The District must document the reasonableness of punitive action, and retain all documentation within the contract file.

5. District Request to Modify Mrp Data: Any request to modify the MRP data for samples located within an asset management contract must meet the following criteria:

a. The District Maintenance Engineer responsible for the geographic area in which the affected sample resides must send a written request to adjust the MRP data to the State Maintenance Engineer, with a copy to the DOT Contract Administrator.

b. Any request to modify MRP data must be received by the State Maintenance Engineer within two weeks after the end of the MRP period.

c. The request to modify MRP data must include justification for the change, including details regarding the Asset Management Monitoring Plan results and documentation that items 1–4 above have been completed, including coordination with the Asset Management Contractor.

d. Modifications to the MRP data are not desirable. It is the intent of this memo, and the previous memo dated May 22, 2005 to eliminate the need for MRP modifications by insuring uniform and consistent results through close coordination with the Asset Management Contractor as described in items 1–4 above, along with the Asset Management Monitoring Plan.

50. Write your samples of memorandum on various professional themes.

KEYS TO EXERCISES

UNIT 1

Exercise 20, page 15:

1 – similar, 2 – at least, 3 – concern, 4 – to, 5 – insured, 6 – compulsory, 7 – to go on, 8 – comprise, 9 – finishing, 10 – institution.

Exercise 39, page 25:

1 – decree, 2 – celebrated, 3 – offers, 4 – long-standing, 5 – recognized.

UNIT 3

Exercise 37, page 59:

1 – travelling, 2 – picturesque, 3 – river, 4 – museums, 5 – snow, 6 – snowboarding, 7 – diverse, 8 – cuisine, 9 – destination.

UNIT 5

Exercise 26, page 92: 1 – world; 2 – business; 3 – spoken; 4 – widespread; 5 – second; 6 – number; 7 – popular; 8 – thing; 9 – necessary.

Exercise 33, page 96: 1 – growing; 2 – tourism; 3 – attractions; 4 – Hermitage Museum; 5 – founding; 6 – heritage.

Exercise 49, page 102: 1 – borrow; 2 – reference; 3 – literature; 4 – poetry; 5 – also; 6 – informational.

UNIT 2

Exercise 19, page 34: 1 – are divided, 2 – polytechnics, 3 – graduating from, 4 – university status, 5 – Bachelor of Arts or Sciences, 6 – degree courses, 7 – receive grants, 8 – to pay for, 9 – term time, 10 – competitive, 11 – colleges.

Exercise 30, page 39: 1 – educational, 2 – college, 3 – universities, 4 – provide, 5 – size.

UNIT 4

Exercise 19, page 72: 1 – vice president, 2 – four-year term, 3 – amendment, 4 – two, 5 – Senate, 6 – legislation, 7 – veto, 8 – commander-in-chief, 9 – to appoint, 10 – influence,

Exercise 37, page 81: 1 – climate, 2 – summers, 3 – rise, 4 – snowfalls, 5 – microclimate.

UNIT 6

Exercise 26, page 116: 1 – industrial, 2 – air, 3 – atmosphere, 4 – smog, 5 – oxygen, 6 – disappear, 7 – interaction.

Exercise 34, page 120:

– mostly **a's**: You're not very green, are you? Please look after our world before it's too late!

– mostly **b's**: You're trying to be more green but you don't always get it right. Learn more about the environment and think before.

– mostly **c's**: Well done! You're really green! We need more people like you to help us save our environment!

Exercise 41, page 122:

1 – branch, 2 – organisms, 3 –

environment, 4 – human, 5 – definition.

UNIT 7

Exercise 18, page 133:

1 – control, 2 – result, 3 – efficiency, 4 – smart, 5 – performed, 6 – devices, 7 – creative, 8 – more.

Exercise 25, page 135:

1 – engineering, 2 – explanation, 3 – engines, 4 – applied, 5 – executing, 6 – important, 7 – appeared.

UNIT 9

Exercise 19, page 179:

1 – computer, 2 – drives, 3 – to, 4 – camcorders, 5 – tape, 6 – store, 7 – power.

Exercise 35, page 191:

1 – to replace, 2 – electronic, 3 – privacy, 4 – information, 5 – control, 6 – consumers.

UNIT 11

Exercise 18, page 238:

1 – reservoirs, 2 – discovered, 3 – drilling, 4 – profitable, 5 – flows, 6 – injecting, 7 – technology.

Exercise 29, page 243:

1 – processing, 2 – raw, 3 – reservoir, 4 – produced, 5 – associated, 6 – degrees, 7 – exist, 8 – collectively.

UNIT 8

Exercise 20, page 154:

1 – muscle, 2 – bicycle, 3 – recreational, 4 – aircraft, 5 – town, 6 – officially, 7 – fastest.

Exercise 38, page 164:

1 – private, 2 – costs, 3 – tendency, 4 – improvement, 5 – worsening, 6 – suffers, 7 – transport, 8 – congestion, 9 – protection.

UNIT 10

Exercise 16, page 209:

1 – electricity, 2 – field, 3 – forces, 4 – electrons, 5 – produces, 6 – produce.

Exercise 24, page 213:

1 – distances, 2 – transformer, 3 – homes, 4 – power, 5 – form, 6 – industry.

Exercise 42, page 226:

1 – possible, 2 – device, 3 – transformer, 4 – charges, 5 – plant, 6 – distant, 7 – transferred, 8 – direct, 9 – delivery, 10 – dangerous.

UNIT 12

Exercise 18, page 260:

1 – components, 2 – adopt, 3 – civilization, 4 – dependent, 5 – need, 6 – life-ensuring, 7 – food.

Exercise 35, page 270:

1 – rational, 2 – conservation, 3 – accidents, 4 – skills, 5 – citizens, 6 – friendly.

TEXTS FOR SUPPLEMENTARY READING

- Read the texts below to complete various information of each Unit
- Be ready to discuss additional information you have read

Text 1

System of Russian Higher Education

The majority of state institutes of higher education are regulated by the Ministry of Education of the Russian Federation. Some of them are regulated by other state Ministries, such as the Ministry of Health Care, the Ministry of Railway Transportation, the Ministry of Culture, the Ministry of International Affairs and others. For examples, institutes of higher education of aviation are regulated by the state, of railway and water transport – by the corresponding Ministries; legal academies are divided between the state and the Ministry of Internal Affairs; the largest medical institutes and medical departments of universities are regulated by the state, smaller – by the Ministry of Health Care.

Non-state educational institutes can be established institutionally and legally in the forms stipulated by the Russian Federation Laws for non-profit organizations. The majority of them teach humanities, economics, and law – the disciplines that do not require expensive high-tech equipped facilities and big capital investments. Students at non-state schools need to pay for their education during the whole period of study.

There are three kinds of higher education institutions in Russia: universities, academies, and institutes. All of them realize programmes of undergraduate and graduate professional education.

1. “University” covers a wide range of fields of study, for example, technical university or classical university.

2. “Academy” differs from universities by a narrower spectrum of specialities connected with a particular industry, for example, Academy of Railway Transport, Academy of Agriculture, or Academy of Economics.

3. The status of an “Institute” requires teaching of at least one discipline.

Universities also conduct fundamental and applied research in a wide spectrum of sciences, while the academies and institutes run their scientific activities in one field of Science or Art. To hold a status of a university or an academy it is obligatory to be a leading scientific and methodological center in the field of your specialization. Institutes mainly offer the professional training. Institute also can be established as a department of a university or an academy with the aim to conduct autonomic educational or scientific activities. For example, the Institute of Social Rehabilitation of

Novosibirsk State Technical University or the Institute of International Affairs and Law of Novosibirsk State Academy of Economics and Management. According to the Russian Federation Laws, there are no preferences or limitations (discrimination of) for the graduates from accredited institutes, academies and universities.

Before 1990 only classical universities had the status of “universities”. There were not so many of them, only in the big regional centers, for example, Novosibirsk State University, Moscow State University, and St. Petersburg State University. All other institutes of higher education held the status of “institutes” (do not mix with Research institutes whose business is not in teaching, but in conducting research).

With the reforms of 1990s institutes of higher education got the right to reorganize their main activities and this led to mass raising the statuses from “institutes” to “academies” and “universities”. This tendency changed the structure of the state system of education.

According to the statistics for the period of 1991–1996 the number of universities increased 6 times and that of academies more than 30 times. In order to raise the status from institutes to universities and academies many institutes open new departments: economics, law, business administration, management. Unfortunately, very often this does not mean that these disciplines are taught on a high professional level. It needs to be mentioned that non-state schools usually have status of institutes. There are only 6 non-state universities and 4 non-state academies in Russia now.

Accreditation: Besides the division into universities, academies and institutes, state licensing and accreditation are the most important characteristics of any institute of higher education. State licence gives institution the permission to offer educational services. That means that an institution has enough well-equipped space, which will allow teaching an appropriate number of students; that it has in its staff well educated and trained lecturers and teachers. This document is issued by Ministry of Education of the Russian Federation. Every branch of the institute of higher education needs to get state licence separately from the head institution. There are two types of accreditations in Russia: state accreditation and community accreditation.

State accreditation means correspondence between the quality of education on accredited programmes and state educational standards. Accreditation also gives the right to issue state-standard diplomas. Constant state control of the quality of educational services is legally guaranteed only for accredited schools. Institutes of higher education can be accredited for the period, which not exceeds 5 years.

Accreditation certificate is not eligible without its attachment, where accredited programmes of all levels (the Bachelor, specialist and Master),

stages of education and qualifications of graduates are listed. All branches of institute of higher education should be accredited at the same time as the head institute. The names and addresses of the branches, list of accredited programmes are mentioned in the attachment. The word “state” in the name of the institute of higher education guarantees that this institute issues state standard diplomas.

The aim of community accreditation is appreciation of the level of activities of institute of higher education, which corresponds to the criteria and expectations of civic educational, professional, scientific and industrial organizations. Community accreditation does not mean financial or any other obligations from the state.

Text 2

Education and Society

Education plays a crucial role in determining social status in Russia. People who leave school after 9 years generally can find only unskilled jobs. Even those who complete secondary education may rise no higher than skilled labor or low-level white-collar work. A college or university education is necessary for most professional and bureaucratic positions and appears to be highly desirable for a position of political power.

For example, a very high percentage of the members of Russia’s parliament are university graduates. Access to higher education is roughly proportionate to the social and financial situation of an individual’s family. Children whose parents have money and status usually have an advantage in gaining admission to an institution of higher education.

The reasons lie not only with the parents’ possible influence and connections but increasingly with the better quality of primary and secondary education that has become available to such children, enhancing their ability to pass difficult university entrance examinations. Moreover, such families can afford to hire tutors for their children in preparation for the exams and can more readily afford to pay university tuition in case the children do not receive stipends.

By the mid-1990s, the new phenomenon of individual commercial success began influencing the attitude of Russian society toward education and its goals. At the same time, the last generation of Soviet-educated Russians was finding itself ill prepared to deal with a new set of conditions for social and economic survival. In the new order, acquisition of money is much more important for both self-respect and practical survival, and career prestige by itself is of relatively less worth than it was in the Soviet system, where every career label ensured a known level of comfort. Significantly, in post-Soviet years, the phrase “to make money” has passed into common usage in colloquial Russian.

Together with the employment insecurity felt in the 1990s by well-educated Russians, the new values have dampened the educational ambitions of many, particularly with regard to higher education. Although older Russians resent those who achieve commercial success in the new “system”, the generation now in school shows increasing interest in advancement in the private sector of the economy. At the same time, polls show that education ranks only ninth among the most pressing concerns of Russians.

Text 3

Mikhail Lomonosov

Russia’s first world-famed specialist in natural science, a poet who laid down the foundations of Russian literary language and an advocate of education, Mikhail Vasilievich Lomonosov (1711–1765) will forever



remain in the history of Russian science as “the first and the greatest”. Aspiring to get an education, Lomonosov left his native village of Kholmogory in Northern Russia in 1730 and travelled all the way to Moscow on foot.

The son of a poor fisherman, he had to conceal his origin in order to be admitted to the Slavonic-Greek-Latin Academy of Moscow, where he started his education at the age of 19. Recognized by his instructors as an excellent student, he completed his education in St. Petersburg and in Germany. He became the first Russian professor of chemistry at St. Petersburg Academy of Sciences in 1745. His major scientific accomplishment was in the field of physical chemistry, with other notable discoveries in astronomy, geophysics, geology, metallurgy and mineralogy. Mikhail Lomonosov was the one who created a system of higher education in Russia. The foundation of a university in Moscow became possible only due to the efforts of M. Lomonosov, the outstanding Russian scholar and scientist, a person of encyclopedic knowledge. In 1940 on the occasion of its 185th Anniversary, Moscow State University was named after him.

Interested in furthering Russian education, Lomonosov wrote a grammar that reformed the Russian literary language by combining Old Church Slavonic with the vulgar tongue. He published the first history of Russia in 1760 and invented a new system of meter in his poetry, which consisted mostly of eloquent odes. He also revived the art of Russian mosaic and built a mosaic and coloured-glass factory.

Famous Russian poet Alexander Pushkin was quite right when he wrote about the giant of the 18th century world science: “Combining the great will-power and the remarkable strength of perception, Lomonosov embraced all the branches of learning. A thirst for a deeper appreciation of things proved an overwhelming passion with that impassioned spirit. A historian, mechanic, chemist, physicist, astronomer, mining specialist, mineralogist, geographer, historian, philologist, artist and poet, he had experienced it all and perceived it all ...”.

Even so, the vast scope of Lomonosov’s interests and the profundity of his knowledge appear amazing for that age. He carried out research and scientific and technical projects that were not simply enormous – they were immeasurable. Lomonosov invented the first gas barometer, developed the methods of exact weighting, brought up the kinetic theory of warmth, and developed the method of processing the colour glasses, which he used for his great mosaics. Lomonosov proved the organic origin of oils, stone coal and amber.

Lomonosov was the first Russian natural scientist of world importance. He had encyclopedic knowledge, interests and abilities, and he also is known as a poet, artist, astronomer and Russian historian, who made important contributions to both literature and science. Most of his accomplishments, however, were unknown outside Russia until long after his death in St. Petersburg on April 15, 1765.

Text 4

Tomsk State University

Tomsk State University (TSU), formally Imperial Tomsk University, is the first university in Siberia – it was founded in 1878 in Tomsk, Russia. TSU opened in 1888 with only one department, the medical school. Today, there are 22 departments in TSU with 23,000 students.

The idea to open the first university in Siberia occurred to progressive minds in Russia back in 1803, but it was not until the late nineteenth century that it became realistic. The government delayed the decision either due to a lack of money or the inadequate development of secondary education in the region. Moreover, some thought that a university in Siberia was a luxury and it was dangerous to give Siberian people higher education. These reasons only resulted in a delay, and could not entirely remove this question from the agenda.

Tomsk was one of the seven cities in Siberia that aspired to the high honour of hosting a university. Eventually, it won. On May 28, 1878 Emperor Alexander II passed the Decree of the State Council of the Russian Empire permitting the establishment of Imperial Siberian University in Tomsk. This put an end to the 75-year-old struggle for a

university in Tomsk and marked the beginning of its history: the construction, opening and development of the ninth higher educational establishment in Russia and the first in Siberia.

The construction of the main building of Tomsk Imperial University and the first dormitory was made possible thanks to private donations, which amounted to half of the budget. Simultaneous with the construction, a library was being assembled as were the materials for some laboratories, museums, the botanical garden with its greenhouse and the herbarium.

The university was meant to be an exclusive educational establishment that combined the academic process with research and aimed at developing a creative personality capable of self-improvement. As a classic university, TSU is based on research and educational schools. It means that the most research is based in the sciences and academic process must involve a sound combination of the natural sciences and the humanities accompanied with a flexibility in education.

Professor V.M. Florinsky said in his speech at the opening ceremony: “We would like our professors and scientists, inspired by their love for the Motherland, to serve both students and science with equal eagerness. We would like them to be more independent in their scientific research and to set up their own scientific schools. Only a combination of the academic process with scientific research will enable our university to fulfill its high mission and, independently of its direct utilitarian objectives, to bear fruit in higher education.” These are the principles that Tomsk State University has been following ever since.

Tomsk State University has always adhered to the strategic direction of its activities in preparing research, educational and managerial elite on the basis of the integration of academic process and scientific research. More than a hundred thousand of its graduates have contributed to the fame and authority of their alma mater. Tomsk State University can boast of having graduated about 100 members of Russian Academy of Sciences, Russian Academy of Medical Sciences, the Academy of Sciences of CIS States and more than 150 Russian Governmental Prizewinners. Two Nobel Prize winners, Nikolay Semyonov and Ivan Pavlov, were members of the university faculty. Today many TSU alumni and staff head various universities, academic institutes, research institutes and enterprises, and hold important governmental positions.

Imperial University, later Tomsk State University, has had a key influence on the development of research, educational and cultural potential in the Asian part of Russia. It is ranked one of the top national universities. The university has been given three State Awards: 1967 – the Order of the Labour Red Banner, 1980 – the Order of October Revolution, 1978 – Siberian Institute of Physics and Technology at TSU was awarded

the Order of the Red Banner and First Degree Diploma from MVSSO USSR.

In 1998 by the Russian Presidential Decree № 30, TSU was listed in the State Code of Most Valuable Objects of Cultural Heritage of the Peoples of the Russian Federation. On August 8, 2003 Russian President, Vladimir Putin signed a Decree in honour of the celebration of the 125th anniversary of TSU as a leading Russian center of education, science and culture.

Originally, the university was to consist of 4 departments as listed in the Charter of Imperial universities. However, TSU began with only a Medical Department. During the following years the problem of its extension was being solved. Nevertheless, the Medical Department had all the necessary divisions and study-rooms to teach students the entire range of natural sciences. The opening of the Law School meant that the university had a wider range of departments that taught the arts.

In 1917 when two more departments – the Department of Physics and Mathematics and the Department of History and Philology – were established, the university complied with the original vision. Today TSU is the largest classic university in the East of Russia. There are 22 departments, 5 branches, educating more than 23,000 students in 85 specializations and programmes.

TSU was the first to carry out multilevel and continuous education. This includes pre-admission (pre-college) education, preparing specialists, bachelors and masters (graduate programmes), post-graduate education, retraining and refresher courses. The university has established 45 centers of pre-admission training on campuses of secondary schools in different regions of Siberia and Kazakhstan which enables 2,000 people to study there annually.

TSU offers a programme “Training Managers and Executives for the Enterprises of the National Economy” (Presidential Management Training Initiative). Its alumni are in great demand as top and senior managers at numerous enterprises. The university has been very active in developing distance-learning programmes, multi-media courses, electronic textbooks, etc. including those for secondary schools. Many of them have been highly graded at international exhibitions.

The university pays great attention to the training of secondary school teachers. In 2001, TSU was certified and accredited by the State Committee of the Ministry of Education after a successful complex assessment of the university’s activities. It confirmed TSU’s status as a leading university. According to the Russian Ministry of Education, TSU is ranked fifth following Moscow State University, St. Petersburg State

University, Moscow Institute of Physics and Technology, and People's Friendship University of Russia.

Text 5

South Russia State Technical University (Novocherkassk Polytechnic Institute)

South Russia State Technical University was founded on October 18 (5), 1907 and had 4 faculties (Mining, Land-Improvement Engineering,



Mechanics, Chemistry), which enrolled 167 students. N.N. Zinin was the first Rector and founder of the Institute.

Since 1930, several institutes have been established on the basis of Novocherkassk Polytechnic Institute: Novocherkassk Institute of Land-Improvement

Engineering, Donskoi Agricultural Institute, North Caucasus Mining-Metallurgical Institute, Rostov Institute of Agricultural Mechanical Engineering and others.

The University has the following faculties: Pre-Institute Training, the Humanities and Social Economics, Mining and Geology, Systems' Engineering and Robotics, Electromechanics, Mechanics, Applied Robotics and Machine-Building, Energetics, Engineering, Chemistry and Technology, a part-time and extra-mural faculty; the Institute branch in Shakhty has the faculties of Mining, Mining and Mechanics, a part-time faculty and an extra-mural faculty; the Institute branch in Volgodonsk has the faculty of Energetics and Machine-Building, a part-time and extra-mural faculty and two educational-consulting centres in Kamensk and Rostov-on-Don.

Now the University enrolls over 13000 students (9000 full-time, 4000 part-time and extra-mural students). At the university students are trained in 48 specialties. The University offers Bachelor's programmes in electroenergetics and heat engineering. The University's research programme corresponds to the specialists' training orientation. The University offers postgraduate courses in 35 specialties (107 specialists pursue their study at the present time); doctoral programmes are offered in 8 specialties (4 aspirants for Doctor's degrees at present); there are over 90 extra-mural aspirants for Candidate's degrees. The University trains students and postgraduates from China and India.

20 branches of the University departments and 9 educational-production and research-production complexes were opened on the basis of industrial enterprises, research institutes, secondary schools of the city and the region. The University structure includes a two-year specialized school with a physical-mathematical bias, a preparatory department and special training courses for applicants, 25 vocational training preparatory centres, 3 special design technological offices, a computer centre, a research department, an experimental plant; 9 enterprises of various status, including 3 joint-stock companies; 3 qualification improvement faculties for institute and technical colleges teachers, and refresher courses for engineers.

The University has a publishing house, a scientific-technical library, a sports centre, a club for scientists and students, an amateur opera and ballet theatre, a health care centre, two sports and health care centres in the country, the museum of battle and labour glory.

Text 6

Harvard University

Harvard University (incorporated as The President and Fellows of Harvard College) is an accredited private university in Cambridge, Massachusetts. Founded on September 8, 1636 by a vote of the Great and General Court of the Massachusetts Bay Colony, Harvard is the oldest institution of higher learning in the US. The institution was named Harvard College on March 13, 1639, after its first principal donor, a young clergyman named John Harvard. A graduate of Emmanuel College, Cambridge, John Harvard bequeathed a few hundred books in his will to form the basis of the college library collection, along with several hundred pounds.

The earliest known official reference to Harvard as a “university” rather than a “college” occurred in the new Massachusetts Constitution of 1780. In his 1869–1909 tenure as Harvard president, Charles William Eliot radically transformed Harvard into the pattern of the modern research university. Eliot’s reforms included elective courses, small classes, and entrance examinations. The Harvard model influenced American education nationally, at both college and secondary levels.

In 1999, Radcliffe College, initially founded as the “Harvard Annex” for women, merged formally with Harvard University, becoming the Radcliffe Institute for Advanced Study. Harvard has the world’s third largest library collection (after the British Library and the Library of Congress) and the largest financial endowment of any academic institution and the second largest endowment for a non-profit organization behind only the Bill&Melinda Gates Foundation.

A faculty of about 2,300 professors serves about 6,650 undergraduate and 13,000 graduate students. The school colour is crimson, which is also the name of the Harvard sports teams and the daily newspaper, The Harvard Crimson. The colour was unofficially adopted (in preference to magenta) by an 1875 vote of the student body, although the association with some form of red can be traced back to 1858, when Charles William Eliot, a young graduate student who would later become Harvard's president, bought red bandannas for his crew so they could more easily be distinguished by spectators at a regatta.

Although the officially stated colour is crimson, the colour actually used on sport uniforms and other Harvard insignia is, in fact, very different from crimson. Rather than a bright crimson, it is a dull, dark red, almost like oxblood. Harvard Student Agency guides are instructed to tell visitors that this is because the athletic flag which was used for the canonical colour had become discoloured through use. The *de jure* colour remains crimson, but the *de facto* colour, therefore, is quite different.

Prominent student organizations at Harvard include the aforementioned Crimson; the Harvard Advocate, one of the nation's oldest literary magazines and the oldest current publication at Harvard; the Harvard Lampoon, a social club which occasionally publishes a humour magazine ("semi-secret Sorrento Square organization which used to occasionally publish a so-called humor magazine"); and the Hasty Pudding Theatricals, which produces an annual burlesque and celebrates notable actors at its Man of the Year and Woman of the Year ceremonies; and the Harvard Glee Club, the oldest college chorus in America. The Harvard-Radcliffe Orchestra, composed mainly of undergraduates, was founded in 1808 as the Pierian Sodality and has been performing as a symphony orchestra since the 1950s.

Harvard College has traditionally drawn many of its students from private schools, though today the majority of undergraduates come from public schools across the United States and around the globe. Harvard has a friendly rivalry with the Massachusetts Institute of Technology which dates back to 1900, when a merger of the two schools was frequently mooted and at one point officially agreed upon (ultimately canceled by Massachusetts courts). Today, the two schools cooperate as much as they compete, with many joint conferences and programmes. In addition, students at the two schools can cross-register in undergraduate or graduate classes without any additional fees, for credits toward their own school's degrees. The relationship and proximity between the two institutions is a remarkable phenomenon, considering their stature; according to The Times Higher Education Supplement, "The US has the world's top two

universities by our reckoning – Harvard and the Massachusetts Institute of Technology, neighbours on the Charles River”.

Over its history, Harvard has graduated many famous alumni, along with a few infamous ones. Among the best-known are political leaders John Adams, Theodore Roosevelt, Franklin Roosevelt, and John F. Kennedy; philosopher Henry David Thoreau and author Ralph Waldo Emerson; poets Wallace Stevens, T. S. Eliot and E. E. Cummings; composer Leonard Bernstein; actor Jack Lemmon. Among its most famous faculty members are biologists James D. Watson and E. O. Wilson.

Admissions: Harvard’s overall undergraduate acceptance rate for 2006 was 9.3%, making it one of the most selective universities in the country. The 2006 figures from US News and World Report indicated that the business school admitted 14.3% of its applicants, the engineering division admitted 12.5%, the law school admitted 11.3%, the education school admitted 14.6%, and the medical school admitted 4.9%.

Organization: Harvard is governed by two boards, the President and Fellows of Harvard College, also known as the Harvard Corporation and founded in 1650, and the Harvard Board of Overseers. The President of Harvard University is the day-to-day administrator of Harvard and is appointed by and responsible to the Harvard Corporation.

Harvard today has nine faculties, listed below in order of foundation:

- The Faculty of Arts and Sciences and its sub-faculty, the Division of Engineering and Applied Sciences, which together serve:
 - Harvard College, the University’s undergraduate portion (1636)
 - The Graduate School of Arts and Sciences (organized 1872)
 - The Harvard Division of Continuing Education, including Harvard Extension School (1909) and Harvard Summer School (1871)
- The Faculty of Medicine, including the Medical School (1782) and the Harvard School of Dental Medicine (1867).
 - Harvard Divinity School (1816)
 - Harvard Law School (1817)
 - Harvard Business School (1908)
 - The Graduate School of Design (1914)
 - The Graduate School of Education (1920)
 - The School of Public Health (1922)
 - The John F. Kennedy School of Government (1936)

In 1999, the former Radcliffe College was reorganized as the Radcliffe Institute for Advanced Study.

Library system and museums: The Harvard University Library System, centered in Widener Library in Harvard Yard and comprising over 90 individual libraries and over 15.3 million volumes, is the fourth largest library collection in the world, after the Library of Congress, the British

Library, and the French Bibliothèque nationale; it is the largest university library system in the world. Cabot Science Library, Lamont Library, and Widener Library are three of the most popular libraries for undergraduates to use, with easy access and central locations. Houghton Library is the primary repository for Harvard's rare books and manuscripts. America's oldest collection of maps, gazetteers, and atlases both old and new is stored in Pusey Library and open to the public. The largest collection of East-Asian language material outside of East Asia is held in the Harvard-Yenching Library.

Harvard operates several art museums, including the Fogg Museum of Art (with galleries featuring history of Western art from the Middle Ages to the present, with particular strengths in Italian early Renaissance, British pre-Raphaelite, and 19th-century French art); the Busch-Reisinger Museum (formerly Germanic Museum, and formerly housed in Adolphus Busch Hall) (central and northern European art; and a Flentrop pipe organ, familiar from recordings by E. Power Biggs); the Sackler Museum (ancient, Asian, Islamic and later Indian art); the Museum of Natural History, which contains the famous Blaschka Glass Flowers exhibit; the Peabody Museum of Archaeology and Ethnology, specializing in the cultural history and civilizations of the Western Hemisphere; and the Semitic Museum.

Text 7

Historical Sights of St. Petersburg



St. Petersburg is the second largest city in Russia after its capital – Moscow, with the population of about 6 million people. It is one of the most beautiful cities in the world. Our guests who left for Paris right after having visited St. Petersburg, and spent several days there on the banks of the Seine, witnessed that they found

the city on the Neva river more amazing, more beautiful, and more impressive than Paris. Our city was founded by Tsar Peter the Great (ruled 1682–1725) in 1703 and from 1712 became the new capital of Russia. It had this status up until 1918 when the capital was brought back to Moscow.

This city witnessed many important historical events. In fact, the whole history of the Russian Empire lies here on the banks of the Neva River. Russia became a European empire at the beginning of the 18th century; in fact, Peter the Great was the first Russian emperor. It was the era of vast changes in our country, and Peter was the greatest reformer ever. Almost all the emperors starting with Peter himself are buried in St. Peter and Paul's Cathedral that is situated on the territory of Peter and Paul's Fortress which is the birthplace of our city. The gilded spire of the cathedral with a three meter high angel on top is one of the symbols of our city.

St. Petersburg thus started as a fortress to protect the lands along the banks of the Neva River and the Gulf of Finland from Sweden. In fact these lands had always been an apple of discord between Russia and its “northern neighbor” Sweden. Separate fights were held throughout centuries up until 1700 when a war was started that was one of the most



important happenings in the history of St. Petersburg and Russia and that came down into history as the Northern War. It was started by the Swedish king Karl XII. For Peter I who was the ruler of our country then the main purpose of the war was to regain the lands along the Neva and the Gulf of Finland that were lost to Sweden in 1617 as a result of a peace treaty.

The beginning of the 17th century was a hard time for Russia when Lithuania and Poland were trying to capture Moscow. Russia was weak and without a tsar then and it asked Sweden for help. As a result of this “help” Russia lost the access to the Baltic Sea. The country could not develop without it that is why in 1700 Peter entered this war that lasted for 21 years and was ended in 1721 with a total victory of Russia. To protect the newly regained lands Peter and Paul's Fortress was founded on a little Hare's Island.

The fortress developed into a city under the rule of the Romanovs – the ruling dynasty in Russia from Peter's grandfather Mikhail until the last Russian emperor Nicholas II.

It was at the time of Elizabeth, Peter's daughter (ruled 1741–1761), that the city obtained its magnificence in architecture. One style was ruling in the middle of the 18th century – baroque, and there was an architect who could not be surpassed in creating baroque masterpieces – Francesco Rastrelli (1700–1771). This Italian architect, who was the favorite court

architect of Elizabeth I, built a lot of richly decorated baroque buildings in St. Petersburg and its suburbs, which are now a distinguishing feature of our city. Among them are the Winter Palace – former main imperial residence, the Smolny Convent (former residence of the first women's school in Russia), and summer imperial palaces in Tsarskoe Selo (now Pushkin) and Peterhof (now Petrodvorets). The Winter Palace is one of the most splendid buildings in St. Petersburg. Almost all the Romanovs starting from Catherine the Great resided there. The palace had hundreds of rooms; many of them were State Halls the interiors of which are preserved till the present days and open to visitors.

When you are inside of these miraculous halls you'll have a strong sensation of having got back to the times of the emperors. When you take the magnificent State Gala Staircase covered with a red velvet carpet and decorated with sculptures, huge mirrors, ceiling paintings, marble, gilded wood carvings – all to the baroque style – you are going to feel yourself one of the astonished guests invited to the pompous balls and receptions held in the Winter Palace. They had never before imagined such richness and splendor. Candles were lit in the vast Great Throne Room where the Emperor and Empress as well as Grand Dukes received their guests. Nobody was forgotten. The provincial nobility was received in the Emblem Hall covered all over with gilded bronze and sparkling in the candlelight.

Now the Winter Palace does not only display beautiful interiors but also houses our greatest pride – the Hermitage Museum. It ranks among the best museums of West European art in the world such as the Louver in Paris, the Metropolitan Museum of Art in New York, the National Gallery and the British Museum in London and Prado in Madrid. The Hermitage possesses the masterpieces of such great painters as Leonardo da Vinci, Raphael, Titian, Giorgione, Rembrandt, Rubens, Van Dyck, Hals, Velasquez, Goya, El Greco, Reynolds, Gainsborough, Monet, Manet, Degas, Renoir, Matisse, Picasso, Van Gogh, Gauguin, Kandinsky, and many others. The Hermitage has more than 3 million exhibits, among them not only paintings but also antique sculptures, medieval applied art, cameos, ancient and 18–19th century gold and jewels, coins, archeological finds, collections of the Eastern countries – Egypt, Iran, China and Tibet, Japan. There is also a Russian department though the main collection of the Russian Art is to be found in the Russian Museum. In the Hermitage you'll find imperial carriages covered with gilded wood carvings, upholstered with velvet and decorated with French paintings; original Russian sledge, Peter I's personal set of medical instruments, and a whole gallery of the Romanovs' gala portraits.

The Hermitage comprises several buildings, and the Winter Palace is just one of them. All the five buildings are situated on the bank of the Neva

river. Behind them there is one of the little rivers – the Moyka – flowing, and the Neva is connected with the Moyka by a short canal that flows right between the buildings of the Hermitage. It's called The Winter Canal, and this is one of the most poetic corners of the "old St.Petersburg". It was described in Alexander Pushkin's famous "Queen of Spades", and until now is the place for romantic dates of people who are in love. This place is especially lovely when seen from the water – when you sail either along the Moyka or along the Neva River in a boat and cast a look on the beautiful arch that frames the Winter Canal.

Text 8

Los Angeles

The City of Los Angeles, also known simply as L.A. or informally as the City of Angels, is the second-largest city in the United States in terms of population, as well as one of the most important cultural, economic, scientific and entertainment centers in the world. It was incorporated as a city in California on April 4, 1850, five months before California achieved statehood, and is the county seat and the largest city in Los Angeles County.

As of the 2000 U.S. Census, the city had a population of 3.69 million, though a July 1, 2004 estimate placed the city's population at 3.85 million, out of 10 million residents in the county.

Los Angeles serves as the core and most important city of the sprawling Southern California urban area which counts nearly 18 million residents. The city is also large by geographic standards since it sprawls over more than 465 square miles (1,200 square kilometers), making it larger than either New York City or Chicago in area.

Los Angeles is also one of the most cosmopolitan places in the world, as well as a vanguard of creativity and innovation, since it is home to individuals from virtually every nation on Earth. In addition, Los Angeles has hosted two Olympic Games, in 1932 and 1984, and is home to world-renowned scientific and cultural institutions. People have always been attracted to the world-class city for its balmy weather, unique and vibrant lifestyle, high-velocity energy, Pacific Rim Gateway status, and the opportunity to realize the "American Dream".

Text 9

Boston

Boston is the largest city and unofficial capital of the region known as New England. Boston is one of the oldest, wealthiest, and most culturally significant large cities in the United States. Its economy is based on education, health care, finance, and technology.

Boston has many nicknames. The City on a Hill came from original Massachusetts Bay Colony's governor John Winthrop's goal to create the biblical "City on a Hill." It also refers to the original three hills of Boston. Beantown refers to early Bostonian merchants' habit for making baked beans with imported molasses.

The Hub* is a shortened form of writer Oliver Wendell Holmes' phrase The Hub of the Solar System, now more commonly The Hub of the Universe. William Tudor, co-founder of the North American Review, christened the city The Athens of America for its great cultural and intellectual influence. The city lies at the center of the Boston CMSA (Consolidated Metropolitan Statistical Area), the seventh largest in the United States. The area encompasses parts of the states of New Hampshire, Maine, Rhode Island, and Connecticut.

Boston was founded on September 17, 1630, by Puritan colonists from England, on a peninsula called Shawmut by its original Native American inhabitants. The peninsula was connected to the mainland by a narrow isthmus, and surrounded by the waters of Massachusetts Bay and the marshes at the mouth of the Charles River. Boston's early European settlers first called the area Trimountaine. They later renamed the town for Boston, England, in Lincolnshire, from which several prominent "pilgrims" colonists emigrated.

A majority of Boston's early citizens were Puritans. Puritan ethics molded an extremely stable and well-structured society in Boston. For example, shortly after Boston's settlement, Puritans founded America's first school, Boston Latin School (1635), and America's first college, Harvard College (1636). Hard work, moral uprightness, and an emphasis on education remain part of Boston's culture. Over the past several decades, Boston has experienced a dramatic loss of regional institutions and traditions, which once gave it a very distinct social character. Boston has begun to resemble other parts of the continuous string of Northeast seaboard cities dubbed the BosWash megalopolis*.

**the Hub (амер.) – шутовское прозвище Бостона*

**агломерация крупных городов, мегалополис*

Text 10

Chicago

Chicago, known as the “Second City,” the “Windy City,” and (and other nicknames) is the third most populous city in the United States, following New York and Los Angeles. Chicago is located in the Midwestern state of Illinois along the southwestern shore of Lake Michigan. When combined with its suburbs and nine surrounding counties in Illinois, Wisconsin, and Indiana, the greater metropolitan area known as Chicagoland encompasses a population of nearly 10 million people.

The city takes its name from the indigenous Potawatomi tribe, who called the marshes on which Chicago was later built “Checagou,” which translates to “wild onion” or “garlic”. The origin of Chicago’s nickname as “The Windy City” is debated and has many possible politically-motivated origins. The phrase was created by New York newspapers in the 1880s. Following the Chicago Fire the city rebuilt itself fairly quickly. Hence, the Chicago citizenry began to brag to New Yorkers of the new city’s life and vitality, only to be labeled as windbags.

Growing from its 1833 founding as a frontier town of the Old Northwest into one of the world’s premier cities, Chicago is ranked as one of 10 “Alpha” (most influential) world cities. Chicago was the site of the world’s first skyscraper, and today is the architectural, financial, and cultural capital of the Midwest and transportation center of the country, with more rail lines and interstates radiating from the city than any other city in the country. Chicago also leads the country in the number of conventions hosted annually.

The city has long been known around the world as a financial, industrial, and transportation center and for its ethnic diversity. Chicago’s skyscrapers, local cuisine, political traditions, and sports teams are some of its most recognized symbols. A variety of colloquial nicknames reflect Chicago’s unique character.

Text 11

Houston

Houston is the largest city in Texas and the fourth-largest in the United States. Houston covers more than 600 square miles (1,558.4 km²) and is the county seat of Harris County – the third most populous in the country. As of the 2004 U.S. Census estimate, Houston had a total population of more than 2 million. The city is at the heart of the Houston-Sugar Land-Baytown metropolitan area, the largest cultural and economic center of the Gulf Coast region and the seventh-largest metropolitan area in the U.S. with a population of 5.3 million in 10 counties.

Houston is known for its energy (particularly oil) and aeronautics industries, and for its ship channel. The area is also the world's leading center for building oil field equipment. The Port of Houston is the sixth-largest port in the world; amid other U.S. ports, it is the busiest in foreign tonnage and second in overall tonnage. Houston is the seat of the internationally-renowned Texas Medical Center, which contains the world's largest concentration of research and healthcare institutions.

Houston is ranked as one of 11 U.S. world-class cities by the Globalization and World Cities Study Group & Network. The city has a vibrant visual and performing arts scene – the Houston Theatre District is ranked second in the country for the number of theatre seats in a concentrated downtown area per capita and has world-class visual and performing arts organizations. The city is also close to beaches on Galveston Island as well as one of the United States' largest concentrations of pleasure boats and tourist attractions.

Text 12

Philadelphia

Philadelphia is the fifth most populous city in the United States and the largest in population and area in the Commonwealth of Pennsylvania. Since 1952, the city and county have shared a common government, yet the county still exists as a separate entity within Pennsylvania. As of July 1, 2004, the population of the city was estimated at 1,470,151. Philadelphia has the third largest downtown residential population in the U.S., behind New York and Chicago. It is also the second largest city on the U.S. East Coast (after New York). The Philadelphia metropolitan area is the fourth largest in the U.S. by the current official definition, with some 5.7 million people. Philadelphia is the central city of the Delaware Valley metropolitan area.

Philadelphia is one of the oldest and most historically significant cities in the United States. Philadelphia was a major center of the independence movement during the American Revolutionary War. The Declaration of Independence and US Constitution were drafted here and signed in the city's Independence Hall. The United States Marine Corps also began here on November 10, 1755, when Samuel Nicholas began recruiting men at Tun Tavern.

During part of the 18 century, the city was the second capital and most populous city of the United States. At that time, it eclipsed Boston and New York City in political and social importance, with Benjamin Franklin playing an extraordinary role in Philadelphia's rise. The city limits have been coterminous with Philadelphia County since The Act of Consolidation, 1854. Until then, the city consisted only of the area

bounded by South and Vine Streets and the Delaware and Schuylkill Rivers. The city's expansion incorporated current day West, South Philadelphia, North Philadelphia, and Northeast Philadelphia, as well as German town and many smaller communities.

Philadelphia is also one of the largest college towns in the U.S., with over 120,000 college and university students enrolled within the city limits and nearly 300,000 in the metropolitan area.

Text 13

Las Vegas

Las Vegas is the most populous city in the state of Nevada, United States. The city is the largest to be founded in the 20th century, and is a major vacation, shopping, and gambling destination.

Las Vegas was established as a railroad town on May 15, 1905, when 110 acres (44.5 ha) owned by Montana Senator William A. Clark's San Pedro, Los Angeles and Salt Lake City Railroad, was auctioned off in what is now downtown Las Vegas. Las Vegas was part of Lincoln County until 1909 when it became part of the newly established Clark County.

Las Vegas became an incorporated city on March 16, 1911 when it adopted its first charter. Las Vegas was given its name by Spaniards in the Antonio Armijo party, who used the water in the area while heading north and west along the Old Spanish Trail from Texas. In the 1800s, areas of the Las Vegas Valley contained artesian wells that supported extensive green areas or Meadows (Vega in Spanish), hence the name Las Vegas.

The name Las Vegas is often applied to the unincorporated areas of Clark County that surround the city, especially the resort areas on and near the Las Vegas Strip. This 4½ mi (7¼ km) stretch of Las Vegas Boulevard is mostly outside the Las Vegas city limits, in the unincorporated town of Paradise. The center of gambling (азартная игра) in the US, Las Vegas is sometimes called Sin City due to the popularity of legalized gambling, availability of alcoholic beverages any time (like all of Nevada), various forms and degrees of adult entertainment. The nickname favored by local government and promoters of tourism is The Entertainment Capital of the World. The city's glamorous image has made it a popular setting for films and television programmes.

Text 14

From the History of London

The name London is thought to have come from the Latin name Londinium, as London was founded by the Romans during their reign over the land, around 43AD – although there is some slight evidence of pre-Roman settlement. This fortified Roman settlement was the capital of the

province of Britannia. Another suggestion for where the name of the city comes from could be that of the mythical leader, King Lud. It was said that Lud laid out the first set of roads in the city. His statue can be seen hidden at the church of St Dunstan's In The West, Fleet Street.

Around AD 61 the Iceni tribe of Celts led by Queen Boudicca stormed London and took the city from the Romans. The Celts burnt the relatively new Roman town to the ground, and archaeological digs have revealed a layer of red ash beneath the City of London, which is believed to be the burnt remains of the old Roman town. After the fall of the Roman Empire, Londinium was abandoned and a Saxon town named Lundenwic was established approximately one mile to the west in what is now Aldwich, in the 7th century. The old Roman city was then reoccupied during the late-9th or early-10th century.



Westminster was once a distinct town, and has been the seat of the English royal court and government since the medieval era. Eventually, Westminster and London grew together and formed the basis of London, becoming England's largest – though not capital – city (Winchester was the capital city of England until the 12th century). London has grown steadily over centuries, surrounding and making suburbs of neighbouring villages and towns, farmland, countryside, meadows and woodlands, spreading in every direction. From the 16th to the early-20th century,

London flourished as the capital of the British Empire.

In 1666, the Great Fire of London swept through and destroyed a large part of the City of London. Rebuilding took over 10 years, but London's growth accelerated in the 18th century and, by the early-19th century, it was the largest city in the world.

Text 15

Districts of London

The City of London is the principal financial district of the United Kingdom, and is one of the most important in the world. It is governed by the Corporation of London, an ancient body headed by the Lord Mayor of London. The City also has its own police force, the City of London police. The City has only a small resident population (about 7,000), but a daytime working population of more than 300,000. Its primacy as the chief

financial district has been directly challenged in recent years by Canary Wharf in East London.

The West End is the most popular shopping and entertainment district in London. Trafalgar Square is the most prominent landmark. Oxford Street is one of the best-known shopping streets in the world. Running from Charing Cross Road in the east to Marble Arch in the west, via Oxford Circus where it crosses Regent Street, it is home to many large department stores and shops. Tottenham Court Road runs north from the eastern end of Oxford Street towards the north of the city centre, and is best known for its plethora of hi-fi, computer and electronics stores. West of the City, Covent Garden is home to the Avenue of Stars, London's version of Hollywood's Walk of Fame. Piccadilly is an elegant thoroughfare running from Piccadilly Circus in the east to Hyde Park Corner in the west. It is adjacent to Mayfair, and Green Park. Regent Street and Bond Street are important thoroughfares.



The East End of London is closest to the original Port of London, and tended for that reason to be the area of the city where immigrants arriving into the port would settle first. The East End extends from the eastern side of the City of London. The area has many places of interest including many of London's markets, and several museums, including the Geffrye Museum and the Museum of Childhood. London Docklands, on the Isle of Dogs along the Thames in the East End, has developed enormously since the early-1980s.



For a period in the early-1980s, many warehouse buildings in Wapping had been occupied and used as artists' studios and low-cost loft living spaces. This inevitably drew the attention of property developers who gradually moved in to take over. The London Docklands

Development Corporation (LDDC) was set up in 1981 to accelerate the process, and the first phases of major development started to reshape the area, culminating in Canary Wharf, whose best-known feature is the 1 Canada Square office tower, which has been the UK's tallest skyscraper since 1991. A massive-scale development within the last three or four years has added a great many more skyscrapers, and many large businesses (investment banks, law firms, etc.) have moved in. Attracted by this growth, restaurants, bars and nightclubs have opened, there are three interconnected shopping malls beneath the Canary Wharf structure, and a cinema complex has opened in the area.

Text 16

London's Authorities and Services

The Greater London Authority (GLA) is the London-wide body responsible for coordinating the boroughs, strategic planning, and running some London-wide services such as policing, the fire service and transport. The GLA was created in 2000 as a replacement body for the former Greater London Council (GLC) which was created in 1965 and abolished in 1986 after political disputes between the GLC and the Conservative government of Margaret Thatcher. The GLA consists of the Mayor of London and the London Assembly.

The mayor is elected by the Supplementary Vote system while the assembly is elected by the Additional Member System. London is represented in Parliament by 74 MPs (members of Parliament). The territorial police force for the 32 London boroughs is the Metropolitan Police Service, more commonly referred to as the Metropolitan Police, or simply "the Met". The City of London has its own police force, the City of London Police.

Health services in London are managed by the national government via the National Health Service (NHS).

Transport is one of the four areas of policy administered by the Mayor of London, but the mayor's financial control is limited. The executive agency which runs London's transport system is Transport for London (TfL). The public transport network is one of the most extensive in the world, but faces congestion and reliability issues. The network is one of the most complex transit systems in the world with just over 1 billion journeys used every year on the underground alone.

As of mid-2005, in preparation for the 2012 London Olympic Games a total of £7 billion (\$12 billion) will be spent on refurbishment and expansion of city links, mainly on the London Underground. Although the main reason for this is because of the increased traffic flow that will be caused by the 2012 Olympics, the work would still be completed if London

had not won the games. By 2013 a new service called Crossrail is due to be opened. Also in planning is the Cross River Tram (CRT). It will depart in the south suburbs, cross the River Thames, through to the City of London (the financial district), and continue its journey to the northern suburbs. It is speculated that it will be the world's longest tram.

The British media is concentrated in London and is sometimes accused of having a "London bias". All the major television networks are headquartered in London including the BBC, which remains Britain's most influential media organization. Partly to counter complaints about London bias, the BBC announced in June 2004 that some departments are to be relocated to Manchester. Other major networks include ITV and BSkyB, Channel 4 and Five are also based in London. Like the BBC, these produce some programmes elsewhere in the UK, but London is their main production centre.

The English newspaper market is dominated by national newspapers, all of which are edited in London. Until the 1970s, most of the national newspapers were concentrated in Fleet Street, but in the 1980s they relocated to new premises with automated printing works. Most of these are in East London, most famously the News International plant at Wapping. The last major news agency in Fleet Street, Reuters, moved to Canary Wharf in 2005, but Fleet Street is still commonly used as a collective term for the national press. Regional Editions of most national newspapers are available, including editions for northern England, Scotland and Wales.

Text 17

Business of London

The City of London is the financial centre of London, home to banks, brokers, insurers and legal and accounting firms. A second financial district is developing at Canary Wharf to the east of central London. This is much smaller than City of London, but has equally prestigious occupants.

Non-financial business headquarters are located throughout central London. Some are in City of London, but more are located further west, in and around Mayfair, St. James's, the Strand and elsewhere. More than half of the UK's top 100 listed companies are headquartered in central London and more than 70% in London's metropolitan area.

London is a leading global centre for professional services, and media and creative industries. 31% of global currency transactions occur in London, with more US Dollars traded in London than New York, and more Euros traded there than every city in Europe combined. Tourism is one of the UK's largest industries, and in 2003 employed the equivalent of 350,000 full-time workers in London.

While the Port of London is now only the third-largest in the United Kingdom – rather than largest in the world, as it once was – it still handles 50 million tones of cargo each year. The main docks are now at Tilbury, which is outside the boundary of Greater London.

London's economy generates \$365 billion annually, and accounts for 17% of the UK's Gross Domestic Product (GDP) although this only refers to the city proper and the economic impact of the entire London metropolitan area is likely to be far higher, perhaps as much as \$600 billion (equivalent to the GDP of the Netherlands).

Text 18

Sport in London

London hosts one of the world's largest mass-participation marathons, the London Marathon, and has hosted the Olympic Games in 1908 and 1948. In July 2005 London was chosen to host the Games in 2012. London will be the first city in the world to host the Summer Olympics three times. The most popular spectator sport in London is football, and London has several of England's leading football clubs.

Historically the London clubs have not accumulated as many trophies as those from the North West of England, such as Liverpool and Manchester United, but at present Arsenal, and Chelsea are regarded as two of the Premier League's "Big three" alongside Manchester United. In 2003-04 they became the first pair of London clubs to finish first and second in the top flight, with Arsenal winning. In 2004-05 they did so again, this time with Chelsea winning.

There are also five London clubs in the fully professional Football League (the level below the Premiership). There are also numerous London clubs playing outside the top four divisions of English football, one or two of which are fully professional and many of which are part-time professional. Wembley Stadium in north-west London is the national football stadium, traditionally the home of the FA Cup Final as well as England national side's home matches.

Currently, Wembley is being completely rebuilt, so Cardiff's Millennium Stadium has been the venue* for recent FA Cup finals, while England plays at various venues around the country. Wembley was one of the venues for the 1966 World Cup, and the 1996 European Championship, and hosted the final of both tournaments. As well as football matches, Wembley has hosted many other sporting events, including the Rugby League Challenge Cup final.

Rugby Union is also well established in London, especially in the middle-class suburbs to the north and west of the city. The English national

Rugby Union stadium is in Twickenham. Three of the twelve clubs in the elite Guinness Premiership have London origins.

There are also London teams in the top-flight British leagues in ice hockey (London Racers) and basketball (London Towers), but neither of these sports draws nearly the large number of spectators that football and rugby union do. There are two Test cricket grounds: Lord's, home of Middlesex and the Marylebone Cricket Club. The All England Lawn Tennis and Croquet Club, home of the Wimbledon Championships, is in Wimbledon in South West London.

**место совершения действия*

Text 19

Tourism in Russia

Tourism in Russia has been growing rapidly in the years following the collapse of the former Soviet Union in 1991. Most of the tourism is centered on the cities of Moscow and St. Petersburg, since these cities are the sites of some of the most famous attractions of Russia.

Tourists are attracted by a very rich cultural heritage and rather tumultuous history of Russia, and this is reflected in the popularity of Russia's most famous attractions. Popular tourist destinations in the major cities include the following:

- The Tretyakov Gallery (Moscow)
- The Bolshoi Theatre (Moscow)
- The Red Square (Moscow)
- The Kremlin (Moscow)
- St. Isaac's Cathedral (St. Petersburg)
- The canals and waterways of St. Petersburg, located on the river Neva. St. Petersburg is sometimes known as the "Venice of the North" and is famed for its "white nights" during the summer
- The Summer Palace of Peter the Great (outskirts of St. Petersburg)
- The Russian Museum, the largest repository of Russian fine art in St. Petersburg.

The Russian countryside tends to be quite rural and undeveloped. Vast stretches of tundra, taiga, woodlands, and steppe stretch across vast expanses of the Eurasian continent – Russia is a country that spans 11 time zones.

In the countryside, there are many little towns with old castles. Some notable cities and towns, which have their own rich cultures and traditions, include Kalinigrad (formerly Königsberg) on the Baltic Sea coast, Novgorod (a famed midieval town), Tver, Nizhni Novgorod, Ekaterinburg, Rostov and Kazan.

Tourists are also drawn to the cruises on the big rivers like Volga, Lena or Yenisei as well as journeys on the famous Trans-Siberian railway, the third-longest continuous service that stretches from Moscow to its eastern terminal of Vladivostok at the coastline of the Pacific Ocean. Other destinations include the Golden Ring region towns of Yaroslavl, Vladimir, Rostov, Suzdal.

Russia, as a whole, may be the coldest country in the world, parts of the country have temperate climates, and most of the country has temperate weather during the summer. The coasts of the Black Sea and the Caspian Sea occur near the temperate mediterranean climate zone due to its adjacency to the Mediterranean Sea. A popular vacationing destination is the city of Sochi, known for its beaches.

The Crimea is also a favourite vacation resort; even though this autonomous region is in the Ukraine, many people associate it with Russia because of its long historical connection to Russia. Yalta is the best known vacation center, though Sevastopol is also well known.

Russian cuisine is rich and varied, due to the vast and multicultural expanse of the country. It draws its foundations from peasant food of the rural populations and tends to be dominated by cabbage, sour cream, root vegetables, and seasonal produce, fish, and meats.

Some of the more distinctive Russian dishes include borscht, pirozhki, shashlyk, and pelmeni. Russia is also famous for its caviar, though severe overfishing has threatened the fisheries (primarily sturgeon) that provide the source of this delicacy. Despite these attractions, travelling in Russia presents many logistical challenges for foreigners, particularly those coming from Western countries. First and foremost challenge that greets new visitors to Russia is the language barrier.

The Russian language uses the Cyrillic alphabet, so reading and interpreting signs often present a challenge, since these signs frequently do not have the transliteration equivalent written in the Latin alphabet familiar to most Westerners. Furthermore, English is not spoken or understood except in the major cities, and even then, most people know perhaps just a few words if at all (though this is slowly changing).

So, the way people live in the modern society requires new standards of communication and that is why it is an essential demand of the contemporary society to be able to speak foreign languages (including Russian for foreigners), because it is the direct access to the world cultural treasures, ability to understand and accept other nations' values while you are travelling.

Text 20

Ecology

Ecology, or ecological science, is the scientific study of the distribution and abundance of living organisms and how the distribution and abundance are affected by interactions between the organisms and their environment. The environment of an organism includes both physical properties, which can be described as the sum of local abiotic factors such as solar insolation, climate and geology, as well as the other organisms that share its habitat. The term *oekologie* was coined in 1866 by the German biologist Ernst Haeckel, although it seems that Henry David Thoreau had already invented it in 1852; the word is derived from the Greek *οίκος* (*oikos*, “household”) and *λόγος* (*logos*, “study”); therefore “ecology” means the “study of the household [of nature]”. The word “ecology” is often used in common parlance as a synonym for the natural environment or environmentalism. Likewise “ecologic” or “ecological” is often taken in the sense of environmentally friendly.

Ecology is usually considered a branch of biology, the general science that studies living organisms. Ecology is a multi-disciplinary science. Because of its focus on the higher levels of the organization of life on earth and on the interrelations between organisms and their environment, ecology draws heavily on many other branches of science, especially geology and geography, meteorology, chemistry, and physics. Agriculture, fisheries, forestry, medicine and urban development are among human activities that would fall within explanation of the definition of ecology: “where organisms are found, how many occur there, and why”.

As a scientific discipline, ecology does not dictate what is “right” or “wrong”. However, ecological knowledge such as the quantification of biodiversity and population dynamics have provided a scientific basis for expressing the aims of environmentalism and evaluating its goals and policies. Ecology is a broad discipline comprised of many sub-disciplines. A common, broad classification, moving from lowest to highest complexity, where complexity is defined as the number of entities and processes in the system under study, is:

- Physiological ecology and Behavioral ecology examine adaptations of the individual to its environment.
- Population ecology studies the dynamics of populations of a single species.
- Community ecology focuses on the interactions between species within an ecological community.
- Ecosystem ecology studies the flows of energy and matter through the biotic and abiotic components of ecosystems.

- Landscape ecology examines processes and relationship across multiple ecosystems or very large geographic areas.

Ecology can also be sub-divided according to the species of interest into fields such as animal ecology, plant ecology, and so on. Another frequent method of subdivision is by biome studies, e.g., Arctic ecology (or polar ecology), tropical ecology, desert ecology, etc.

The primary technique used for investigation is often used to subdivide the discipline into groups such as chemical ecology, genetic ecology, field ecology, statistical ecology, theoretical ecology, and so forth. Note that these different systems are unrelated and often applied at the same time; one could be a theoretical community ecologist, or a polar ecologist interested in animal genetics.

Text 21

Ecological Crises

Generally, an ecological crisis occurs when the environment of a species or a population evolves in a way unfavourable to that species survival. It may be that the environment quality degrades compared to the species needs, after a change in an abiotic ecological factor (for example, an increase of temperature, less significant rainfalls).

It may be that the environment becomes unfavourable for the survival of a species (or a population) due to an increased pressure of predation (for example overfishing). Lastly, it may be that the situation becomes unfavourable to the quality of life of the species (or the population) due to a rise in the number of individuals (overpopulation).

Ecological crises may be more or less brutal (occurring within a few months or taking as long as a few million years). They can also be of natural or anthropic origin. They may relate to one unique species or to many species. Lastly, an ecological crisis may be local (as an oil spill) or global (a rise in the sea level due to global warming).

According to its degree of endemism, a local crisis will have more or less significant consequences, from the death of many individuals to the total extinction of a species. Whatever its origin, disappearance of one or several species often will involve a rupture in the food chain, further impacting the survival of other species.

In the case of a global crisis, the consequences can be much more significant; some extinction events showed the disappearance of more than 90% of existing species at that time. However, it should be noted that the disappearance of certain species, such as the dinosaurs, by freeing an ecological niche, allowed the development and the diversification of the mammals. An ecological crisis thus paradoxically favored biodiversity.

Sometimes, an ecological crisis can be a specific and reversible phenomenon at the ecosystem scale. But more generally, the crisis impact will last. Indeed, it rather is a connected series of events that occur till a final point. From this stage, no return to the previous stable state is possible, and a new stable state will be set up gradually.

Lastly, if an ecological crisis can cause extinction, it can also more simply reduce the quality of life of the remaining individuals. Thus, even if the diversity of the human population is sometimes considered threatened few people envision human disappearance at short span. However, epidemic diseases, famines, impact on health of reduction of air quality, food crises, reduction of living space, accumulation of toxic or non degradable wastes, threats to keystone species (great apes, panda, whales) are also factors influencing the well-being of people.

During the past decades, this increasing responsibility of humanity in some ecological crises has been clearly observed. Due to the increases in technology and a rapidly increasing population, humans have more influence on their own environment than any other ecosystem engineer.

Text 22

Nature of the Engineers Work

Engineers apply the principles of science and mathematics to develop economical solutions to technical problems. Their work is the link between perceived social needs and commercial applications.

Engineers consider many factors when developing a new product. For example, in developing an industrial robot, engineers precisely specify the functional requirements; design and test the robot's components; integrate the components to produce the final design; and evaluate the design's overall effectiveness, cost, reliability, and safety. This process applies to the development of many different products, such as chemicals, computers, gas turbines, helicopters, and toys.

In addition to design and development, many engineers work in testing, production, or maintenance. These engineers supervise production in factories, determine the causes of component failure, and test manufactured products to maintain quality. They also estimate the time and cost to complete projects. Some move into engineering management or into sales. In sales, an engineering background enables them to discuss technical aspects and assist in product planning, installation, and use. Supervisory engineers are responsible for major components or entire projects.

Engineers use computers extensively to produce and analyze designs; to simulate and test how a machine, structure, or system operates; and to generate specifications for parts. Many engineers also use computers to

monitor product quality and control process efficiency. The field of nanotechnology, which involves the creation of high-performance materials and components by integrating atoms and molecules, also is introducing entirely new principles to the design process.

Most engineers work in office buildings, laboratories, or industrial plants. Others may spend time outdoors at construction sites and oil and gas exploration and production sites, where they monitor or direct operations or solve onsite problems. Some engineers travel extensively to plants or worksites.

It is important for engineers, as it is for those working in other technical and scientific occupations, to continue their education throughout their careers because much of their value to their employer depends on their knowledge of the latest technology. Engineers in high-technology areas, such as advanced electronics or information technology, may find that technical knowledge can become outdated rapidly. By keeping current in their field, engineers are able to deliver the best solutions and greatest value to their employers.

Engineers who have not kept current in their field may find themselves passed over for promotions or vulnerable to layoffs. Competitive pressures and advancing technology force many industrial companies to improve and update product designs and to optimize their manufacturing processes. Employers rely on engineers to further increase productivity as investment in plant and equipment increases to expand output of goods and services.

New technologies continue to improve the design process, enabling engineers to produce and analyze various product designs much more rapidly than in the past.

Text 23

Civil Engineering

In modern usage, civil engineering is a broad field of engineering that deals with the planning, construction, and maintenance of fixed structures, or public works, as they are related to earth, water, or civilization and their processes.

Most civil engineering today deals with roads, structures, water supply, sewer, flood control and traffic. In essence, civil engineering is a profession which makes the world a more habitable place to live.

Engineering has developed from observations of the ways natural and constructed systems react and from the development of empirical equations that provide bases for design. Civil engineering is the broadest of the engineering fields. In fact, engineering was once divided into only two

fields—military and civil. Civil engineering is still an umbrella field comprised of many related specialties.

General civil engineering is concerned with the overall interface of fixed projects with the greater world. General civil engineers work closely with surveyors and specialized civil engineers to fit and serve fixed projects within their given site, community and terrain by designing grading, drainage (flood control), paving, water supply, sewer service, electric and communications supply and land (real property) divisions. General engineers spend much of their time visiting project sites, developing community/neighborhood consensus, and preparing construction plans.

Structural engineering is concerned with the design of bridges, buildings, offshore oil platforms, dams, etc. Structural design and structural analysis are components of structural engineering and a key component in the structural design process. This involves computing the stresses and forces at work within a structure. There are some structural engineers who work in non-typical areas, such as designing aircraft, spacecraft and even biomedical devices. Major design concerns are building seismic resistant structures and seismically retrofitting existing structures.

Geotechnical engineering. The main subject of the studies also known as soil mechanics is concerned with soil properties, mechanics of soil particles, compression and swelling of soils, seepage, slopes, retaining walls, foundations, footings, ground and rock anchors, use of synthetic tensile materials in soil structures, soil-structure interaction and soil dynamics. Geotechnical engineering covers this field of studies for application in engineering. The importance of geotechnical engineering can hardly be overstated: buildings must be supported by reliable foundations. Dam design and construction reducing flooding of lower drainage areas is an important subject of geotechnical engineering.

Transportation engineering. Transportation engineering is primarily concerned with motorized road transportation, especially in North America. This includes areas such as queuing theory and traffic flow planning, roadway geometric design and driver behavior patterns. Simulation of traffic operation is performed through use of trip generation, traffic assignment algorithms which can be highly complex computational problems. Other specialized areas of transportation engineering deal with the designs of non-road transportation facilities, such as rail systems, airports, and ports.

Environmental engineering. Wastewater treatment is a critical activity in environmental engineering, a sub-discipline of civil engineering. Environmental engineering deals with the treatment of chemical,

biological, and/or thermal waste, the purification of water and air, and the remediation of contaminated sites, due to prior waste disposal or accidental contamination. Among the topics covered by environmental engineering are water purification, sewage treatment, and hazardous waste management.

Environmental engineering is related to the fields of hydrology, geohydrology and meteorology insofar as knowledge of water and groundwater flows is required to understand pollutant transport. Environmental engineers are also involved in pollution reduction, green engineering, and industrial ecology.

Environmental engineering also deals with the gathering of information on the environmental consequences of proposed actions and the assessment of effects of proposed actions for the purpose of assisting society and policy makers in the decision making process. Environmental engineering is the contemporary term for sanitary engineering. Some other terms in use are public health engineering and environmental health engineering.

Hydraulic engineering is concerned with the flow and conveyance of fluids, principally water. This area of engineering is intimately related to the design of pipelines, water distribution systems, drainage facilities (including bridges, dams, channels, culverts, levees, and storm sewers), canals, and to environmental engineering. Hydraulic engineers design these facilities using the concepts of fluid pressure, fluid statics, fluid dynamics, and hydraulics, among others.

Construction engineering. Construction engineering involves planning and execution of the designs from transportation, site development, hydraulic, environmental, structural and geotechnical engineers.

Urban Engineering. Urban engineering is a subset of the general practice of urban planning. It is limited to civil engineering in an urban setting and does not include designing buildings or their functions.

Text 24

The History of Mechanical Engineering

Mechanical engineering is an engineering discipline that involves the application of principles of physics for analysis, design, manufacturing, and maintenance of mechanical systems. It requires a solid understanding of key concepts including mechanics, kinematics, thermodynamics and energy. Practitioners of mechanical engineering, known as mechanical engineers, use these principles and others in the design and analysis of automobiles, aircraft, heating & cooling systems, manufacturing plants, industrial equipment and machinery, and more.

Mechanical engineering could be found in many ancient and medieval societies, found throughout the globe. In ancient Greece, there were brilliant mechanical engineers such as Archimede (287 BC–212 BC), as well as Heron of Alexandria (10–70 AD). The mechanical works of the latter two deeply influenced mechanics in the Western tradition, although there were many others who contributed to early mechanical science. In ancient China, there were also many notable figures, such as Zhang Heng (78–139 AD) and Ma Jun (200–265 AD). The medieval Chinese horologist and engineer Su Song (1020–1101 AD) incorporated an escapement mechanism into his astronomical clock tower two centuries before any escapement could be found in clocks of medieval Europe, as well as the world's first known endless power-transmitting chain drive.

Before the Industrial Revolution, most engineering was restricted to military and civil uses. Engineers in the military, though not always referred to as such, designed fortification systems and various war machines. Civil engineers were responsible primarily for building and ground structures. “During the early 19th century in England mechanical engineering developed as a separate field to provide manufacturing machines and the engines to power them. The first British professional society of civil engineers was formed in 1818; that for mechanical engineers followed in 1847”.

In the United States, the first mechanical engineering professional society was formed in 1880, making it the third oldest type of engineering behind civil (1852) and mining & metallurgical (1871). The first schools in the United States to offer an engineering education were the United States Military Academy in 1817, an institution now known as Norwich University in 1819, and Rensselaer Polytechnic Institute in 1825. An engineering education is based on a strong foundation in mathematics and science; this is followed by courses emphasizing the application of this knowledge to a specific field and studies in the social sciences and humanities to give the engineer a broader education.

Text 25

Congestion

Congestion occurs when transport demand exceeds transport supply in a specific section of the transport system. Under such circumstances, each vehicle impairs the mobility of others.

The last decades have seen the extension of roads in rural but particularly in urban areas. Those infrastructures were designed for speed and high capacity, but the growth of urban circulation occurred at a rate higher than often expected. Investments came from diverse levels of

government with a view to provide accessibility to cities and regions. There were strong incentives for the expansion of road transportation by providing high levels of transport supply. This has created a vicious circle of congestion which supports the construction of additional road capacity and automobile dependency. Urban congestion mainly concerns two domains of circulation, often sharing the same infrastructures:

Passengers. In many regions of the world incomes have significantly increased to the point that one automobile per household or more is common. Access to an automobile conveys flexibility in terms of the choice of origin, destination and travel time. The automobile is favored at the expense of other modes for most trips, including commuting. For instance, automobiles account for the bulk of commuting trips in the United States.

Freight. Several industries have shifted their transport needs to trucking, thereby increasing the usage of road infrastructure. Since cities are the main destinations for freight flows (either for consumption or for transfer to other locations) trucking adds to further congestion in urban areas.

Components: Delivery time (e.g. duration, possibility to fix delivery date); Reliability of delivery (e.g. availability of goods, order handling time); Flexibility of delivery (e.g. delivery date, delivery address); Quality of delivery (e.g. accurate delivery, condition of delivered goods). Unattended delivery problem: Mainly apply to parcel deliveries. Contradiction between working schedules and delivery schedules. Made worse by the growth of two income families.

Infrastructure provision was not able to keep up with the growth in the number of vehicles, even more with the total number of vehicles-km. During infrastructure improvement and construction, capacity impairment (fewer available lanes, closed sections, etc.) favors congestion. Important travel delays occur when the capacity limit is reached or exceeded, which is the case of almost all metropolitan areas. In the largest cities such as London, road traffic is actually slower than it was 100 years ago.

Marginal delays are thus increasing. Large cities have become congested most of the day, and congestion is getting more acute. Another important consideration concerns parking, which consumes large amounts of space. In automobile dependent cities, this can be very constraining as each economic activity has to provide an amount of parking space proportional to their level of activity. Parking has become a land use that greatly inflates the demand for urban land.

Daily trips can be either “mandatory” (workplace-home) or “voluntary” (shopping, leisure, visits). The former is often performed within fixed schedules while the latter comply with variable schedules.

Mandatory trips are mainly responsible for the peaks in circulation flows, implying that about half the congestion in urban areas is recurring at specific times of the day and on specific segments of the transport system. The other half is caused by random events such as accidents and unusual weather conditions (rain, snowstorms, etc.).

As far as accidents are concerned, their randomness is influenced by the level of traffic as the higher the traffic on specific road segments the higher the probability of accidents. The spatial convergence of traffic causes a surcharge of transport infrastructures up to the point where congestion can lead to the total immobilization of traffic.

Not only does the massive use of the automobile have an impact on traffic circulation and congestion, but it also leads to the decline in public transit efficiency when both are sharing the same roads. In some areas, the automobile is the only mode for which infrastructures are provided. This implies less capacity for using alternative modes such transit, walking and cycling. At some levels of density, no public infrastructure investment can be justified in terms of economic returns. Longer commuting trips in terms of average travel time, the result of fragmented land uses and congestion levels are a significant trend.

Convergence of traffic at major highways that serve vast low density areas with high levels of automobile ownership and low levels of automobile occupancy. The result is energy (fuel) wasted during congestion (additional time) and supplementary commuting distances. In automobile dependent cities, five measures can help alleviate congestion to some extent:

- Ramp metering. Controlling the access to a congested highway by letting automobiles in one at a time instead of in groups. The outcome is a lower disruption on highway traffic flows.
- Traffic signal synchronization. Tuning the traffic signals to the time and direction of traffic flows.
- Incident management. Making sure that vehicles involved in accidents or mechanical failures are removed as quickly as possible from the road.
- HOV lanes. High Occupancy Vehicle lanes insure that vehicles with 2 or more passengers (buses, vans, carpool, etc.) have exclusive access to a less congested lane.
- Public transit. Offering alternatives to driving that can significantly improve efficiency, notably if it circulates on its own infrastructure (subway, light rail, buses on reserved lanes, etc.).

All these measures only partially address the issue of congestion, as they alleviate, but do not solve the problem.

Text 26

The Urban Transit Challenge

As cities continue to become more dispersed, the cost of building and operating public transportation systems increases. For instance, only about 80 large urban agglomerations have a subway system, the great majority of them being in developed countries. Furthermore, dispersed residential patterns characteristic of automobile dependent cities makes public transportation systems less convenient for the average commuter.

In many cities additional investments in public transit did not result in significant additional ridership. Unplanned and uncoordinated land development has led to rapid expansion of the urban periphery. Residents may become isolated in outlying areas without access to affordable and convenient public transportation. Over-investment (when investments do not appear to imply significant benefits) and under-investment (when there is a substantial unmet demand) in public transit are both complex challenges.

Urban transit is often perceived as the most efficient transportation mode for urban areas, notably large cities. However, surveys reveal stagnation or a decline of public transit systems, especially in North America. The economic relevance of public transit is being questioned. Most urban transit developments had little, if any impacts to alleviate congestion. This paradox is partially explained by the spatial structure of contemporary cities which are oriented along servicing the needs of the individual, not necessarily the needs of the collectivity.

Thus, the automobile remains the preferred mode of urban transportation. In addition, public transit is publicly owned, implying that it is a politically motivated service that provides limited economic returns. Even in transit-oriented cities such as in Europe, transit systems depend on government subsidies. Little or no competition is permitted as wages and fares regulated, undermining any price adjustments to changes in ridership. Thus public transit often serves the purpose of a social function ("public service") as it provides accessibility and social equity, but with limited relationships with economic activities. Among the most difficult challenges facing urban transit are:

- Decentralization. Public transit systems are not designed to service low density and scattered urban areas that are increasingly dominating the landscape. The greater the decentralization of urban activities, the more difficult and expensive it becomes to serve urban areas with public transit.

- Fixity. The infrastructures of several public transit systems, notably rail and metro systems are fixed, while cities are dynamical entities. This

implies that travel patterns tend to change and that a transit system built for servicing a specific pattern may eventually face “spatial obsolescence”.

- **Connectivity.** Public transit systems are often independent from other modes and terminals. It is consequently difficult to transfer passengers from one system to the other.

- **Competition.** In view of cheap and ubiquitous road transport systems, public transit faces strong competition. The higher the level of automobile dependency, the more inappropriate the public transit level of service. The public service being offered is simply outpaced by the convenience of the automobile.

Text 27

Automobiles

1. The difference between spark ignition engines and diesel engines.
Just before burning their fuels, both engines compress air inside a sealed cylinder. This compression process adds energy to the air and causes its temperature to skyrocket. In a spark ignition engine, the air that's being compressed already contains fuel so this rising temperature is a potential problem. If the fuel and air ignite spontaneously, the engine will “knock” and won't operate at maximum efficiency.

The fuel and air mixture is expected to wait until it's ignited at the proper instant by the spark plug. That's why gasoline is formulated to resist ignition below a certain temperature. The higher the “octane” of the gasoline, the higher its certified ignition temperature.

Virtually all modern cars operate properly with regular gasoline. Nonetheless, people frequently put high-octane (high-test or premium) gasoline in their cars under the mistaken impression that their cars will be better for it. If your car doesn't knock significantly with regular gasoline, use regular gasoline. A diesel engine doesn't have spark ignition.

Instead, it uses the high temperature caused by extreme compression to ignite its fuel. It compresses pure air to high temperature and pressure, and then injects fuel into this air. Timed to arrive at the proper instant, the fuel bursts into flames and burns quickly in the superheated compressed air. In contrast to gasoline, diesel fuel is formulated to ignite easily as soon as it enters hot air.

2. An automatic transmission in a car. An automatic transmission contains two major components: a fluid coupling that controls the transfer of torque from the engine to the rest of the transmission and a gearbox that controls the mechanical advantage between the engine and the wheels. The fluid coupling resembles two fans with a liquid circulating between them. The engine turns one fan, technically known as an “impeller”, and this

impeller pushes transmission fluid toward the second impeller. As the liquid flows through the second impeller, it exerts a twist (a “torque”) on the impeller.

If the car is moving or is allowed to move, this torque will cause the impeller to turn and, with it, the wheels of the car. If, however, the car is stopped and the brake is on, the transmission fluid will flow through the second impeller without effect. Overall, the fluid coupling allows the efficient transfer of power from the engine to the wheels without any direct mechanical linkage that would cause trouble when the car comes to a stop.

Between the second impeller and the wheels is a gearbox. The second impeller of the fluid coupling causes several of the gears in this box to turn and they, in turn, cause other gears to turn. Eventually, this system of gears causes the wheels of the car to turn. Along with these gears are several friction plates that can be brought into contact with one another by the transmission to change the relative rotation rates between the second impeller and the car’s wheels.

These changes in relative rotation rate give the car the variable mechanical advantage it needs to be able to both climb steep hills and drive fast on flat roadways. Finally, some cars combine parts of the gear box with the fluid coupling in what is called a “torque converter”. Here the two impellers in the fluid coupling have different shapes so that they naturally turn at different rates. This asymmetric arrangement eliminates the need for some gears in the gearbox itself.

3. The difference between internal and external combustion engines.

External combustion engines burn a fuel outside of the engine and produce a hot working fluid that then powers the engine. The classic example of an external combustion engine is a steam engine. Internal combustion engines burn fuel directly in the engine and use the fuel and the gases resulting from its combustion as the working fluid that powers the engine. An automobile engine is a fine example of an internal combustion engine.

4. Why are there pistons in an engine? The pistons in a gasoline engine compress the fuel and air mixture before ignition and then extract energy from the burned gases after ignition. When the engine is operating, each piston travels in and out of a cylinder with one closed end many times a second. The piston makes four different strokes during its travels. In the first or “intake” stroke, the piston travels away from the closed end of the cylinder and draws the fuel and air mixture into the cylinder through an opened valve.

During the second or “compression” stroke, the piston travels toward the closed end of the cylinder and compresses the fuel and air mixture to high pressure, density, and temperature. The spark plug now ignites the fuel and air mixture and it burns. During the third or “power” stroke, the

piston travels away from the closed end of the cylinder and the expanding gases do work on the piston, providing it with the energy that propels the car forward. During the fourth or “exhaust” stroke, the piston travels toward the closed end of the cylinder and pushes the burned gases out of the cylinder through another opened valve.

5. *An internal combustion engine.* An internal combustion engine burns a mixture of fuel and air in an enclosed space. This space is formed by a cylinder that’s sealed at one end and a piston that slides in and out of that cylinder. Two or more valves allow the fuel and air to enter the cylinder and for the gases that form when the fuel and air burn to leave the cylinder. As the piston slides in and out of the cylinder, the enclosed space within the cylinder changes its volume. The engine uses this changing volume to extract energy from the burning mixture.

The process begins when the engine pulls the piston out of the cylinder, expanding the enclosed space and allowing fuel and air to flow into that space through a valve. This motion is called the intake stroke. Next, the engine squeezes the fuel and air mixture tightly together by pushing the piston into the cylinder in what is called the compression stroke. At the end of the compression stroke, with the fuel and air mixture squeezed as tightly as possible, the spark plug at the sealed end of the cylinder fires and ignites the mixture. The hot burning fuel has an enormous pressure and it pushes the piston strongly out of the cylinder.

This power stroke is what provides power to the car that’s attached to the engine. Finally, the engine squeezes the burned gas out of the cylinder through another valve in the exhaust stroke. These four strokes repeat over and over again to power the car. To provide more steady power, and to make sure that there is enough energy to carry the piston through the intake, compression, and exhaust strokes, most internal combustion engines have at least four cylinders (and pistons). That way, there is always at least one cylinder going through the power stroke and it can carry the other cylinders through the non-power strokes.

6. *A steam engine.* Like the internal combustion engines used in automobiles, a steam engine is a type of heat engine--a device that diverts some of the heat flowing from a hotter object to a colder object and that turns that heat into useful work. The fraction of heat that can be converted to work is governed by the laws of thermodynamics and increases with the temperature difference between the hotter and colder objects. In the case of the steam engine, the hotter the steam and the colder the outside air, the more efficient the engine is at converting heat into work.

A typical steam engine has a piston that moves back and forth inside a cylinder. Hot, high-pressure steam is produced in a boiler and this steam enters the cylinder through a valve. Once inside the cylinder, the steam

pushes outward on every surface, including the piston. The steam pushes the piston out of the cylinder, doing mechanical work on the piston and allowing that piston to do mechanical work on machinery attached to it.

The expanding steam transfers some of its thermal energy to this machinery, so the steam becomes cooler as the machinery operates. But before the piston actually leaves the steam engine's cylinder, the valve stops the flow of steam and opens the cylinder to the outside air. The piston can then reenter the cylinder easily. In many cases, steam is allowed to enter the other end of the cylinder so that the steam pushes the piston back to its original position. Once the piston is back at its starting point, the valve again admits high-pressure steam to the cylinder and the whole cycle repeats. Overall, heat is flowing from the hot boiler to the cool outside air and some of that heat is being converted into mechanical work by the moving piston.

7. *What is the purpose of pistons in an engine?* The piston moves in and out of a cylinder, moving the air, fuel, and exhaust about and extracting work from the burned fuel and air. Without the piston, there would be no way to obtain energy from the gasoline.

Text 28

History of Electrical Engineering

According to thales of Miletus, writing at around 600 BC, a form of electricity was known to the Ancient Greeks who found that rubbing fur on various substances, such as amber, would cause a particular attraction between the two. The Greeks noted that the amber buttons could attract light objects such as hair and that if they rubbed the amber for long enough they could even get a spark to jump. An object found in Iraq in 1938, dated to about 250 BC and called the Baghdad Battery, resembles a galvanic cell and is believed by some to have been used for electroplating.

Electricity has been a subject of scientific interest since at least the 17th century. A friction machine was constructed at about 1663 by Otto von Guericke, using a rotating sulphur globe rubbed by hand. Isaak Newton suggested the use of a glass globe instead of a sulphur one (Optics, 8th Query). In the latter part of the 18th Century, Benjamin Franklin, Ewald Jurgen George von Kleist, and Pieter van musschenbroek (the last two the inventors of the Leyden jar) made several important discoveries concerning electrostatic machines.

The first suggestion of an influence machine appears to have grown out of the invention of Alessandro Volta's electrophorus. "Doubblers" were the first rotating influence machines. Abraham Bennet, the inventor of the

gold leaf electroscope, described a “doubler” or “machine for multiplying electric charges”. The Bennet’s doubler was developed in 1787.

In the 19th century, the subject of electrical engineering, with the tools of modern research techniques, started to intensify. Notable developments in this century include the work of Georg Ohm, who in 1827 quantified the relationship between the electric current and potential difference in a conductor, Michael Faraday, the discoverer of electromagnetic induction in 1831, and James Clerk Maxwell, who in 1873 published a unified theory of electricity and magnetism in his treatise on Electricity and Magnetism.

In the 1830s, Georg Ohm also constructed an early electrostatic machine. The hopolar generator was developed first by Michael Faraday during his memorable experiments in 1831. It was the beginning of modern dynamos – that is, electrical generators which operate using a magnetic field. In 1878, the British inventor James Wimshurst developed an apparatus that had two glass disks mounted on two shafts (ed. it was not till 1883 that the Wimshurst machine was more fully reported to the scientific community).

During the latter part of the 1800s, the study of electricity was largely considered to be a subfield of physics. It was not until the late 19th century that universities started to offer degrees in electrical engineering. In 1883 Cornell University introduced the world’s first course of study in electrical engineering and in 1885 the University College London founded the first chair of electrical engineering in the United Kingdom. The University of Missouri subsequently established the first department of electrical engineering in the United States in 1886.

During this period work in the area increased dramatically. In 1882 Edison switched on the world’s first large-scale electrical supply network that provided 110 volts direct current to fifty-nine customers in lower Manhattan. In 1887 Nikola Tesla filed a number of patents related to a competing form of power distribution known as alternating current. In the following years a bitter rivalry between Tesla and Edison, known as the “War of Currents”, took place over the preferred method of distribution. AC eventually replaced DC for generation and power distribution, enormously extending the range and improving the safety and efficiency of power distribution.

The efforts of the two did much to further electrical engineering–Tesla’s work on induction motors and polyphase systems influenced the field for years to come, while Edison’s work on telegraphy and his development of the stock ticket proved lucrative for his company, which ultimately became General Electric. However, by the end of the 19th century, other key figures in the progress of electrical engineering were

beginning to emerge. Charles Proteus Steinmetz help fostered the development of alternating current that made possible the expansion of the electric power industry in the United States, formulating mathematical theories for engineers.

Konrad Zuse invented the first electrical computer, the Z22. It still is functional and stands in Berlin.

During the development of radio, many scientists and inventors contributed to radio technology and electronics. In his classic UHF* experiments of 1888, Heinrich Hertz transmitted (via a spark-gap transmitter) and detected radio waves using electrical equipment. In 1895, Nikola Tesla was able to detect signals from the transmissions of his New York lab at West Point (a distance of 80.4 km). In 1896, Alexander Popov made the wireless transmissions across 60 m and Guglielmo Marconi, around the same time, made a transmission across 2.4 km. John Fleming invented the first radio tube, the diode, in 1904.

Reginald Fessenden recognized that a continuous wave transmission was required for speech for radio and he continued the work of Nikola Tesla, John Stone Stone, and Elihu Thomson on this subject. By the end of 1906, Fessenden sent the first radio broadcast of voice. Also in 1906, Robert von Lieben and Lee De Forest independently developed the amplifier tube, called the triode. Edwin Howard Armstrong developed in 1914 the FM radio. Manfred von Ardenne later introduced the cathode ray tube, a crucial enabling technology for electronic television, in 1931.

The second world war saw tremendous advances in the field of electronics; especially in RADAR and with the invention of the magnetron by Randle and Boot at the University of Birmingham in 1940. Radio location, radio communication and radio guidance of aircraft were all developed in Britain at this time. An early electronic computing device, “Colossus” was built by Tommy Flowers to decipher the coded messages of the German Lorenz cipher machine*.

Also developed at this time were advanced clandestine radio transmitters and receivers for use by secret agents. An American invention at the time was a device to scramble the telephone calls between Churchill and Roosevelt. This was called the Green Hornet system and worked by inserting noise into the signal. The noise was then extracted at the receiving end. This system was never broken by the Germans.

A great amount of work was undertaken in the United States as part of the War Training Programme in the areas of radio direction finding, pulsed linear networks, frequency modulation, vacuum tube circuits, transmission line theory and fundamentals of electromagnetic engineering. These studies were published shortly after the war in what became known as the ‘Radio Communication Series’ published by McGraw hill 1946. In

1941 Konrad Zuse presented the Z3, the world's first fully functional and programmable computer.

Prior to the second world war, the subject was commonly known as 'radio engineering' and basically was restricted to aspects of communications and RADAR, commercial radio and early television. At this time, study of radio engineering at universities could only be undertaken as part of a physics degree.

Later, in post war years, as consumer devices began to be developed, the field broadened to include modern TV, audio systems, Hi-Fi and latterly computers and microprocessors. In 1946 the ENIAC* of John Presper Eckert and John Mauchly followed, beginning the computing era. The arithmetic performance of these machines allowed engineers to develop completely new technologies and achieve new objectives, including the Apollo missions and the NASA* moon landing.

The invention of the transistor in 1947 by William B. Shockley, John Bardeen and Walter Brattain opened the door for more compact devices and led to the development of the integrated in 1958 by Jack Kilby and independently in 1959 by Robert Noyce. In the mid to late 1950s, the term radio engineering gradually gave way to the name electronics engineering, which then became a stand alone university degree subject, usually taught alongside electrical engineering with which it had become associated due to some similarities.

In 1968 Marcian Hoff invented the first microprocessor at Intel and thus ignited the development of the personal computer. The first realization of the microprocessor was the Intel 4004, a 4-bit processor developed in 1971, but only in 1973 did the Intel 8080, an 8-bit processor, make the building of the first personal computer.

**UHF – Ultra High Frequency – сверхвысокая частота*

**криптографическая [шифровальная] машина*

**ENIAC – Electronic Numerical Integrator and Computer*

**NASA – National Aeronautics and Space Administration – Национальный комитет по авиации и исследованию космического пространства*

Text 29

Subcutaneous Implant

The technology now exists and has been successfully tested to allow an identification device of some type, including a tiny microchip, to be implanted under the skin of the hand. Programmable subcutaneous visible implants could contain biosensors to monitor temperature and blood pressure, and display these readings – clearly a medical advancement.

But the devices could have a more serious purpose. They could be used for electronic tagging. Whenever anyone wanted to buy or sell something, he could be required to wave his hand over a scanning device that would read the chip, identify the buyer or seller, and validate or invalidate the sale.

Interval Research (Palo Alto) has patented a “programmable tattoo”. The biologically inert subcutaneous implant is constructed of a flexible material so as to conform to the skin’s surface. The small liquid-crystal display can be inserted just beneath the skin (e.g., in place of a wrist watch). Because human skin is partially transparent, the display is clearly visible.

The implant also includes a receiver for receiving programming information from a user, and a display for displaying the programming information through the skin. The display is connected to a control chip and power comes from a small battery. Both of these are implanted beneath the skin. Implanting is an outpatient operation and the battery can be recharged inductively, by holding the wrist near a charger.

We have already demonstrated our willingness to accept devices to electronically tag or track individuals. It has become quite commonplace, for example, for law enforcement agencies to require individuals to wear electronic bracelets in order to monitor their activities.

Text 30

Digital Angel

The Digital Angel™ technology incorporates a microchip that can be worn close to the body and includes biosensors that can measure the biological parameters of the body and send the information with RFID (radio frequency identification) technology to a ground station or computer. It will also have an antenna that can receive signals from GPS satellites, thus pinpointing the location of the wearer.

According to the Digital Angel™ web site, while a number of other tracking and monitoring technologies have been patented and marketed in the past, they are all unsuitable for the widespread tracking, recovery and identification of people due to a variety of limitations, including unwieldy size, maintenance requirements, insufficient or inconvenient power-supply and activation difficulties. For the first time in the history of location and monitoring technology, Digital Angel™ overcomes these limitations.

Some of its potential uses, according to their web site include: monitor patients by doctors, commodities supply chain management, locating people such as small children and the elderly, tracking parolees, people under house arrest, and individuals in witness protection programmes, trace valuable items such as art pieces or computer

equipment. Of particular interest is its application as an important security measure. It can carry personal identification information and transmit this information via wireless communication with personal computers.

The Digital Angel human implant, called VeriChips, was recently approved by the FDA* for storing medical information and the company is going forward to market their implantable chips that would provide easy access to individual medical records. (WorldNetDaily, October 21, 2004). Applied Digital Solutions, based in Delray Beach, Fla., expressed hope that such medical uses would accelerate the acceptance of under-the-skin ID chips as security and access-control devices (The New York Times, October 14, 2004).

All it takes is a syringe-injected microchip implant for patrons of the Baja Beach Club in Barcelona, Spain to breeze past a “reader” that recognizes their identity, credit balance and even automatically opens doors to exclusive areas of the club for them. “By simply passing by our reader, the Baja Beach Club will know who you are and what your credit balance is”, Conrad K. Chase explains.

**FDA – Food and Drug Administration – Управление по санитарному надзору за качеством пищевых продуктов и медикаментов (США)*

Text 31

Iriscans

Iriscan technology is already being introduced in financial organizations here and abroad that require nonintrusive, noncontact, and accurate electronic identification. Iriscan technology identifies people by analyzing the unique pattern in the iris of the human eye.

The iris is the coloured ring of tissue that surrounds the pupil of the eye and is a complex combination of patterns that can be recorded and stored by the computer. The iris-recognition product captures a photographic image of the iris, analyzes its unique visual structure, and then compares it to previously stored Iriscodes for authentication of identity. Imagine this technology being in place providing access control to facilities and point-of-sale control. It's already in place at some bank ATMs*.

**ATM – automatic teller machine – банковский автомат, банкомат*

Text 32

Bar Codes

Bar codes are everywhere: they are as familiar as a trip to buy groceries. Now part of almost every package that crosses the supermarket, drugstore, and retail counter, bar codes stand poised to move into many other facets of society. In their quest for better device identification, the U.S. Department of Defense and NASA are testing coding systems that pack in much more information than current bar codes. These new “two-dimensional” bar codes can squeeze in enough information to fit the Gettysburg Address into a two-inch square. It’s a technology that will open up a whole range of applications.

This next generation of identification codes needs no centralized database. Instead, the symbol itself can contain all the necessary information. Thus these codes can help companies and the military keep better track of products that cross organizational boundaries. When the device, substance or person travels to a new warehouse, store, hospital or location, all its data go along, in compact form, accessible to anyone with a machine that can read the symbol. Miniaturized, some of these new codes can identify electronic components, jewelry or even medical devices. It represents a giant step in component traceability.

Text 33

Ethical Problems with Modern Technology

Everyday, our life spectrum is broadening, and new technologies are created. Many different types of technologies are available and are used through our computers. Computers are present in every aspect of our lives. But it is quite surprising that very few people truly understand how computers work, or pause to think about the changes computers cause in our lives and in our society. They perform many ordinary, everyday functions and also perform many life-critical tasks. We bank by computer, we shop by computer, and we even rely on computers for medical treatments.

Computer programmers and computer scientists make all of this possible. Questions that a computer programmer may deal with include queries such as: Are ethics integrated into the computer science industry? What role do the codes of conduct really play for programmers? How are these codes of conduct implemented and applied? What is being done to limit people from programming/developing anything they wish? Do most programmers ignore the coding standards and the codes of ethics that are set forth by multiple professional computer associations? Because of the prevalence of computers in our everyday lives, it is important to

understand how programmers view ethics, and what kind of roles that ethics play in their daily work.

The American Heritage Dictionary describes ethics as “The rules or standards governing the conduct of a person or the members of a profession”. Ethics is “The science of human duty; the body of rules drawn from this science; a particular system of principles and rules concerning duty, whether true or false”. In general, ethics are rules that govern actions and decisions in a particular profession.

Computer ethics may be defined as an academic field in its own right with unique ethical issues that would not have existed if computer technology had not been invented. Computers rely on programming, which is limitless; if one can dream it, one can design the programme and implement it. Ethical questions about the uses and applications of electronic computers have been raised since their inception approximately sixty years ago.

Text 34

Informational Environment of the Sphere of Education of Russia

New Information Technologies (NIT) is a major factor, which determines the quality of education in modern society. These technologies are actively used in educational processes, scientific research in the universities, management of educational enterprises and for the satisfaction of informational, social and cultural needs of all participants in the educational process. The peculiarity of the educational system in connection with new information technologies is evinced by the fact that this system is not only a consumer of NIT but is a source of development and advancement of these technologies and actively participates in the formation of a modern informational environment.

Today, the educational system of Russia has a vast information infrastructure which includes 89 educational and scientific centres functioning under the supervision of the Centre for New Information Technologies of Ministry of General and Professional Education of Russia. These centres are, as a rule, units of the large universities and subdivided by scale and function into republican, regional, municipal, special (objective) Centres of New Information Technologies (CNIT).

All these centres have modern computer equipment, qualified personnel and developed telecommunication possibilities. More than 30 of these centres carry out a role in the universities network of Russia RUNNET nodes, work in tight contact with the Internet Centres of Dj. Soros. Regional Centres of Information Technologies were organized with the maintenance of the regional authorities and Rectors Counsels of the

Region. They carry out a broad spectrum of functions connected with the implementation of new information technologies in all spheres of regional activity.

In the wealth of manifestations of NIT in the sphere of education, Internet is the most important of course. The main telecommunication Internet environment for the educational enterprises in Russia is RUNNET (Russian Universities Network). This network has nodes in 34 large towns of Russia (Moscow, St. Petersburg, Novosibirsk, Tomsk, Vladivostok, Tambov, etc.). Summary capacity of the external channels of the RUNNET is 10 Mbps (Tele globe 6 Mbps and NORDUnet). This makes it possible to work with modern multimedia applications not only in Russia with an acceptable quality. RUNNET structure actively uses satellite segments and ground fiber optic lines.

Experiments with high speed ATM* channels are on the agenda. In particular the exploitation of ATM channel Moscow/St. Petersburg has begun. RUNNET is not the only network which lets educational enterprises access Internet. RBNET, Relarn-IP, FreeNet, RadioMSU are the others. Besides these networks, which have external links, regional and corporate networks have been actively developed over the last few years.

These regional networks allow a broad range of schools, colleges and universities to be connected to the Internet at the local level. Examples of these regional networks of science and education are ROKSON (St. Petersburg), KUBANNet (Kuban), EUNET (Ekaterinburg), TSUNet (Tambov) and others. The mentioned networks incorporate in their structure local networks of regional educational enterprises. Therefore today we can speak of the existence of a rapidly developed unified telecommunication information environment in the educational sphere of Russia.

The informational processes in this environment evolve in different directions. In the context of this conference the most interesting is of course the direction connected with people active in the sphere of art and culture. Almost all www servers of the regional centres of new information technologies have pages devoted to regional history, culture and art, proposed virtual photo tours associated with sights, and architectural monuments of historical importance. The regional museums are represented on many www servers of CNIT and universities.

On the www server of Voronezh state university we can see Voronezh museum of literature of I.S. Nikitin, Regional historic museum, Ostrogzh art museum, museum of I.N. Kramskoy, Alexandrov people museum of M.E. Piatnitsky. The big gallery of Novgorod icons is represented on the www server of Novgorod state university. A big list of museums is on the www server of Kazan state university (Ethnography

museum, Archeological museum, Museum of A.M. Gorky, virtual museum of jewellery). On the www server of Tambov state technical university we can see pages of Tambov regional art gallery, museum of A.M. Gerasimov, museum of G.V. Chicherin, Tambov historic museum, museum of people education and others. Art museum, Russian museum of photography and others find space on the www server maintained by the State university of Nizhny Novgorod. One can see pages of the Y.M. Lermontov museum in Tarhany on the www server of Penza state university. Karelia state museum, art museum and others are represented on the server of Petrozavodsk state university. On the server of Vladivostok state university one can find pages of Archeology museum.

Besides the reflection on the www pages of Russian universities of real flesh and blood museums, the important role belongs to the virtual museums which exist only on www pages. For example, the students' projects of the Russian state humanitarian university founded the basis for the so-called \ '93Open museum\ '94 on the server.

On the Moscow state university www server one can see the mirrors of the famous virtual museums of Nicolas Pioch and Carol Jackson. WWW server of Perm state university has interesting Virtual club of Perms photo artists, Virtual modern art gallery, Cartoons gallery. On the server of Krasnoyarsk technical state university the exhibition of modern Krasnoyarsk artists is represented. Virtual museum of applied art of Siberia is placed on the www server of Novosibirsk state technical university.

The constant increase of the bandwidth of telecommunication networks of science and education; improvements in compression techniques, improvements of the technical parameters of servers and client hardware, stimulate the teams of universities server developers.

Particular examples of these experiments can be found on the www servers of the Centre of New Information Technologies of Ministry of Education of Russia, the server of Volgograd state technical university, Cheliabinsk state technical university and others. It is an interesting fact that in many cases www pages devoted to the history, art and culture emerge not only on the www servers of "classical" universities but on the servers of technical universities. This testifies to the expressive humanitarian influence of the Internet to the technological culture of society and to that of technical education in particular.

** ATM – asynchronous transfer mode – асинхронный режим передачи – (стандартизованная ИТУ (International Telecommunication Union) технология коммутации пакетов фиксированной длины)*

Text 35

Electricity

Electricity is the flow of electrical power or charge. It is a secondary energy source which means that we get it from the conversion of other sources of energy, like coal, natural gas, oil, nuclear power and other natural sources, which are called primary sources. The energy sources we use to make electricity can be renewable or non-renewable, but electricity itself is neither renewable nor non-renewable.

Electricity is a basic part of nature and it is one of our most widely used forms of energy. Many cities and towns were built alongside waterfalls (a primary source of mechanical energy) that turned water wheels to perform work. Before electricity generation began slightly over 100 years ago, houses were lit with kerosene lamps, food was cooled in iceboxes, and rooms were warmed by wood-burning or coal-burning stoves.

Beginning with Benjamin Franklin's experiment with a kite one stormy night in Philadelphia, the principles of electricity gradually became understood. Thomas Edison helped change everyone's life – he perfected his invention – the electric light bulb.

Prior to 1879, direct current (DC) electricity had been used in arc lights for outdoor lighting. In the late-1800s, Nikola Tesla pioneered the generation, transmission, and use of alternating current (AC) electricity, which can be transmitted over much greater distances than direct current. Tesla's inventions used electricity to bring indoor lighting to our homes and to power industrial machines.

Despite its great importance in our daily lives, most of us rarely stop to think what life would be like without electricity. Yet like air and water, we tend to take electricity for granted. Every day, we use electricity to do many jobs for us – from lighting and heating/cooling our homes, to powering our televisions and computers.

Electricity is a controllable and convenient form of energy used in the applications of heat, light and power. In order to understand how electric charge moves from one atom to another, we need to know something about atoms. Everything in the universe is made of atoms—every star, every tree, every animal. The human body is made of atoms. Air and water are, too. Atoms are the building blocks of the universe. Atoms are so small that millions of them would fit on the head of a pin.

Atoms are made of even smaller particles. The center of an atom is called the nucleus. It is made of particles called protons and neutrons. The protons and neutrons are very small, but electrons are much, much smaller. Electrons spin around the nucleus in shells a great distance from the

nucleus. If the nucleus were the size of a tennis ball, the atom would be the size of the Empire State Building. Atoms are mostly empty space.

If you could see an atom, it would look a little like a tiny center of balls surrounded by giant invisible bubbles (or shells). The electrons would be on the surface of the bubbles, constantly spinning and moving to stay as far away from each other as possible. Electrons are held in their shells by an electrical force.

The protons and electrons of an atom are attracted to each other. They both carry an electrical charge. An electrical charge is a force within the particle. Protons have a positive charge (+) and electrons have a negative charge (-). The positive charge of the protons is equal to the negative charge of the electrons. Opposite charges attract each other.

When an atom is in balance, it has an equal number of protons and electrons. The neutrons carry no charge and their number can vary. The number of protons in an atom determines the kind of atom, or element, it is. An element is a substance in which all of the atoms are identical (the Periodic Table shows all the known elements). Every atom of hydrogen, for example, has one proton and one electron, with no neutrons. Every atom of carbon has six protons, six electrons, and six neutrons. The number of protons determines which element it is.

Electrons usually remain a constant distance from the nucleus in precise shells. The shell closest to the nucleus can hold two electrons. The next shell can hold up to eight. The outer shells can hold even more. Some atoms with many protons can have as many as seven shells with electrons in them. The electrons in the shells closest to the nucleus have a strong force of attraction to the protons. Sometimes, the electrons in the outermost shells do not. These electrons can be pushed out of their orbits. Applying a force can make them move from one atom to another. These moving electrons are electricity.

Text 36

Static Electricity

Electricity has been moving in the world forever. Lightning is a form of electricity. It is electrons moving from one cloud to another or jumping from a cloud to the ground. Have you ever felt a shock when you touched an object after walking across a carpet? A stream of electrons jumped to you from that object. This is called static electricity.

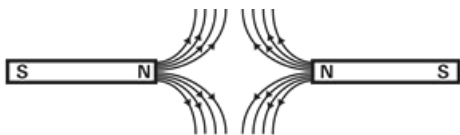
Have you ever made your hair stand straight up by rubbing a balloon on it? If so, you rubbed some electrons off the balloon. The electrons moved into your hair from the balloon. They tried to get far away from each other by moving to the ends of your hair. They pushed against each

other and made your hair move—they repelled each other. Just as opposite charges attract each other, like charges repel each other.

Text 37

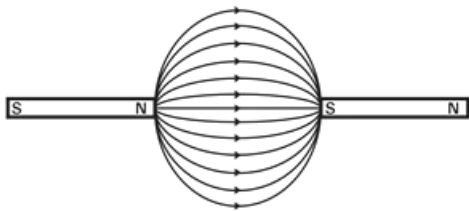
Magnets and Electricity

The spinning of the electrons around the nucleus of an atom creates a tiny magnetic field. Most objects are not magnetic because the atoms are arranged so that the electrons spin in different, random directions, and cancel out each other.



Magnets are different; the molecules in magnets are arranged so that the electrons spin in the same direction. This arrangement of atoms creates two poles in a magnet, a North-seeking pole and a South-seeking pole.

A magnet is labeled with North (N) and South (S) poles. The magnetic force in a magnet flows from the North pole to the South pole. This creates a magnetic field around a magnet.



Opposite poles of magnets (N-S) attract each other.

Have you ever held two magnets close to each other? They don't act like most objects. If you try to push the South poles together, they repel each other. Two North poles also repel each other.

Turn one magnet around and the North (N) and the South (S) poles are attracted to each other. The magnets come together with a strong force. Just like protons and electrons, opposites attract.

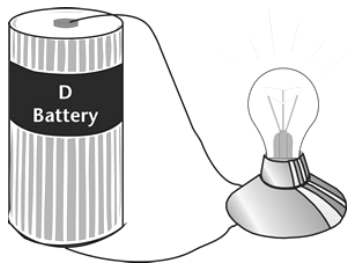
These special properties of magnets can be used to make electricity. Moving magnetic fields can pull and push electrons. Some metals, like copper, have electrons that are loosely held. They can be pushed from their shells by moving magnets. Magnets and wire are used together in electric generators.

Text 38

Batteries Produce Electricity

A battery produces electricity using two different metals in a chemical solution. A chemical reaction between the metals and the chemicals frees more electrons in one metal than in the other. One end of the battery is attached to one of the metals; the other end is attached to the other metal. The end that frees more electrons develops a positive charge and the other end develops a negative charge.

If a wire is attached from one end of the battery to the other, electrons flow through the wire to balance the electrical charge. A load is a device that does work or performs a job. If a load—such as a lightbulb—is placed along the wire, the electricity can do work as it flows through the wire. In the picture above, electrons flow from the negative end of the battery through the wire to the lightbulb. The electricity flows through the wire in the lightbulb and back to the battery.



Text 39

Electricity Travels in Circuits

Electricity travels in closed loops, or circuits (from the word circle). It must have a complete path before the electrons can move. If a circuit is open, the electrons cannot flow. When we flip on a light switch, we close a circuit. The electricity flows from the electric wire through the light and back into the wire. When we flip the switch off, we open the circuit. No electricity flows to the light.

When we turn a light switch on, electricity flows through a tiny wire in the bulb. The wire gets very hot. It makes the gas in the bulb glow. When the bulb burns out, the tiny wire has broken. The path through the bulb is gone. When we turn on the TV, electricity flows through wires inside the set, producing pictures and sound. Sometimes electricity runs motors – in washers or mixers. Electricity does a lot of work for us. We use it many times each day.

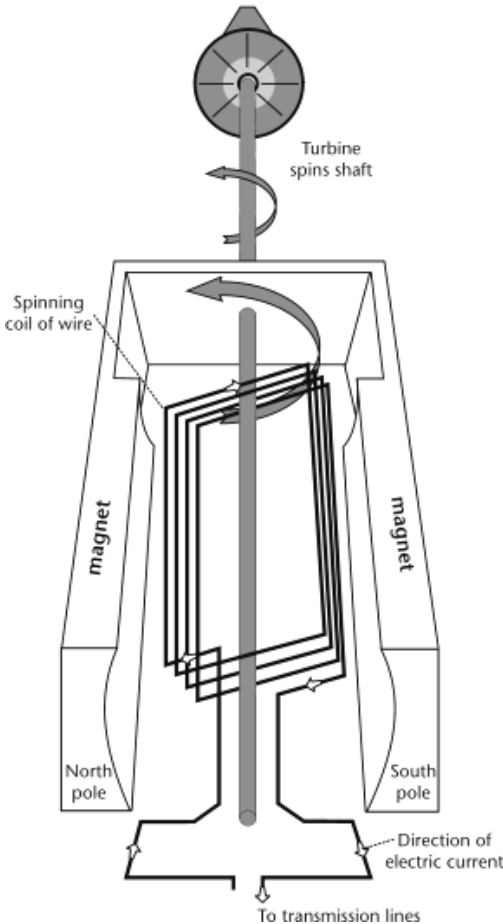
Text 40

How Electricity Is Generated

A generator is a device that converts mechanical energy into electrical energy. The process is based on the relationship between magnetism and electricity. In 1831, Faraday discovered that when a magnet is moved inside a coil of wire, electrical current flows in the wire.

A typical generator at a power plant uses an electromagnet—a magnet

TURBINE GENERATOR



produced by electricity—not a traditional magnet. The generator has a series of insulated coils of wire that form a stationary cylinder. This cylinder surrounds a rotary electromagnetic shaft. When the electromagnetic shaft rotates, it induces a small electric current in each section of the wire coil. Each section of the wire becomes a small, separate electric conductor. The small currents of individual sections are added together to form one large current. This current is the electric power that is transmitted from the power company to the consumer.

An electric utility power station uses either a turbine, engine, water wheel, or other similar machine to drive an electric generator or a device that converts mechanical or chemical energy to generate electricity. Steam turbines, internal-combustion engines, gas combustion turbines, water turbines, and wind turbines are the most common

methods to generate electricity. Most power plants are about 35 percent efficient. That means that for every 100 units of energy that go into a plant, only 35 units are converted to usable electrical energy.

Most of the electricity in the United States is produced in steam turbines. A turbine converts the kinetic energy of a moving fluid (liquid or gas) to mechanical energy. Steam turbines have a series of blades mounted on a shaft against which steam is forced, thus rotating the shaft connected to the generator. In a fossil-fueled steam turbine, the fuel is burned in a furnace to heat water in a boiler to produce steam. Coal, petroleum (oil), and natural gas are burned in large furnaces to heat water to make steam that in turn pushes on the blades of a turbine. Did you know that coal is the largest single primary source of energy used to generate electricity in the United States? In 2005, more than half (51%) of the country's 3.9 trillion kilowatthours of electricity used coal as its source of energy.

Natural gas, in addition to being burned to heat water for steam, can also be burned to produce hot combustion gases that pass directly through a turbine, spinning the blades of the turbine to generate electricity. Gas turbines are commonly used when electricity utility usage is in high demand. In 2005, 17% of the nation's electricity was fueled by natural gas.

Petroleum can also be used to make steam to turn a turbine. Residual fuel oil, a product refined from crude oil, is often the petroleum product used in electric plants that use petroleum to make steam. Petroleum was used to generate about three percent (3%) of all electricity generated in U.S. electricity plants in 2005.

Nuclear power is a method in which steam is produced by heating water through a process called nuclear fission. In a nuclear power plant, a reactor contains a core of nuclear fuel, primarily enriched uranium. When atoms of uranium fuel are hit by neutrons they fission (split), releasing heat and more neutrons. Under controlled conditions, these other neutrons can strike more uranium atoms, splitting more atoms, and so on. Thereby, continuous fission can take place, forming a chain reaction releasing heat. The heat is used to turn water into steam, that, in turn, spins a turbine that generates electricity. Nuclear power was used to generate 20% of all the country's electricity in 2005.

Hydropower, the source for almost 7% of U.S. electricity generation in 2005, is a process in which flowing water is used to spin a turbine connected to a generator. There are two basic types of hydroelectric systems that produce electricity. In the first system, flowing water accumulates in reservoirs created by the use of dams. The water falls through a pipe called a penstock and applies pressure against the turbine blades to drive the generator to produce electricity. In the second system,

called run-of-river, the force of the river current (rather than falling water) applies pressure to the turbine blades to produce electricity.

Geothermal comes from heat energy buried beneath the surface of the earth. In some areas of the country, enough heat rises close to the surface of the earth to heat underground water into steam, which can be tapped for use at steam-turbine plants. This energy source generated less than 1% of the electricity in the country in 2005.

Solar power is derived from the energy of the sun. However, the sun's energy is not available full-time and it is widely scattered. The processes used to produce electricity using the sun's energy have historically been more expensive than using conventional fossil fuels. Photovoltaic conversion generates electric power directly from the light of the sun in a photovoltaic (solar) cell. Solar-thermal electric generators use the radiant energy from the sun to produce steam to drive turbines. In 2005, less than 1% of the nation's electricity was based on solar power.

Wind power is derived from the conversion of the energy contained in wind into electricity. Wind power, less than 1% of the nation's electricity in 2005, is a rapidly growing source of electricity. A wind turbine is similar to a typical wind mill.

Biomass includes wood, municipal solid waste (garbage), and agricultural waste, such as corn cobs and wheat straw. These are some other energy sources for producing electricity. These sources replace fossil fuels in the boiler. The combustion of wood and waste creates steam that is typically used in conventional steam-electric plants. Biomass accounts for about 1% of the electricity generated in the United States.

Text 41

The Transformer

To solve the problem of sending electricity over long distances, William Stanley developed a device called a transformer. The transformer allowed electricity to be efficiently transmitted over long distances. This made it possible to supply electricity to homes and businesses located far from the electric generating plant.

The electricity produced by a generator travels along cables to a transformer, which changes electricity from low voltage to high voltage. Electricity can be moved long distances more efficiently using high voltage. Transmission lines are used to carry the electricity to a substation. Substations have transformers that change the high voltage electricity into lower voltage electricity. From the substation, distribution lines carry the electricity to homes, offices and factories, which require low voltage electricity.

Text 42

History of Oil Extraction

Petroleum, in some form or other, is not a substance new in the world's history. More than four thousand years ago, according to Herodotus and confirmed by Diodorus Siculus, asphalt was employed in the construction of the walls and towers of Babylon; there were oil pits near Ardericca (near Babylon), and a pitch spring on Zacynthus. Great quantities of it were found on the banks of the river Issus, one of the tributaries of the Euphrates. Ancient Persian tablets indicate the medicinal and lighting uses of petroleum in the upper levels of their society.

The first oil wells were drilled in China in the 4th century or earlier. They had depths of up to 243 meters (about 800 feet) and were drilled using bits attached to bamboo poles. The oil was burned to evaporate brine and produce salt. By the 10th century, extensive bamboo pipelines connected oil wells with salt springs. The ancient records of China and Japan are said to contain many allusions to the use of natural gas for lighting and heating. Petroleum was known as burning water in Japan in the 7th century.

In the 8th century, the streets of the newly constructed Baghdad were paved with tar, derived from easily accessible petroleum from natural fields in the region. In the 9th century, oil fields were exploited in the area around modern Baku, Azerbaijan, to produce naphtha. These fields were described by the geographer Masudi in the 10th century, and by Marco Polo in the 13th century, who described the output of those wells as hundreds of shiploads. Petroleum was first distilled by Muslim chemists in the 9th century, producing chemicals such as kerosene.

The earliest mention of American petroleum occurs in Sir Walter Raleigh's account of the Trinidad Pitch Lake in 1595; whilst thirty-seven years later, the account of a visit of a Franciscan, Joseph de la Roche d'Allion, to the oil springs of New York was published in Sagard's *Histoire du Canada*. A Russian traveller, Peter Kalm, in his work on America published in 1748 showed on a map the oil springs of Pennsylvania.

The modern history of petroleum began in 1846 with the discovery of the process of refining kerosene from coal by Atlantic Canada's Abraham Pineo Gesner. The first modern oil well was drilled in 1745 in Pechelbronn, Alsace (France) under the direction of Louis de La Sablonniere, by special appointment of King Louis XV. The Pechelbronn oil field was alive until 1970, and was the birth place of companies like Schlumberger. The first modern refinery was built there in 1857.

Poland's Ignacy Lukasiewicz discovered a means of refining kerosene from the more readily available "rock oil" ("petr-oleum") in 1852 and the first rock oil mine was built in Bobrka, near Krosno in southern Poland in the following year. These discoveries rapidly spread around the world, and Meerzoeff built the first Russian refinery in the mature oil fields at Baku in 1861. At that time Baku produced about 90% of the world's oil.

By 1910, significant oil fields had been discovered in Canada (specifically, in the province of Ontario), the Dutch East Indies (1885, in Sumatra), Iran (1908, in Masjed Soleiman), Peru, Venezuela, and Mexico, and were being developed at an industrial level.

Even until the mid-1950s, coal was still the world's foremost fuel, but oil quickly took over. Following the 1973 energy crisis and the 1979 energy crisis, there was significant media coverage of oil supply levels. This brought to light the concern that oil is a limited resource that will eventually run out, at least as an economically viable energy source. At the time, the most common and popular predictions were always quite dire, and when they did not come true, many dismissed all such discussion. The future of petroleum as a fuel remains somewhat controversial. USA Today news (2004) reports that there are 40 years of petroleum left in the ground. Some would argue that because the total amount of petroleum is finite, the dire predictions of the 1970s have merely been postponed. Others argue that technology will continue to allow for the production of cheap hydrocarbons and that the earth has vast sources of unconventional petroleum reserves in the form of tar sands, bitumen fields and oil shales that will allow for petroleum use to continue in the future, with both the Canadian tar sands and United States shale oil deposits representing potential reserves matching existing liquid petroleum deposits worldwide.

Today, about 90% of vehicular fuel needs are met by oil. Petroleum also makes up 40% of total energy consumption in the United States, but is responsible for only 2% of electricity generation. Petroleum's worth as a portable, dense energy source powering the vast majority of vehicles and as the base of many industrial chemicals makes it one of the world's most important commodities. Access to it was a major factor in several military conflicts including World War II and the Persian Gulf Wars of the late twentieth and early twenty-first centuries. The top three oil producing countries are Saudi Arabia, Russia, and the United States. About 80% of the world's readily accessible reserves are located in the Middle East, with 62.5% coming from the Arab 5: Saudi Arabia (12.5%), UAE, Iraq, Qatar and Kuwait. However, with today's oil prices, Venezuela has larger reserves than Saudi Arabia due to crude reserves derived from bitumen.

Oil occurs in certain geologic formations at varying depths in the Earth's crust, and in many cases elaborate, expensive equipment is required to get it from there. The oil is usually found trapped in a layer of porous sandstone, which lies just beneath a dome-shaped or folded layer of some non-porous rock such as limestone. In other formations the oil is trapped at a fault, or break in the layers of the crust.

In the dome and folded formations natural gas is usually present just below the non-porous layer and immediately above the oil. Below the oil layer the sandstone is usually saturated with salt water. The oil is released from this formation by drilling a well and puncturing the limestone layer on either side of the limestone dome or fold. If the peak of the formation is tapped, only the gas is obtained. If the penetration is made too far from the center, only salt water is obtained. Since the formation may be several miles below the surface this is clearly a difficult business.

The oil in such formation is usually under such great pressure that it flows naturally, and sometimes with great force, from the well. However, in some cases this pressure later diminishes so that the oil must be pumped from the well. Natural gas or water is sometimes pumped into the well to replace the oil that is withdrawn. Oil wells may be either on land or under water. In North America many wells are "offshore" in the shallow parts of the oceans, especially in the Gulf of Mexico. The "crude" or unrefined oil is typically collected from individual wells by small pipelines.

Text 43

Possible Future Sources of Natural Gas

One experimental idea is to use the methane gas that is naturally produced from landfills to supply power to cities. Tests have shown that methane gas could be a financially sustainable power source.

There are plans in Ontario to capture the biogas, methane gases rising from the manure of cattle caged in a factory farm, and to use that gas to provide power to a small town. There is also the possibility that with the source separation of organic materials from the waste stream that by using an anaerobic digester, the methane can be used to produce usable energy. This can be improved by adding other organic material (plants as well as slaughter house waste) to the digester. A speculative source of enormous quantities of methane is from methane hydrate, found under sediments in the oceans. At present (2006), no technology has been developed to recover this source of energy economically.

In any form, a minute amount of odorant such as methyl mercaptan, with a rotting-cabbage-like smell, is added to the otherwise colourless and odorless gas, so that leaks can be detected before a fire or explosion occurs.

Sometimes a related compound, ethyl mercaptan is used, with a rotten-egg smell. Adding odorant to natural gas began in the United States after the 1937 New London School explosion. The buildup of gas in the school went unnoticed, killing three hundred students and faculty when it ignited.

Although concentrated thiols are extremely toxic, it is considered non-toxic in the extremely low concentrations in which it occurs in natural gas delivered to the end user. For example, a safe exposure level to ethyl mercaptan at 5 parts per million over an eight-hour period has been established by the American Congress of Government and Industrial Hygienists (ACGIH).

Actual concentrations used by gas companies are on the order of 5 parts per billion (5 parts in 109), one-thousandth the maximum safe limit. In mines, where methane seeping from rock formations has no odor, sensors are used, and mining apparatus has been specifically developed to avoid ignition sources, e.g., the Davy lamp.

Explosions caused by natural gas leaks occur a few times each year. Individual homes, small businesses and boats are most frequently affected when an internal leak builds up gas inside the structure. Frequently, the blast will be enough to significantly damage a building but leave it standing. In these cases, the people inside tend to have minor to moderate injuries. Occasionally, the gas can collect in high enough quantities to cause a deadly explosion, disintegrating one or more buildings in the process. The gas usually dissipates readily outdoors, but can sometimes collect in dangerous quantities if weather conditions are right. Also, considering the tens of millions of structures that use the fuel, the individual risk of using natural gas is very low.

Some gas fields yield sour gas containing hydrogen sulfide. This untreated gas is toxic. Extraction of natural gas (or oil) leads to decrease in pressure in the reservoir. This in turn may lead to subsidence at ground level. Subsidence may affect ecosystems, waterways, sewer and water supply systems, foundations, etc.

Text 44

Historical Tour of Oklahoma's Oil & Gas Industry

The first recorded oil well in what is now Oklahoma was completed in 1859, the same year that Colonel Edwin Drake ushered in the age of oil at Titusville, Pennsylvania. Although Oklahoma's first oil find was accidental – the driller was seeking saltwater – other oil men quickly invaded the Indian Territory in search of “black gold”. Their efforts were hampered severely by governmental regulation, inadequate transportation facilities and the lack of a readily accessible market.

Nevertheless, on April 15, 1897, a shot of nitroglycerin brought in the Nellie Johnstone No. 1 – The first commercial oil well in Oklahoma. Just before Indian Territory and Oklahoma Territory were united in single statehood in 1907, a fantastic oil-boom era begins in the region. Its immense oil riches ignited a mineral rush that would ebb and flow across the twin territories and the state for more than thirty years and would rival all previous quests for hidden wealth in the American West.

The Oklahoma oil fields were part of the huge Mid-Continent Oil Region that stretched from central Texas across Oklahoma to eastern Kansas. Within this vast reservoir of crude oil were some of the nation's greatest oil finds. Texas boasted of Desdemona, Eastland, Ranger, Breckenridge, Electra and Burkburnett; Kansas has Neodesha, Augusta, Eldorado, and Paola; Oklahoma claimed Cleveland, Red Fork, Glenn Pool, the Osage, Burbank, Cushing, Healdton, Three Sands, Garber, the Greater Seminole, Oklahoma City, and many others.

More than 8,804,000,000 barrels of crude were pumped from the various pools of the Mid-Continent Region from 1900 to 1935. In twenty-seven of these thirty-five years, this region ranked first among the nation's major producing areas. Moreover, in the years between 1918 and 1922 and between 1924 and 1935, the Mid-Continent Oil Region poured forth more than half of all the crude produced within the United States.

Oklahoma was consistently a leader in production within the Mid-Continent Region. For twenty-two of the years between 1900 and 1935 it ranked first among the Mid-Continent Region states in production, and for nine years it was second.

With each new oil pool brought into production, one or more boom towns were created. Many of these suddenly thriving communities previously had been rural hamlets, but others were entirely new creations spawned by the rush for wealth. Most of the boom towns sank back into obscurity or oblivion when production declined from the pools which had given them life. Several of them, however, survived and are modern, progressive communities.

The development of most boom towns followed a similar pattern. First, the discovery of a new pool of oil by an enterprising wildcatter would ignite a frenzy of excitement marked by a furious scramble to lease the most promising lands. With the beginning of drilling activity, the community nearest the fields would be inundated by oil-field workers. This rush of humanity would stimulate the frantic construction of hotels, cafés, pool halls, and other establishments designed to meet the needs of the workers. The town would mushroom as men and women of various backgrounds would flock to the area to share in the wealth generated by the black gold flowing from the earth. Frequently the boom towns were so

crowded that workers were forced to sleep in tents, on rooftops, or even under pool tables.

The fact that many workers who followed the oil strikes either were single men or had left their families at home added to the chaos of the boom towns. Without the stabilizing influence of wives and families, the men were more likely to spend their leisure time and money in saloons, dance halls, and bawdy houses.

Civilizing elements, such as churches and law enforcement agencies, faced a difficult battle under these circumstances. However, in those towns where prosperity persisted over a sufficient period of time, the forces of order and law dominated. More men married or brought their families to the community, schools were constructed, and churches grew in number and attendance. Many of the towns, of course, declined or even died before the civilizing process could take place. Yet, even in those places, law-abiding individuals and legitimate businessmen sought to bring stability to the chaos and to establish enduring cities.

Oil made Oklahoma. It ushered the state into the twentieth century and gave it an economic base that for decade allowed continued development. Boom towns, gambling wildcatters, and the men and women whose labor made it all possible are vital elements of the state's heritage. Moreover, the state's petroleum industry had influence far beyond Oklahoma's borders.

Technological innovations first tried in the Oklahoma oil fields revolutionized the industry, and the oil fortunes made within the state laid the foundations for some of the world's greatest energy companies, which went on to develop the petroleum industry in dozens of other countries. In 1963 the Oklahoma Petroleum Council, later to be merged into the Mid-Continent Oil & Gas Association, and the Oklahoma Historical Society began a cooperative programme to mark some of the significant sites and events in the history of the petroleum industry in Oklahoma.

The participation of the Council and the Association in this activity has been coordinated by a Historical Committee, which works with the Historical Society on research, site selection and dedication plans. In only one other state has there been such a systematic method of telling the story, by means of historical monuments, of the significant role played by oil and gas.

Text 45

Water Treatment in the Middle Ages

The ancient civilizations of Greece and Rome designed amazing aqueducts to route water pathways and provide the first municipal water systems. On the American continent, archeological evidence suggests that

the ancient Mayan civilization used similar aqueduct technology to provide water to urban residents. Further advancements in water technology ended, for the most part, with the fall of these civilizations.

During the Middle Ages, few experiments were attempted in water purification or filtration. Devout Catholicism throughout Europe marked this time period, often known as the Dark Ages due to the lack of scientific innovations and experiments. Because of the low level of scientific experimentation, the future for water purification and filtration seemed very dark.

The first record of experimentation in water filtration, after the blight of the Dark Ages, came from Sir Francis Bacon in 1627. Hearing rumors that the salty water of the ocean could be purified and cleansed for drinking water purposes, he began experimenting in the desalination of seawater. Using a sand filter method, Bacon believed that if he dug a hole near the shore through which seawater would pass, sand particles (presumably heavier than salt particles) would obstruct the passage of salt in the upward passage of the water; the other side of the hole would then provide pure, salt-free water. Sadly, his hypothesis did not prove true, and Bacon was left with salty, undrinkable water. His experiment did mark rejuvenation in water filter experimentation. Later scientists would follow his lead and continue to experiment with water filtration technology.

Text 46

A Great Discovery in Water Filtration History

The Renaissance period, beginning in the late fourteenth century, ended the scientific and intellectual stagnation of the Dark Ages and sparked a new period of discovery. In this period, often called the Age of Discovery, several inventions came about that greatly affected the world. Included among these inventions was the microscope, a scientific innovation that greatly affected the history of water filters.

Long before the actual use of a microscope as we know it today, people had recognized the power of concave glass to make items appear larger and to focus heat from the sun. This discovery was little used until the advent of spectacles in the mid-thirteenth century. It wasn't until the late sixteenth century that such concave pieces of glass, or "lenses" as they were called, became relevant to the history of microscopy, and, consequently, to the history of water filters.

In 1590, two Dutch spectacle makers, Zaccharias Janssen and his son Hans, began experimenting with lenses in a tube and found that they could greatly magnify objects viewed through the tube. This invention was the forerunner to modern-day telescopes and microscopes. A century later,

Anton van Leeuwenhoek, considered the father of microscopy, built upon the Janssen's simple invention. By grinding and polishing the tiny curved lenses, he was able to reach magnifications of up to 270 times the original object. This advanced microscope had a great effect upon the study of water purity and water filtration. Scientists were now able to view tiny material particles present in water that had been presumed to be clean.

Text 47

Early Water Treatment

The earliest recorded attempts to find or generate pure water date back to 2000 b.c.e.. Early Sanskrit writings outlined methods for purifying water. These methods ranged from boiling or placing hot metal instruments in water before drinking it to filtering that water through crude sand or charcoal filters. These writings suggest that the major motive in purifying water was to provide better tasting drinking water. It was assumed that good tasting water was also clean. People did not yet connect impure water with disease nor did they have the technology necessary to recognize tasteless yet harmful organisms and sediments in water.

Centuries later, Hippocrates, the famed father of medicine, began to conduct his own experiments in water purification. He created the theory of the “four humors”, or essential fluids, of the body that related directly to the four temperatures of the seasons. According to Hippocrates, in order to maintain good health, these four humors should be kept in balance. As a part of his theory of the four humors, Hippocrates recognized the healing power of water. For feverish patients, he often recommended a bath in cool water. Such a bath would realign the temperature and harmony of the four humors. Hippocrates acknowledged that the water available in Greek aqueducts was far from pure in its quality.

Like the ancients before him, Hippocrates also believed good taste in water meant cleanliness and purity of that water. Hippocrates designed his own crude water filter to “purify” the water he used for his patients. Later known as the “Hippocratic sleeve”, this filter was a cloth bag through which water could be poured after being boiled. The cloth would trap any sediments in the water that were causing bad taste or smell.

Text 48

The Advent of Municipal Water Treatment

Long before the scientists linked cholera deaths to poor water quality, people were beginning to suggest that pure water be provided to every household through some sort of citywide water filtration. The supposition that every person deserved clean water to drink and bathe in

was related to the general philosophical themes of the Enlightenment period in Europe. During the Age of Enlightenment of the sixteenth through eighteenth centuries, philosophers ruminated over the natural rights of all humanity. The right to clean, pure water began to be associated with these innate rights of all humanity. Such philosophical discussions led the French scientist La Hire to propose that every French household has a sand water filter installed that would provide clean water to that household. Sand filters had become the most popular method of water filtration throughout many European towns.

About 100 years after La Hire first suggested that all citizens should be given the right to pure water, government officials in the United Kingdom began to wonder, also, if every household in their domain should be provided with some kind of filtered water. In 1804, the first citywide, municipal water treatment plant was installed in Paisley, Scotland. This plant would provide filtered water to every household within the city limits. The Scottish water treatment plant depended upon slow sand filters designed by Robert Thom, an important scientist of the Scottish Enlightenment. In 1827, James Simpson, an English scientist, created a similar design to Thom's, and the Simpson water filter models were soon implemented in municipal water treatment plants throughout England.

The slow sand water filters designed by Thom and Simpson were very large and required frequent and extensive cleaning. Because of the growing need for filtered water, scientists in the United States designed a rapid sand filter in the late nineteenth century. The rapid sand filter was cleaned by powerful jet streams of water, greatly increasing the efficiency and capacity of the water filter.

Text 49

The Use of Chlorine to Purify Water

As municipal water treatment facilities sought to increase the quality and healthfulness of public water supplies, more and more cities began to implement chlorine into their water treatment process. Chlorine was first recognized as a valuable chemical in treating water when John Snow used it to purify the cholera-causing water of the Broad Street Pump. Noting the disinfecting nature of chlorine and its ability to curb cholera deaths, government officials in Great Britain began to chlorinate the public drinking water. This application of chlorine resulted in a sharp decline in deaths from typhoid, as well. After the tremendous success of drinking water chlorination in England, chlorination began in New Jersey and soon spread through the entire United States. Chlorination of drinking water, combined with the use of sand water filters resulted in the virtual

elimination of such waterborne diseases as cholera, typhoid, and dysentery. In fact, chlorine was so effective at eliminating the outbreak and spread of waterborne diseases that Life magazine named water chlorination as “probably the most significant public health advance of the millennium”.

Chlorine has now been a major part of municipal water treatment for nearly 100 years. About 98% of municipal water treatment facilities now use chlorine disinfectant as their disinfectant of choice, and about 200 million U.S. residents receive chlorinated drinking water through their home faucets. Scientists are now beginning to examine the possible byproducts and side effects of using chlorine in drinking water. Chlorine is listed as a known poison; it undoubtedly has an adverse effect on our body systems. Chlorinated water has been linked to the aggravation and cause of respiratory diseases like asthma. Also, because chlorine vaporizes at a much faster rate than water, chlorinated water presents a significant threat to the respiratory system when used for showering. Recent discoveries of the health concerns of chlorine have led many people to install shower filters or whole house water filter systems into their homes. Such installations are the next step in the evolution of water filtration technology.

Text 50

Water Filtration at Present – Whole House Water Filter Systems

Despite government regulations and incredible advancements in water technology, the water issuing from home taps is still quite contaminated. Although municipal water treatment plants are intended to provide clean, healthy water to all city residents, such plants must work with heavily contaminated water. The water contains disease-bearing pathogens, pesticide chemicals, and industrial sludge, to name only a few of modern water contaminants.

City officials must provide the healthiest water to municipal residents which modern technology affords. Considering the dirty water with which they have to work, this task can be quite daunting. Disinfection and disease control remain the main goals of such water treatment plants. Consequently, city residents receive chlorinated, and often fluoridated, water. Chlorine has been linked to asthma and other respiratory diseases, and excessive fluoride intake can lead to yellowed teeth, dental problems, and other serious health problems for young children.

City water treatment plants are simply unable to provide pure, chemical-free water to city residents. Even when water is purified at a municipal water treatment plant, it often picks up lead and other chemicals when travelling through a home's plumbing system. While shower filters

are a viable solution for the removal of chlorine from showering water, the best, and most modern, available water filtration technology lies in whole house filtration systems. These water filtration systems are installed in individual homes. They filter water as it reaches a home's plumbing system, removing chlorine byproducts, tiny organic materials, and any other unwanted chemicals. They provide the purest form of water available. In fact, water filtered through a whole house water filter has begun to fulfill Hippocrates's vision of great-tasting, clean water.

Text 51

The Future of Water Filtration

The current major concerns in regard to water quality are lead and disinfection byproducts. Lead is a key operational and treatment concern for municipal water treatment plants. It cannot be considered independently of other water quality and treatment issues.

In fact, it seems that water disinfection and protection from lead infiltration are at odds with each other. The pH level required for disinfection must be below 8.0, but the pH level required to minimize lead solvency in plumbing systems is often 8.0 or higher. Water treatment plants provide clean, disinfected water to home plumbing systems, but this water is immediately contaminated from lead as it passes through the plumbing system. The solution to this problem may be the removal of lead from plumbing systems, a factor that would completely revolutionize the plumbing industry.

The rising concern over chlorine byproducts is also likely to affect the future of water filtration. It has long been recognized that chlorination of water results in the formation of THMs. THMs are harmful chemicals that form as a reaction between chlorine and natural, organic materials in water. The most well-known of the THMs is the poison chloroform. This poisonous gas, detrimental to the respiratory system when inhaled, is one of the most important reasons for the installation of shower filters or whole house water filters. It is likely that future research will find other byproducts of chlorination, and the use of chlorine for disinfection could be restricted.

Though these are all speculations, water filtration and treatment will, doubtlessly, continue to evolve in the future. The most important future development may well be the complete transformation of water filtration technology from municipal water treatment plants to whole house water filters, or a combination of the two systems.

WORD-BUILDING

Словообразование

Эффективным средством расширения запаса слов в английском языке служит знание способов словообразования. Словообразование происходит:

1. При помощи суффиксов:

Суффиксы	Исходное слово	Производное
<i>Существительных</i> -er; or	to teach – учить to work – работать to invent – изобретать	teacher – учитель worker – рабочий inventor – изобретатель
-ist	art – искусство science – наука	artist – художник scientist – ученый
-ion; (-ation; -tion; -sion)	to invite – приглашать to organize – организовывать to connect – соединять to express – выражать	invitation – приглашение organization – организация connection – соединение expression – выражение
-ment	to agree – соглашаться to improve – улучшать	agreement – соглашение improvement – улучшение
-ing	to begin – начинать to feel – чувствовать	beginning – начало feeling – чувство
-ness	dark – темный kind – добрый	darkness – темнота kindness – доброта
-ship	friend – друг leader – вождь, лидер	friendship – дружба leadership – руководство
-hood	child – ребенок brother – брат	childhood – детство brotherhood – братство
-ance; -ence	important – важный different – различный	importance – важность difference – различие
<i>прилагательных</i> -able; ible	to change – изменять(ся) access – доступ	changeable – изменчивый accessible – доступный
-al; -ic; (-ical)	culture – культура history – история	cultural – культурный historic – historical – исторический
-ful	beauty – красота	beautiful – красивый

	use – польза	useful – полезный
-less	help – помощь home – дом	helpless – беспомощный homeless – бездомный
-ous	fame – слава, известность danger – опасность	famous – известный dangerous – опасный
-y	sun – солнце health – здоровье	sunny – солнечный healthy – здоровый
<i>глаголов</i> -ate	active – активный	to activate – активизировать
-en	short – короткий	to shorten – укоротить
-fy (-ify)	pure – чистый simple – простой	to purify – очищать to simplify – упрощать
-ize (-ise)	modern – современный	to modernize – модернизировать
<i>наречий</i> -ly	loud – громкий part – часть	loudly – громко partly – частично

2. При помощи префиксов:

Префиксы	Корневое слово	Производное
un-	pleasant – приятный familiar – знакомый	unpleasant – неприятный unfamiliar – незнакомый
in-	correct – правильный	incorrect – неправильный
im- (il-, ir-)	polite – вежливый literate – грамотный regular – регулярный	impolite – невежливый illiterate – неграмотный irregular – нерегулярный
dis-	to appear – появляться	to disappear – исчезать
re-	to read – читать	to reread – перечитать
pre-	war – война, военный	prewar – довоенный
post-	war – война, военный	post-war – послевоенный
sub-	division – разделение	subdivision – подразделение
en-	large – большой	to enlarge – увеличивать

3. При помощи конверсии:

to answer – отвечать	answer – ответ
to walk – гулять	walk – прогулка
to work – работать	work – работа
to order – приказывать	order – приказ
to change – менять	change – изменение
to free – освобождать	free – свободный
to clean – чистить	clean – чистый

4. Путем словосложения:

bed + room	bedroom – спальня
black + board	blackboard – классная доска
news + paper	newspaper – газета
first + class	first-class – первый класс
rail + road	railroad – железная дорога
gun + powder	gunpowder – порох
tram + way	tramway – трамвай
pipe + line	pipeline – трубопровод
high + way	highway – шоссе, автомагистраль
air + plane	airplane – самолет
skate + board	skateboard – роликовая доска
house + hold	household – домашнее хозяйство
wind + mill	windmill – ветродвигатель, ветряная мельница
clock + work	clockwork – часовой механизм

GRAMMAR REFERENCES

Краткие сведения по грамматике английского языка

1. Порядок слов в английском предложении

ПОРЯДОК СЛОВ В АНГЛИЙСКИХ ПОВЕСТВОВАТЕЛЬНЫХ ПРЕДЛОЖЕНИЯХ

В английском языке, особенно в научно-технической литературе, повествовательное предложение имеет твердый порядок слов, необходимый для точного выражения отношений между словами, так как отношения между словами определяются не изменениями окончаний слов, а местом слов в предложении и служебными словами – предлогами и союзами. Каждый член предложения имеет свое определенное место:

1 – подлежащее, 2 – сказуемое, 3 – дополнение, 4 – обстоятельство

Примечание 1. Определение не имеет постоянного места и может стоять при любом члене предложения, выраженном существительным:

We received important information yesterday.

1 2 определение 3 4

Мы получили важную информацию вчера.

Примечание 2. Когда существительное определяется двумя или более прилагательными или существительными в качестве определения, то из них, которое более тесно связано по смыслу с ним, становится ближе к нему:

<i>an old red dress</i>	старое красное платье
<i>a big square table</i>	большой квадратный стол
<i>a tall angry man</i>	сердитый мужчина высокого роста

Примечание 3. Если есть два или более обстоятельства, они располагаются в следующем порядке.

– обстоятельство места;

– обстоятельство времени, причем последнее может выходить на нулевое место или перед подлежащим:

Last month I met her by chance at the scientific conference.

0 1 2 3 4 5

В прошлом месяце я случайно встретила ее на научной конференции.

Основные формы английского глагола

1	2	3
Infinitive Инфинитив (неопределенная форма глагола)	Past Indefinite (Simple) Прошедшее время группы Indefinite (простое прошедшее)	Participle II Причастие II
to ask спрашивать, спросить	asked спрашивал, спросил	asked спрашиваемый, спрошенный
to give давать	gave давал, дал	given данный, заданный

Примечание:

Все английские глаголы делятся на две группы: стандартные (правильные) и нестандартные (неправильные).

Стандартные глаголы образуют II и III формы путем прибавления к инфинитиву (без частицы to) суффикса *-ed (-d)*.

Нестандартные глаголы имеют особые формы, которые следует заучивать (например: *speak – spoke – spoken*; *give – gave – given*).

2. Глагол

2.1. Личные и неличные формы глагола

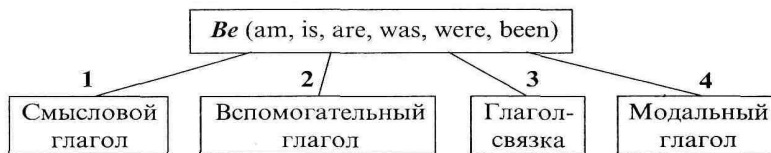
Личные формы глагола в предложении выполняют функцию сказуемого (Predicate). Личные формы глагола выражают лицо, число, наклонение, время, залог.

В английском языке глаголы в личной форме имеют три лица – 1, 2, 3, два числа – единственное и множественное, три наклонения – повелительное, изъявительное и сослагательное, два залога – активный и пассивный, и четыре группы времен в изъявительном наклонении: Indefinite (Simple), Continuous (Progressive), Perfect, Perfect Continuous.

Неличные формы глагола – инфинитив, или неопределенная форма (the Infinitive), герундий (the Gerund) и причастие (the Participle) не выполняют функцию сказуемого.

Глагол TO BE

Глагол *to be* в английском предложении может употребляться в следующих функциях:



1. Смысловой глагол в значении «находиться», «быть». В этом случае за ним всегда следует обстоятельство:

1. The new equipment *is* in the next room. Новое оборудование *находится* в следующей комнате.

2. Вспомогательный глагол:

а) для образования времен группы Continuous:

They *are rebuilding* this old station. Они *перестраивают* этот старый вокзал.

б) страдательного залога в сочетании с Participle II:

In 1869 Periodic Table of chemical elements *was published*. В 1869 году *была опубликована* Система химических элементов.

3. Глагол-связка в составном именном сказуемом со значением «быть»; «являться»; «состоять»; «заключаться в том, чтобы» и т.п.

В этом случае за ним всегда следует именная часть сказуемого (существительное, прилагательное, местоимение, инфинитив или герундий). Глагол *to be* в настоящем простом времени на русский язык не переводится.

She *is* an engineer

Она – инженер.

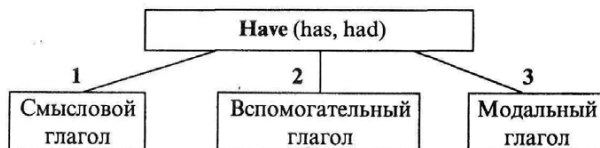
The initial purpose *is to blend* technology with the natural surroundings. Первоначальная цель – *объединить* технику с природной средой (закljučается в том, чтобы объединить...).

4. Модальный глагол со значением «должен». В этом случае за личными формами глагола *to be* следует инфинитив с частицей *to*:

We *were to receive* new equipment yesterday. Мы *должны были получить* новое оборудование вчера.

Глагол TO HAVE

Глагол *to have* в английском предложении может употребляться в следующих функциях:



1. Смысловой глагол со значением «иметь», «обладать»:

This metal *has* many important qualities. Этот металл *имеет* много важных свойств.

2. Вспомогательный глагол для образования времен Perfect (перфектных). В этом случае *to have* не переводится и указывает на то, что действие закончилось к определенному моменту в настоящем, прошлом или будущем.

The new invention *has* just *been discussed* in our laboratory. Новое изобретение только что *обсуждали* в нашей лаборатории.

3. Модальный глагол со значением «должен», «нужно», «следует». В этом случае за личными формами глагола *to have* всегда стоит инфинитив с частицей *to*:

We *have to rebuild* this old building. Нам *нужно перестроить* это старое здание.

2.2. Глагольные времена в действительном залоге изъявительного наклонения

В английском языке существует четыре группы времен, каждая из которых имеет настоящее, прошедшее и будущее время.

Времена 1-й группы **Indefinite (Simple) Tenses** (простое неопределенное время) выражают действия безотносительно к их продолжительности или завершенности.

I *write* many letters (usually, every day). (Present).

Я *пишу* много писем (обычно, каждый день)

I *wrote* many letters yesterday. (Past).

Я *писала* много писем вчера.

I *shall (will) write* many letters tomorrow. (Future).

Я *напишу (буду писать)* много писем завтра.

Времена 2-й группы **Continuous (Progressive)** (длительное время) указывают на длительность действия в настоящем, прошедшем и будущем и употребляются в тех случаях, когда речь идет о конкретном действии, время совершения которого определяется достаточно точно с помощью обстоятельства времени или по смыслу предложения.

I am going to the University now. Я *иду* в университет (сейчас).
(Present)

I was going to the University Я *шел* в университет, когда
when I met my friend. (Past) встретил своего друга.

Времена 3-й группы **Perfect** (законченное время) выражают действие, завершившееся к моменту в настоящем, прошедшем или будущем или предшествующее этому моменту.

Present Perfect употребляется:

а) Для выражения законченного действия, которое имеет тесную связь с настоящим временем по своим результатам, при этом обстоятельство времени может быть не указано.

He *has washed* the car. Он *помыл* машину.
(It looks lovely now). (Теперь она чудесно выглядит).

б) С обстоятельствами, выражающими период времени, не окончившийся до момента речи (*today, this week, this month, this year*).

I haven't seen him this month. Я *не видел* его в этом месяце.

в) С наречиями неопределенного времени:

<i>ever</i> – когда-либо	<i>always</i> – всегда	<i>already</i> – уже	<i>just</i> – только что
<i>never</i> – никогда	<i>often</i> – часто	<i>seldom</i> – редко	<i>not yet</i> – еще нет

(обычно в таком случае мы переводим глагол в Present Perfect глаголом несовершенного вида).

I have never met him. Я *никогда не встречал* его.

г) Для обозначения действия, начавшегося в прошлом и продолжающегося в настоящем, со словами *since* с, с *тех пор, как* и *for* в течение; в этом случае глагол в форме Present Perfect обычно переводится на русский язык глаголом в настоящем времени:

I have known him since 1990. Я *знаю* его с 1990 г.
He has lived in our town for many years. Он *живет* в нашем городе уже много лет.

Past Perfect употребляется для выражения действия, закончившегося до начала другого действия или до указанного момента в прошлом. Этот момент может определяться выражениями с предлогом *by*:

a) *by 5 o'clock; by that time, by the end of the week (month, year)* и т.д.
 He *had left* his previous job Он *ушел (покинул)* свою предыдущую работу к концу мая прошлого года.

б) Другим прошедшим действием, которое произошло позднее и которое выражается глаголом в *Past Indefinite (Simple)*.

He *had already finished* his report Он *уже закончил* доклад, когда я пришел к нему.

Future Perfect употребляется для обозначения действия, которое будет закончено до определенного момента в будущем, который может быть обозначен обстоятельствами или другим действием, выраженным глаголом в *Present Indefinite (Simple)*.

By the end of October I'll have worked here for 5 years. В конце октября исполнится 5 лет, как я работаю здесь.

Примечание: Для выражения завершенного действия в придаточных предложениях времени и условия, относящихся к будущему, употребляется *Present Perfect* вместо *Future Perfect*.

I shall return your grammar book to you after I have learned some rules. Я верну Вам учебник по грамматике, после того как выучу несколько правил.

Времена 4-ой группы – **Perfect Continuous Tenses** (законченное длительное) – в технической литературе употребляется довольно редко.

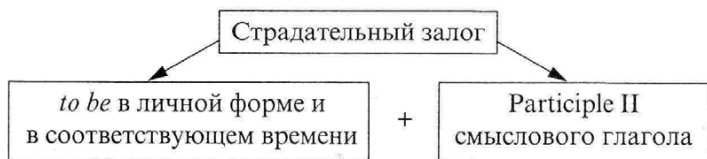
Образование глагольных времен в действительном залоге

	Indefinite	Continuous	Perfect
Infinitive	to V	to be + V + -ing	to have + V + -ed (3 форма глагола)
Present	V + s (ед. ч.)	am is are + V	have + V + -ed has
Past	V + ed (2 форма глагола)	was + V + -ing were	had + V + -ed
Future	shall + V will	shall be + V + -ing will be	shall have + V + -ed will have

V – форма глагола без частицы *to*

2.3. Глагольные времена в страдательном залоге изъявительного наклонения

Английское сказуемое в страдательном залоге в любом времени показывает, что подлежащее подвергается воздействию, оно пассивно. Эта форма встречается в английском языке чаще, чем в русском.



Форма страдательного залога аналитическая и состоит из двух основных компонентов:

The new design *was discussed* by a group of specialists. Новый проект *был обсужден* группой специалистов.

Английский страдательный залог может переводиться на русский язык следующим образом:

- 1) при помощи глагола «быть» и краткой формы причастия страдательного залога (в настоящем времени «быть» опускается);
- 2) глаголом, оканчивающимся на – ся;
- 3) глаголом в действительном залоге в 3-м лице множественного числа с неопределенно-личным значением

<i>The plan is developed.</i>	1. План <i>разработан</i> .
	2. План <i>разрабатывается</i> .
	3. План <i>разрабатывают</i> .
<i>The plan was developed.</i>	1. План <i>был разработан</i> .
	2. План <i>разрабатывался</i> .
	3. План <i>разрабатывали</i> .
<i>The plan will be developed.</i>	1. План <i>будет разработан</i> .
	2. План <i>будет разрабатываться</i> .
	3. План <i>будут разрабатывать</i> .

В страдательном залоге употребляются все времена, за исключением Future Continuous и Present, Past, Future Perfect Continuous (см. таблицу).

Образование глагольных времен в страдательном залоге

to be + V + -ed (3 форма глагола)			
	Indefinite	Continuous	Perfect
Present	am is + V + -ed are	am is + being + V + -ed are	have + been + V + -ed has
Past	was + V + -ed were	was + being + V + -ed were	had + been + V + -ed
Future	shall be + V + -ed will be		shall have + been + V + -ed will have

1. Времена группы *Indefinite*:

Houses *are built* quickly now. Дома *строятся* теперь быстро.
(Present)

These houses *were built* last year. Эти дома *были построены* в
(Past) прошлом году.

These houses *will be built* next year. Эти дома *будут построены* в
(Future) следующем году.

2. Времена группы *Continuous*:

These houses *are being built* now. Эти дома *строятся* сейчас.
(Present) (теперь)

These houses *were being built* for three years. (Past) Эти дома *строились* в течение 3-х лет.

3. Времена группы *Perfect*:

The houses *have already been built*. (Present) Дома (уже) *построены*.

The houses *had been built* by April. (Past) Дома (уже) *были построены* к апрелю.

The houses *will have been built* by May. (Future) Дома *построят* (будут построены) к маю.

Особенности перевода английского страдательного залога

В страдательном залоге особенно часто употребляются глаголы с послелогами типа: *to deal with* (иметь дело с), *to depend on* (зависеть от), *to speak about* (говорить о), *to refer to* (ссылаться на), *to live in* (жить в), *to send for* (посылать за), *to insist on (upon)* (настаивать на) и т.п.

Перевод предложений, в которых употреблены глаголы с предлогами в страдательном залоге, следует начинать с *предлога*.

This article is much spoken *about*. Об этой статье много говорят.

This scientist's papers are often referred *to*. На труды этого ученого часто ссылаются.

The expert was sent for. За экспертом послали.

Для технического текста весьма характерны глагольные фразеологические сочетания типа: *to take care of* (заботиться о), *to make mention of* (упоминать), *to make provision for* (предусмотреть), *to make use of* (использовать), *to pay attention to* (обращать внимание на), *to take advantage of* (воспользоваться), *to take notice of* (принимать во внимание) и т.п.

Предложения с подобными фразеологическими сочетаниями переводятся на русский язык неопределенно-личными предложениями.

Care should be taken... Следует *позаботиться* о....

Mention has been made... Было *упомянуто*...

Attention should be paid to... Следует *обратить* внимание на...

Advantage was taken of this... *Воспользовались* этим...

Use is being made of... *Применяют*...

Provision is made for ... *Предусматривается*...

Notice should be taken ... Следует *принять* во внимание...

Предложения со сказуемыми в страдательном залоге, выраженными глаголами *to follow* (следовать за), *to answer* (отвечать на), *to watch* (следить за), *to influence* (влиять на), *to join* (присоединяться к), *to address* (обращаться к) и т.п., обычно переводятся на русский язык предложениями со сказуемыми, выраженными глаголами в действительном залоге, а подлежащее английского предложения переводится дополнением.

We were addressed for the K нам обратились за объяснением этой формулы.

My report was followed by a discussion.	За моим докладом последовала дискуссия.
The conference was attended by many scientists and engineers.	На конференции присутствовало много ученых и инженеров.
This question was answered.	На этот вопрос ответили.
His experiment was being watched with great attention.	За его экспериментом следили с большим вниманием.

2.4. Оборот *THERE BE*

Оборот *there be* имеет значение: *быть, находиться, существовать, иметься*. Перевод предложений с этим оборотом следует начинать с обстоятельства, если оно есть, или со сказуемого.

<i>There are many new industrial technologies in Europe.</i>	Европа располагает многими новыми промышленными технологиями. (В Европе много новых промышленных технологий.)
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<i>There are different ways of making decisions by engineers.</i>	Существуют различные способы принятия решений инженерами.
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В технической литературе данный оборот встречается с другими глаголами, такими как: *to exist* (существовать), *to remain* (оставаться), *to appear* (появляться), *to arise* (возникать), *to come* (приходить) и т.д.

<i>There exist definite rules of creating new approaches.</i>	Существуют определенные правила создания новых подходов.
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2.5. Модальные глаголы и их эквиваленты

Модальные глаголы выражают не действия, а отношение говорящего к действиям или состояниям.

Главные глаголы этой группы: *can, may, must, shall, should, will, would, ought to*. Кроме того, модальность может быть выражена глаголами *to be, to have*.

1) Модальные глаголы не имеют окончания –s в 3-ем лице ед.ч.

2) Не образуют неличных форм (инфинитива, причастия, герундия).

После модальных глаголов, как правило, стоит смысловой глагол без частицы *to*. После *ought* следует глагол с частицей *to*.

Вопросительную и отрицательную формы они образуют без помощи вспомогательного глагола.

3) В зависимости от времени совершения действия модальные глаголы могут употребляться со всеми формами инфинитива.

Если действие относится к настоящему времени, употребляется простой инфинитив или инфинитив продолженной формы (Continuous).

He can draw.	Он может (умеет) чертить.
He can be drawing now.	Возможно, он чертит сейчас.
He could have helped her to draw this table.	Он мог бы помочь ей начертить эту таблицу.
They must be very attentive.	Они должны быть очень внимательными.

Can (could, to be able to)

Модальный глагол *can* имеет следующие формы:
can – настоящее время (могу, может, можем и т.д.)
could – прошедшее время, сослагательное наклонение, форма вежливости (мог, могла, могли)

Модальный глагол *can* выражает:

1) умственную и физическую возможность, умение выполнить действие, выраженное инфинитивом стоящего за ним глагола.

I can speak English	Я могу говорить по-английски.
I can't drive a car.	Я не могу водить машину.

2) разрешение, запрещение (в отрицательных) и неуверенность (в вопросительных) предложениях:

You can take my lectures.	Ты можешь взять мои лекции.
You can't do such things to your parents.	Ты не смеешь так поступать со своими родителями.
Can it be so?	Разве это может быть так?

May (might, to be allowed to)

Модальный глагол *may* имеет следующие формы:
may – настоящее время (могу, может и т.д.)
might – прошедшее время (мог, могли), сослагательное наклонение (мог бы, могли бы).

Модальный глагол *may* выражает:

1) разрешение, позволение совершить какое-либо действие:

You may go home now.	Вы можете идти домой сейчас.
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2) предложение с оттенком сомнения:

She might not come.	Возможно, она не придет.
It may start snowing.	Возможно (может быть), пойдет снег.

Форма *might* может выражать упрек или неодобрение:

You *might* send the telegram. Вы *могли бы* отправить (послать) телеграмму.

Must

Модальный глагол *must* имеет только одну форму, которая употребляется в настоящем времени и не изменяется в косвенной речи. В прошедшем и будущем времени для выражения долженствования вместо *must* употребляются глаголы *to have to* и *to be to*.

Модальный глагол *must* выражает:

1) Необходимость, обязанность, долг:

Parents *must* take care of their children. Родители *должны* заботиться о своих детях.

2) Запрещение (в отрицательных предложениях):

Cars *must not* be parked here. Здесь стоянка машин запрещена.

3) Уверенность в том, что действие совершается или свершилось:

Peter *must* be at home. Питер, *должно* быть, дома.

He *must* be working at the library. Он, *вероятно* (по всей вероятности) работает в библиотеке.

He *must* have mentioned it. Он, *должно быть*, упомянул об этом.

4) Настойчивый совет, приказание:

You *must* apologize. You were wrong. Вам следует извиниться. Вы были неправы.

To have to

Эквивалент модального глагола *to have to* может употребляться в настоящем, прошедшем и будущем временах, образуя вопросительную и отрицательную формы с помощью вспомогательных глаголов *do, does, did, will*.

They *have to* apply this new system in working thick seams. Им *необходимо* (должны) применять эту новую систему при разработке мощных пластов.

Did you *have to* wait yesterday? Вам *пришлось* ждать вчера?

We *don't have to* write one more test. Нам *не нужно* писать еще один тест.

Модальный глагол *to have* выражает обязанность и необходимость, обусловленную обстоятельствами:

The lift was out of order and we *had to* walk up. Лифт не работал, и мы *должны были* (нам *пришлось*) идти наверх пешком.

To be to

Эквивалент модального глагола *to be to* употребляется в двух формах: *the Present Indefinite* и *the Past Indefinite*, и всегда с частицей *to*:

We *are to* meet at the bus stop. Мы *должны* встретиться на автобусной остановке.

Модальный глагол *to be to* выражает предварительную договоренность, планируемое действие, инструкции, распоряжения:

The oil industry *is to* increase its output. Нефтяная промышленность должна увеличить добычу.

My nephew *is to* visit us in September. Мой племянник навестит нас в сентябре.

My grandson *is to* take his exams in June. Мой внук должен сдавать экзамены в июне.

What *are* we *to* do next? Что нам делать дальше?

Should, ought to

Модальные глаголы *should* и *ought to* имеют только одну форму, которая употребляется в настоящем времени и не изменяется в косвенной речи. После *ought* инфинитив всегда употребляется с частицей *to*:

Глаголы *should* и *ought* выражают:

1) совет или рекомендацию (следует, должен):

You *should* help your younger brother. Тебе *следует* помочь младшему брату.

You *ought to* know safety rules. Вы *должны* (Вам *следует*) знать правила безопасности.

2) недоумение, удивление, возмущение. В этом случае *should* придает эмоциональную окраску высказыванию, не выражая модальности.

How *should* I know? Откуда мне знать?

Need

Модальный глагол *need* имеет только одну форму, он употребляется преимущественно в отрицательных предложениях и выражает ненужность совершения действия.

You *needn't* do it now.

Вам *не нужно* делать это сейчас.

You *needn't* have done it.

Вам *не нужно* было делать это.

Need может употребляться и как смысловой (не модальный) глагол со значением «нуждаться в чем-либо», «требоваться»:

She *needs* a good rest.

Ей *нужен* хороший отдых.

2.6. Перевод глаголов **SHOULD** и **WOULD**

Глаголы *should* и *would* в зависимости от того, в каком предложении (простом или сложноподчиненном) они находятся, должны переводиться по-разному.

Should	Would
МОДАЛЬНЫЙ ГЛАГОЛ	
Для выражения долженствования для всех лиц ед. и мн. числа:	В технической литературе в значении обычности или неизбежности действия в прошлом для всех лиц ед. и мн. числа:
You <i>should help</i> them to develop a new style of this project.	All attempts in the past to retain the existing means of production <i>would meet</i> with failure.
Вы <i>должны</i> (вам <i>следует</i>) помочь им разработать новый стиль этого проекта.	Все попытки в прошлом сохранить существующие средства производства <i>обычно терпели</i> неудачу.
ВСПОМОГАТЕЛЬНЫЙ ГЛАГОЛ	
В главной части сложноподчиненных условных предложений	
В 1-м лице ед. и мн. числа: We <i>should not have created</i> this project if an expert on architecture had not helped us.	Во 2-м и 3-м лице ед. и мн. числа: Appropriate decisions <i>would have appeared</i> if some new specialists had taken part in this project.
Мы <i>не создали бы</i> этот проект, если бы специалист по архитектуре не помог нам.	Соответствующие решения по дизайну появились бы, если бы новые специалисты приняли участие в данном проекте.

В придаточных дополнительных предложениях для выражения будущего в прошедшем времени (Future-in-the-Past), если глагол главного предложения стоит в Past Indefinite.	
<p>В 1-м лице ед. и мн. числа: Specialists predicted that in 10 or 20 years we <i>should select</i> better ergonomics tools.</p> <p>Специалисты предсказали, что через 10–20 лет мы будем отбирать лучшие средства в эргономике.</p>	<p>Во 2-м и 3-м лице ед. и мн. числа: The scientist <i>said</i> that ergonomics <i>would become</i> concerned with marketing in the future.</p> <p>Ученый <i>сказал</i>, что эргономика <i>будет заниматься</i> маркетингом в будущем.</p>

2.7. Неличные формы глагола

ИНФИНИТИВ

The Infinitive – неличная форма глагола, имеющая в качестве основного признака частицу *to* и обладающая свойствами глагола и существительного (как и герундий): to build (строить), to read (читать), to speak (говорить).

Как глагол, инфинитив может иметь следующие признаки:

а) может определяться наречием:

He likes *to work* systematically. Он любит (ему нравится) *работать* систематически.

б) может иметь прямое дополнение:

He likes *to attend* his English classes. Он любит (ему нравится) *посещать* занятия по английскому языку.

в) имеет видовые и залоговые формы:

Признак действия	Active	Passive
Одновременность	to + V	to be + V + -ed (3 форма)
Предшествование	to have + V + -ed (3 форма)	to have been + V + -ed (3 форма)

I am sorry *to trouble* you. Простите за беспокойство.
 I am sorry *to have troubled* you. Мне неприятно, что я вас побеспокоил.
 I am glad *to be working* with you. Я рад, что работаю с вами.

Как существительное, инфинитив выполняет функцию подлежащего, части глагольного (модального) и именного сказуемого, дополнения или части сложного дополнения, определения и обстоятельства. Наибольшие трудности для понимания и перевода возникают, когда инфинитив является подлежащим, обстоятельством цели или определением.

А. Если английское предложение начинается с инфинитива, то, следовательно, этот инфинитив занимает 0-е или 1-е место, т.е. это или обстоятельство (0), или подлежащее (1).

Чтобы установить это точно, необходимо найти сказуемое предложения, которое согласуется с подлежащим в числе. Если сказуемое имеет свое собственное подлежащее, то инфинитив или инфинитивный оборот (инфинитив и все слова, относящиеся к нему) является обстоятельством цели и переводится на русский язык при помощи предлога «для» + существительное или при помощи союзов «для того чтобы» и «чтобы» + русский инфинитив. Часто в этом случае перед английским инфинитивом стоит союз *in order to* (чтобы; для того чтобы):

(In order) To define the word “innovation” you must know all the definitions of the term. Для того чтобы определить (чтобы определить)..., Для определения слова «новшество, инновация» вы должны (вам нужно) знать все определения этого термина.

Б. Иногда инфинитив (инфинитивный оборот) является подлежащим английского предложения и переводится существительным или неопределенной формой:

To meet the requirements of our customers is the general purpose of our firm. Удовлетворение требований наших клиентов – главная цель фирмы.
Удовлетворять требования наших клиентов – вот в чем заключается цель нашей фирмы.

В. Инфинитив в форме страдательного залога в функции определения переводится определительным придаточным предложением или придаточным оборотом, имеющим оттенок долженствования или будущности:

The design *to be made* by our specialists is intended for a new firm. Проект, который должен быть выполнен/будет выполнен нашими специалистами, предназначен для новой фирмы.

Инфинитивные обороты

1. Субъектный инфинитивный оборот (Сложное подлежащее) – это сочетание существительного в общем падеже (или местоимения в именительном падеже) в функции подлежащего с инфинитивом в качестве второй части составного глагольного сказуемого.

Служебную часть этого сказуемого составляют в основном глаголы в форме страдательного залога, примыкающие к инфинитиву, такие, как *to see* (в значении «считать»), *to say* (сказать), *to think* (думать), *to suppose* (предполагать), *to believe* (считать, полагать), *to find* (находить, считать), *to know* (знать), *to make* (заставлять) и т. д.:

All bodies are known to possess weight.

В субъектном инфинитивном обороте инфинитив обозначает действие или состояние лица (или предмета), обозначенного существительным (или местоимением) в составе этого оборота.

Перевод предложения, содержащего субъектный инфинитивный оборот, следует начинать со служебной части составного глагольного сказуемого. Значение служебной части передается в русском языке неопределенно-личным оборотом, который является главным предложением в русском сложноподчиненном предложении (Известно,...).

Имя существительное (или местоимение), являющееся подлежащим в английском предложении, становится подлежащим русского придаточного предложения (...все тела...), а инфинитив переводится глаголом-сказуемым русского придаточного предложения (...обладают....). Придаточное предложение присоединяется к главному посредством союза «что»: *Известно, что* все тела обладают весом.

Предложение с субъектным инфинитивным оборотом можно переводить простым предложением, в котором неопределенно-личный оборот употребляется как вводное предложение: Все тела, как известно, обладают весом.

Субъективный инфинитивный оборот употребляется с глаголами в форме страдательного залога, такими как: *to say* (говорить), *to report* (сообщать), *to announce* (объявлять), *to state* (утверждать), *to suppose* (полагать) и т. д.:

Mr. Bunting was supposed to know nothing about it. Полагали, что мистер Бантинг ничего не знал об этом.

When two bodies oscillate at the Когда два тела колеблются с

same frequency they <i>are said to be</i> in resonance	одинаковой частотой, говорят, что они находятся в резонансе.
The atmosphere <i>has been proved to extend</i> several hundred kilometers above the earth.	Доказано, что атмосфера простирается на несколько сот километров над землей.

Субъектный инфинитивный оборот употребляется также со следующими глаголами в действительном залоге: *to seem*, *to appear* (казаться), *to prove* (оказаться), *to happen*, *to chance* (случаться):

To an ordinary observer the air <i>seems to have</i> no weight.	Обычному наблюдателю кажется, что воздух не имеет веса.
<i>I happened to be</i> there at that time.	Я случайно был там в это время.

Субъектный инфинитивный оборот употребляется со словосочетаниями, в состав которых входят глагол-связка *to be* и прилагательные *likely* (вероятный), *unlikely* (невероятный), *certain*, *sure* (несомненный, безусловный). В этом случае инфинитив в субъектном инфинитивном обороте обычно выражает действие или состояние, относящееся к будущему времени:

He is <i>sure to be</i> sent there.	Он, безусловно, будет послан туда.
A large proportion of radium is <i>likely to be</i> lost from sea water	Большая часть радия, вероятно, будет потеряна при получении его из морской воды.

2. Объектный инфинитивный оборот (Сложное дополнение)

– это сочетание существительного в общем падеже (или личного местоимения в объектном падеже) с инфинитивом, выступающее как единый член предложения.

We know <i>gravity to pull</i> every particle of a body.	Мы знаем, что <i>земное притяжение</i> действует на каждую частицу тела.
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В этом предложении дополнением к сказуемому *know* является оборот *gravity to pull* (что притяжение действует), а не одно слово *gravity*, так как на вопрос *What do you know?* (Что вы знаете?) ответ будет не *gravity*, а – *gravity to pull*, т. е., иначе говоря, все сочетание *gravity to pull* является неразрывным и относится к сказуемому как единое целое – сложное дополнение.

В объектном инфинитивном обороте существительное в общем падеже (или личное местоимение в объектном падеже) обозначает лицо (или предмет), совершающее действие или подвергающееся действию, обозначенному инфинитивом. Поэтому объектный инфинитивный оборот переводится на русский язык придаточным

дополнительным предложением (вводимым союзами *что, чтобы, как*), подлежащее которого соответствует существительному в общем падеже (или местоимению в объектном падеже) переводимого оборота, а сказуемое соответствует инфинитиву этого оборота:

We know *electrons to travel* from the cathode to the anode. Мы знаем, что *электроны переходят* от катода к аноду.
My uncle wanted *us to help* him. Мой дядя хотел, чтобы *мы* помогли ему.

В объектном инфинитивном обороте инфинитив может употребляться также в пассивной форме:

We know *a vector quantity to be represented* by means of a straight line. Мы знаем, что *векторная величина изображается* прямой линией.
She did not want *him to be laughed* at. Она не хотела, чтобы *над ним смеялись*.

Объектный инфинитивный оборот употребляется:

1. После глаголов *to hear* (слышать), *to see* (видеть), *to feel* (чувствовать), *to watch*, *to observe* (наблюдать). После этих глаголов частица *to* перед инфинитивом не употребляется:

Eric *watched him go* from group to group. Эрик наблюдал, как он ходил от группы к группе.
Johnny *saw the crowd break* the line of policemen barring their way. Джонни видел, как толпа прорвала строй полицейских, преграждавших ей дорогу.

Примечание 1: В сложное дополнение после глаголов восприятия может входить как инфинитив, так и причастие. При этом причастие обычно обозначает процесс, инфинитив обозначает законченное действие. Например:

She *saw me approaching*. Она видела, как я подходил к воротам.
He *saw me approach* the gate. Он видел, как я подошел к воротам.

Примечание 2: После глаголов *to hear* в значении «узнать» и *to see* в значении «понимать» объектный инфинитивный оборот не употребляется:

I hear that your son entered the University. Я слышал (узнал), что ваш сын поступил в университет.
I see that you understand the rule. Я вижу (понимаю, знаю), что вы понимаете правило.

2. После глаголов, выражающих волеизъявление: *to want* (хотеть), *to wish*, *to desire* (желать) и др., а также после оборота *I should like* (я хотел бы):

I should like her to look through my report. Я бы хотел, чтобы она просмотрела мой доклад.

I have some notes I want you to read over. У меня есть некоторые записи, которые я хочу, чтобы вы просмотрели.

3. После глаголов, выражающих мнение, суждение, предположение и т. п.: *to believe* (полагать, считать); *to consider* (считать); *to think* (думать, считать); *to suppose* (полагать); *to know* (знать); *to prove* (оказываться, доказывать); *to understand* (понимать); *to expect* (ожидать); *to assume* (предполагать, допускать) и др.:

Experiments proved heat and other forms of energy to be mutually convertible. Опыты показали, что тепло и другие формы энергии взаимно обратимы.

We believe him to be a good engineer. Мы считаем, что он хороший инженер.

4. После глаголов, выражающих приказание, требование, принуждение, просьбу, разрешение: *to order*, *to command* (приказывать); *to cause*, *to make* (заставлять, принуждать); *to request* (просить); *to allow*, *to permit* (разрешать, допускать) и др. В этом случае инфинитив имеет пассивную форму:

Raising the piston allows water to be forced through the valve by the atmospheric pressure. Движение поршня вверх дает возможность атмосферному давлению проталкивать воду через клапан (букв.: позволяет, чтобы вода проходила через клапан под напором атмосферного давления).

Примечание: Если после глаголов, выражающих разрешение или приказание, следует существительное (или местоимение), обозначающее лицо, и за ним инфинитив в активной форме, то инфинитив, как правило, не является частью сложного дополнения, а выполняет функцию второго дополнения, непосредственно подчиненного глаголу. Следовательно, в этом случае нет сложного дополнения, нет и объектного инфинитивного оборота:

He ordered the prisoners to go away. Он приказал пленным уйти.

Объектный инфинитивный оборот также употребляется после глаголов в неличной форме:

I want to see the last leaf fall.	Я хочу видеть, как упадет последний лист.
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The young man stood in the doorway watching him work.	Молодой человек стоял в дверях, наблюдая, как он работает.
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3. Предложный инфинитивный оборот (for-Phrase). Инфинитивные обороты с предлогом *for* представляют собой сочетание, в состав которого входит: предлог *for* плюс существительное в общем падеже (или местоимение в объектном падеже) плюс инфинитив.

Эти обороты переводятся на русский язык полным придаточным предложением, обычно вводимым союзом *что, чтобы*, причем существительное (или местоимение) этого оборота вместе с предшествующим ему предлогом *for* переводится существительным (или местоимением) в функции подлежащего придаточного, предложения, а инфинитив – глаголом-сказуемым в личной форме:

He waited for her to speak, but she did not.	Он ждал, чтобы она заговорила, но она молчала.
--	--

The period T is the time required for a particle to make one complete vibration.	Период T – это время, необходимое для того, чтобы частица сделала одно полное колебание.
--	--

For the project to be made in time, we must begin to work immediately.	Для того чтобы наш проект был сделан вовремя, мы должны начать работать немедленно.
--	---

Если оборот занимает место подлежащего, то предложение с ним переводится простым предложением.

For a designer to know the peculiarities of a mining site is quite necessary.	Проектировщику совершенно необходимо знать все особенности шахтного участка.
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Причастие и его формы

Существуют простые и сложные формы причастий. Простые формы причастий – это Participle I (Active), Participle II.

Participle I образуется путем добавления к основе глагола окончания *-ing*: *reading, asking*.

Participle II неправильных глаголов образуется особым способом; это третья форма неправильных глаголов: *to write – written, to build – built*.

Сложные формы причастий – это Participle I (Passive), Perfect Participle (Active и Passive).

Participle I Passive образуется сочетанием *Participle I (Active)* от глагола *to be (being)* и *Participle II* смыслового глагола: *being read, being built, being constructed*.

Perfect Participle Active образуется сочетанием *Participle I (Active)* от глагола *to have (having)* и *Participle II* смыслового глагола: *having asked, having read, having constructed*.

Perfect Participle Passive образуется сочетанием *Perfect Participle Active* от глагола *to be (having been)* и *Participle II* смыслового глагола: *having been asked, having been built, having been constructed*.

Причастие с относящимися к нему словами образует **причастный оборот**.

Participle I используется в глагольных временах группы Continuous: *to be + -ing*: I am *reading* a book.

Participle II используется для образования:

1) страдательного (Passive) залога – *to be + -ed* (или 3 ф-мы глагола):

The painting was *bought* yesterday.

2) группы времен Perfect Active и Passive – *to have + -ed* и *to have been + -ed*:

I have finished drawing this table.

This table has been *drawn* by me.

3) Причастие имеет признаки глагола:

а) может определяться наречием:

Speaking loudly they came into laboratory. *Громко разговаривая*, они вошли в лабораторию.

б) может иметь прямое дополнение:

Reading a newspaper, he pays *Читая* газету, он обращает особое special attention to new facts *внимание на новые факты,* concerning prices. *касающиеся цен.*

в) имеет временные и залоговые формы:

<i>Признак действия</i>	<i>Active</i>	<i>Passive</i>
Одновременность	V + -ing	being + V + -ed (3 форма) V + -ed (3 форма)
Предшествование	having + V + -ed (3 форма)	having been + V + -ed (3 форма)

Как прилагательное, Participle I и II могут быть в предложении определениями:

This walking excavator is of modern design. Этот шагающий экскаватор современной конструкции.

The problems *being discussed* at the meeting were of great importance. Проблемы, *обсуждавшиеся* (которые *обсуждались*) на заседании, были очень важными.

The idea *used* in his design is the same as in his teacher's work. Идея, *используемая* в его проекте, такая же, как и в работе его учителя.

The term "polymer" *used* by many specialists appeared in 1910. Термин «полимер», *используемый* многими специалистами, возник (появился) в 1910 г.

Часто в технической литературе встречается одиночное причастие в функции правого определения. В этом случае его нужно при переводе ставить перед определяемым словом.

The new building materials *tested* were used by our specialist. Прошедшие испытания новые строительные материалы использовались нашими специалистами.

Как наречие, Participle I Active и Passive, Participle II, Perfect Participle Active и Passive могут использоваться в качестве обстоятельств:

Our architect does his work well *using new materials*. Наш архитектор хорошо делает свою работу, *используя новые материалы*.

Having examined the internal qualities of gypsum every specialist *Изучив* присущие гипсу свойства, любой специалист может легко

can easily call it building material of называть его строительным
the 21st century. материалом 21 века.

Часто в функции обстоятельств употребляются причастия I и II с союзами *when, while, if, as, unless ...*

While using new equipment, *При использовании (используя)* нового
the engineers pay special оборудования инженеры уделяют
attention to safety. особое внимание безопасности.

When renovated the house *При обновлении (перестройке)* внешний
was partially transformed. вид дома был частично изменен.

Participle I Active (asking) в функции определения переводится:

а) причастием действительного залога с суффиксами *-ущ, -ющ, -ащ, -ящ, -вш, -ш*, Например: asking – спрашивающий

б) глаголом в личной форме в придаточном определительном предложении.

Most home *heating and cooling* Большинство бытовых
systems do not mechanically bring *нагревающих и охлаждающих*
fresh air into the house. систем не доставляют свежий
воздух в дома.

We can use a new ventilation Мы можем пользоваться новой
system *linking* all three our shops. вентиляционной системой,
соединяющей все три наши цеха.

В функции обстоятельства *Participle I* переводится:

а) деепричастием с суффиксами *-ая; -ая; -ась; -ась*

б) глаголами в личной форме в придаточных обстоятельственных предложениях;

в) предлогом «при» + существительное, когда перед *Participle I Active* стоят союзы *when, while, if, as, unless ...*

Developing / when developing the *Разрабатывая* новую систему
new management system, engineers управления, инженеры
use modern computers. используют новые компьютеры.

Participle I Passive (being asked) в функции определения переводят:

а) причастием страдательного залога с суффиксами *-и, -ви, -м;*

б) глаголом в личной форме в придаточном определительном предложении:

The design *being updated* by our specialists will be used in 2 years. Проект, который *обновляют* (сейчас) наши специалисты, будет использован через 2 года.

в) глаголом в личной форме в придаточном обстоятельственном предложении:

Being updated by our specialists the design will be used in 2 years. Поскольку сейчас проект обновляется нашими специалистами, он будет использован через 2 года.

Participle II (asked) в функции определения переводится:

а) причастием страдательного залога с суффиксами *-nn*, *-m*, *-t*, *-u*, *-vii*;

б) глаголом в личной форме в придаточном определительном предложении.

The discussed plans are of great importance. *Обсуждаемые* планы имеют большое значение.

This plan *discussed* by our specialists is very important for us. Этот план, *обсужденный* нашими специалистами, очень важен для нас.

Или:

Этот план, который *обсуждался* нашими специалистами, очень важен для нас.

В функции обстоятельства *Participle II* переводится:

а) глаголом в личной форме в придаточном обстоятельственном предложении;

б) с предлогом «при» + существительное, когда перед *Participle II* стоят союзы *when*, *if*, *as*, *unless* и т.д.

Unless discussed by specialists the design must not be used in the near future. Если проект не обсуждался нашими специалистами, его нельзя использовать в ближайшем будущем.

When used the design showed all the merits of its creators. *При использовании* этот проект показал все достоинства его создателей.

Perfect Participle Active (having asked) в функции обстоятельства переводится:

а) деепричастием совершенного вида с суффиксами *-av*, *-iv*;

б) глаголом в личной форме в придаточном обстоятельственном предложении, вводимом союзами *так как*, *после того как*, *когда*:

Having discussed the design of a new building, we can start looking for suitable materials. *Обсудив* проект нового здания, мы можем начать поиски соответствующих материалов.

Perfect Participle Passive (having been asked) в функции обстоятельства переводится глаголом в личной форме в придаточном обстоятельственном предложении, вводимом союзами *так как, после того как, когда*:

Having been discussed by specialists the design can be used at once. После обсуждения/После того, как проект обсудили специалисты его можно сразу использовать.

Самостоятельный причастный оборот

Причастие в сочетании с существительным или местоимением может образовывать причастные обороты.

В английском языке причастные обстоятельственные обороты бывают двух типов:

а) Обороты, в которых причастие выражает действие, относящееся к подлежащему предложения. Они соответствуют русским деепричастным оборотам и называются *зависимыми*.

Speaking of the equipment we should take into consideration all new designs. *Говоря об оборудовании*, мы должны учитывать все новые проекты.

б) Обороты, в которых причастие имеет свое собственное подлежащее, отличное от подлежащего основного предложения. Такие обороты называются **независимыми** или **самостоятельными причастными оборотами** (СПО). Они соответствуют русским обстоятельным придаточным предложениям или самостоятельным предложениям в зависимости от их места в предложении.

The design having been completed, the specialists felt relief. *Когда проект был закончен*, специалисты почувствовали облегчение.

Перевод

В начале предложения СПО переводится обстоятельственным предложением с союзами *когда, если, так как, после того как...* в зависимости от смысла.

В конце предложения СПО переводится самостоятельным предложением, присоединяемым одним из сочинительных союзов: *причем, при этом, а, но* или отдельным предложением.

There are a number of reasons to connect computers into a network, *the two most important being the necessity for human beings to communicate and the sharing of resources.* Имеется несколько причин для объединения компьютеров в единую сеть. *Две главные из них:* потребность людей в общении и необходимость обмениваться/делиться ресурсами.

Часто в технической литературе СПО в конце предложения вводится предлогом *with*. Перевод остается без изменений.

Smileys are used all over the place in the Internet, with icons of them looking like faces very much. Смайлики используются повсеместно в Интернете, причем их изображения очень похожи на лица.

Основными признаками СПО, по которым довольно просто найти его в предложении, являются следующие:

- СПО имеет: запятую, собственное подлежащее, причастие;
- СПО не имеет своего сказуемого.

Причастие в сочетании с существительным или местоимением может образовывать причастные обороты: объектный, субъектный и абсолютный.

Причастный оборот **Объектный падеж с причастием настоящего времени** (Objective-with-the-Present-Participle) представляет собой сочетание существительного или местоимения в объектном падеже с причастием настоящего времени. Этот оборот употребляется после глаголов: *to feel, to find, to hear, to listen, to look, to notice, to see, to watch.*

I hear the phone ringing in the next room. Я слышу, как звонит телефон в соседней комнате.
She watched the children playing in the yard. Она наблюдала, как дети играли во дворе.

Этот оборот аналогичен объектному инфинитивному обороту, но причастный оборот показывает действие в процессе его совершения, а инфинитивный оборот только указывает на действие.

I saw the children playing Я видел, как дети играли в хоккей.
hockey.

I saw the children play hockey. Я видел, что дети играли в хоккей.

Оборот **Объектный падеж с причастием прошедшего времени** (Objective with-the-Past-Participle) представляет собой сочетание существительного или местоимения в объектном падеже с причастием прошедшего времени. Этот оборот употребляется после глаголов: *to have, to get, to want, to wish, to watch, to hear, to see. to find.*

I want to have a new dress made. Я хочу пошить новое платье.

Этот оборот с глаголом *to have (to get)* означает, что действие совершается не самим подлежащим, а другим лицом для него или за него.

I had my coat cleaned. Я почистил пальто (это сделали для меня).

Субъектный причастный оборот (Nominative-with-the Participle) представляет собой сочетание существительного в общем падеже или местоимения в именительном падеже с причастием настоящего или прошедшего времени. Употребляется после глаголов, выражающих восприятие.

The pupils were heard Слышали, как ученики разговаривали о
speaking about their finals. выпускных экзаменах.

The teacher was seen Видели, как ученики окружили учителя.
surrounded by the pupils.

Герундий и его формы

The Gerund – это неличная форма глагола, оканчивающаяся на *-ing* и обладающая свойствами глагола и существительного. Герундий всегда выражает действие как развивающийся процесс, например: *building* (строительство), *reading* (чтение), *fighting* (борьба).

Как глагол, герундий может иметь следующие признаки:

а) определяется *наречием*:

I like *reading aloud*.

Я люблю *читать вслух*

б) может иметь *прямое дополнение*:

I like *reading* such *books*.

Я люблю *читать* такие *книги*.

в) имеет *видовые и залоговые формы*

<i>Признак действия</i>	<i>Active</i>	<i>Passive</i>
Одновременность	V + -ing	being + V + -ed (3 форма)
Предшествование	having + V + -ed (3 форма)	having been + V + -ed (3 форма)

Как существительное, герундий может употребляться с предлогами и может определяться притяжательным и указательным местоимением, а также именем существительным в притяжательном падеже:

We heard of *his being sent* at a practice to the modern engineering school. Мы слышали, что его послали на практику в современную техническую школу.

Как существительное, герундий может быть в предложении:

а) подлежащим:

Reading is useful.

Чтение полезно.

б) частью составного именного или глагольного сказуемого:

Mathematical operations are adding, subtracting and others. Математические операции – это сложение, вычитание и др.

I began reading this book yesterday. Я начал читать эту книгу вчера.

в) дополнением (прямым и предложным):

Logical operations include comparing, selecting and others. Логические операции включают сравнение, выбор и др.

Supercomputers are used for calculating complex problems. Суперкомпьютеры используются для решения сложных задач.

г) обстоятельством (всегда с предлогом):

After finishing calculations a supercomputer puts out results.

После окончания вычислений суперкомпьютер выдает результаты.

д) определением (всегда с предлогом):

The way of solving this problem is rather difficult. Способ решения этой задачи довольно труден.

В зависимости от функции, которую герундий выполняет в предложении, он может переводиться:

- | | |
|------------------------------|---------------------------------|
| 1) существительным; | 2) инфинитивом; |
| 3) деепричастием; | 4) существительным с предлогом; |
| 5) придаточным предложением. | |

Ниже на каждый случай приведено по одному примеру.

- | | |
|--|--|
| 1) <i>Adding and subtracting</i> are reasonable operations. | Сложение и вычитание – это разумные операции. |
| 2) The fifth generation PCs began <i>operating</i> at the end of 90s. | ПК пятого поколения начали <i>работать</i> в конце 90-х годов. |
| 3) <i>After completing</i> computations of the problems the personal computer displayed the answers. | Окончив вычисления задач, персональный компьютер выдал ответы на экран. |
| 4) Nowadays the high-speed processors are <i>used for processing</i> information. | В настоящее время высокоскоростные процессоры используются для обработки информации. |
| 5) <i>The Internet being used</i> for transmitting e-mails is known long ago. | То, что Интернет используется для передачи электронных посланий, известно давно. |

Перевод слов, оканчивающихся на -ed

Основные трудности возникают, когда в предложении несколько слов с окончанием *-ed*.

Затруднения могут вызвать формы *Past Indefinite* (2-я форма глагола) и *Participle II* (3-я форма глагола).

В английском предложении 2-я форма – всегда сказуемое, а 3-я форма – определение. Распознать их можно по следующим признакам:

1. Если *перед* формой стоит личное местоимение в именительном падеже, то это сказуемое.

I asked for a book devoted to environmental problems. Я попросил книгу, посвященную проблемам защиты окружающей среды.

2. Если *после* -ed-формы стоит *прямое дополнение*, то это тоже *сказуемое*:

The *experienced* engineer *created* Опытный (профессиональный) инженер *создал* 2 новых проекта.
two new projects.

В этом предложении два слова заканчиваются на *-ed*. Предпочтение отдаем слову *created*, так как за ним стоит прямое дополнение *two new projects*. Слово *experienced* является определением к существительному *engineer*.

3. Если *после* – ed-формы стоит *дополнение с предлогом by*, то это причастие в форме *определения*.

The boy *bitten by* a dog had to turn Мальчику, укушенному собакой, пришлось обратиться к врачу.
to the doctor.

4. Если в предложении есть *сказуемое*, согласно перечисленным выше признакам, -ed-форма является *определением* к тому существительному, *после* которого она стоит.

The paper *translated* into Статья, переведенная на английский English last week was *handed to* язык на прошлой неделе, передана our professor.
нашему профессору.

5. Если в предложении имеются две подряд стоящие – ed-формы, то *вторая* – это обычно *сказуемое*, а *первая* – *определение* к существительному, стоящему перед нею.

The data *received included* valuable Полученные данные содержали ценную информацию.
information.

2.8. Усилительный оборот *IT IS (WAS) ... WHO (THAT...)*

В английском языке существует усилительная конструкция, которая выглядит следующим образом

Слово, на котором хотят заострить внимание, помещается между *it is (was) ...who (that)*.

It is *in England* that the Great Именно *в Англии* состоялась Exhibition took place.
знаменитая выставка.

При переводе на русский язык вводящие слова *who, that* опускаются, а усиление *выражается словами: именно, лишь, только, это, как раз вот и*, которые ставятся в начале предложения.

In 1861 W. Morris formed his first company. В 1861г. У. Моррис основал свою первую компанию.

It was in 1861 that W. Morris formed his first company. Как раз (именно) в 1861 году У. Моррис основал свою первую компанию.

It was W. Morris who formed his first company in 1861. Именно У. Моррис основал свою первую компанию в 1861 году.

It was the first company that W. Morris formed in 1861. Как раз первую компанию У. Моррис основал в 1861 г.

Следовательно, сложноподчиненное английское предложение переводится на русский язык простым предложением.

3. Бессоюзные определительные придаточные предложения

Бессоюзное определительное придаточное предложение всегда стоит после определяемого существительного. Признаком такой синтаксической связи является наличие двух подряд стоящих существительных или существительного и местоимения, не связанных между собой предлогом. Второе слово из такой пары является подлежащим определительного придаточного предложения.

The report *he has just delivered* is of great importance. Доклад, который он только что прочитал, имеет большое значение.

Определительное придаточное предложение с предлогом после сказуемого следует начинать переводить с этого предлога:

All programmes may be divided into different types according to the service *they are intended for*. Все программы могут подразделяться на различные типы согласно работе, для которой они предназначены.

The style *our lecturer is speaking of* is of great importance. Стиль, о котором рассказывает наш лектор, очень важен.

4. Имя существительное в функции определения или цепочка определений

Если между артиклем (или другим определителем) и существительным, к которому он относится, стоит несколько существительных, они образуют цепочку определений, а существительное, к которому относится артикль, является по отношению к ним опорным. С него рекомендуется начинать перевод цепочки определений.

Определения могут переводиться следующим образом:

1. прилагательным:

a steam turbine – паровая турбина

2. существительным в родительском падеже:

the airplane wing – крыло самолета

3. существительным с предлогом:

a steam engine car – автомобиль с паровым двигателем

4. переставлением членов атрибутивной группы:

working expectancy – ожидаемая продолжительность трудовой деятельности;

administrative efficiency – умелое руководство

5. описательным переводом:

Jet lag (дословно: реактивное отставание) – нарушение суточного ритма организма, расстройство биоритмов в связи с перелетом (отсюда в этом словосочетании слово *jet* – реактивный самолет) через несколько часовых поясов.

В предложении это словосочетание, естественно, можно перевести гораздо короче с учетом контекста:

On the third day of my stay in California I still had a jet lag. На третий день пребывания в Калифорнии я по-прежнему ощущал разницу во времени.

6. группой существительных:

the car speed calculation problem проблема вычисления скорости автомобиля

Наибольшая широта смысловых связей прослеживается в словосочетаниях, образованных из двух или более существительных (N+N: Noun+Noun – *stone wall*) или существительных, перед

которыми стоит многочленное сочетание в роли определения (см. последний пример).

В таких словосочетаниях главным словом является последнее существительное, а предшествующие слова чаще всего выполняют функцию определения:

<i>stone wall</i>	стена (какая?) из камня или каменная
<i>shuttle diplomacy</i>	челночная дипломатия
<i>top trade union leaders</i>	лидеры (какие? чего?) союзов (каких?)
<i>(UK)/ top labor union leaders (U.S.)</i>	профессиональных (какие лидеры профсоюзов?) высшие => высшее руководство профсоюзов

Иногда первое существительное в словосочетании N+N выступает в роли (а) обстоятельства или (б) дополнения:

<i>(a) weekend rally</i>	митинг в конце недели
<i>seashore bike ride</i>	велосипедная прогулка по берегу моря
<i>(б) space programme</i>	программа космических исследований
<i>corruption struggle</i>	борьба с коррупцией

Многочленные словосочетания при переводе необходимо понять с точки зрения смысловой связи составляющих их компонентов, при этом основным или опорным словом все равно будет последнее:

<i>Most-favoured-nation trading status.</i>	Статус наибольшего благоприятствования в торговле
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ТАБЛИЦА НЕПРАВИЛЬНЫХ ГЛАГОЛОВ

Infinitive (первая форма глагола)	Past Simple (вторая форма глагола)	Past Participle (третья форма глагола)	Перевод на русский язык
abide	abode; abided	abode; abided	пребывать; держаться
arise	arose	arisen	подняться; возникнуть
awake	awoke	awaked; awoke	будить; проснуться
be	was/were	been	быть
beat	beat	beaten	бить
become	became	become	становиться
befall	befell	befallen	случиться
begin	began	begun	начинать
bend	bent	bent	гнуть, изгибать
bind	bound	bound	связать
blow	blew	blown	дуть, выдыхать
break	broke	broken	ломать
breed	bred	bred	выращивать
bring	brought	brought	приносить
broadcast	broadcast	broadcast	распространять; разбрасывать
build	built	built	строить
burn	burnt; burned	burnt; burned	жечь; гореть
burst	burst	burst	взрываться
buy	bought	bought	покупать
cast	cast	cast	кинуть; лить металл
catch	caught	caught	ловить
choose	chose	chosen	выбирать
come	came	come	приходить
cost	cost	cost	стоить
cut	cut	cut	резать
dare	durst; dared	dared	смечь
deal	dealt	dealt	иметь дело
dig	dug	dug	копать, рыть
dive	dived; dove	dived	нырять; погружаться
do	did	done	делать
draw	drew	drawn	тянуть; рисовать
dream	dreamt; dreamed	dreamt; dreamed	грезить; мечтать
drink	drank	drunk	пить

drive	drove	driven	вести автомобиль, приводить в движение
dwell	dwelt	dwelt	обитать; задерживаться
eat	ate	eaten	есть пищу
fall	fell	fallen	падать
feed	fed	fed	кормить(ся), питать(ся)
feel	felt	felt	чувствовать
fight	fought	fought	сражаться
find	found	found	находить
fit	fit	fit	подходить по размеру
fly	flew	flown	летать
forbid	forbade	forbidden	запрещать
forecast	forecast; forecasted	forecast; forecasted	предсказывать
forget	forgot	forgotten	забывать
forgive	forgave	forgiven	прощать
freeze	froze	frozen	замерзать
get	got	got	получать
give	gave	given	давать
go	went	gone	идти
grow	grew	grown	расти
hang	hung	hung	висеть, вешать
have	had	had	иметь
hear	heard	heard	слышать
hide	hid	hidden	прятать(ся)
hit	hit	hit	ударять(ся)
hold	held	held	держать
hurt	hurt	hurt	ранить, причинять боль
input	input; inputted	input; inputted	входить
inset	inset	inset	вставлять; вкладывать
keep	kept	kept	хранить
know	knew	known	знать
lade	laded	laded; laden	грузить
lay	laid	laid	класть
lead	led	led	вести (за собой)
learn	learnt; learned	learnt; learned	учить
leave	left	left	уезжать, уходить
lend	lent	lent	давать в долг

lie	lay	lain	лежать, ложиться
light	lit lighted	lit lighted	освещать
lose	lost	lost	терять
make	made	made	делать
mean	meant	meant	иметь в виду
meet	met	met	встретить
misgive	misgave	misgiven	внушать опасения
mistake	mistook	mistaken	ошибаться
outdo	outdid	outdone	превосходить
overdraw	overdrew	overdrawn	превышать
pay	paid	paid	платить
prove	proved	proved; proven	доказывать; оказаться
put	put	put	класть
read[ri:d]	read[red]	read [red]	читать
rid	rid; rided	rid; rided	избавлять
ride	rode	ridden	ехать верхом или на велосипеде
ring	rang	rung	звонить
rise	rose	risen	подниматься
rive	rived	riven	расщеплять
run	ran	run	бежать
say	said	said	говорить
see	saw	seen	видеть
seek	sought	sought	искать
sell	sold	sold	продавать
send	sent	sent	посылать
set	set	set	устанавливать
sew	sewed	sewn/sewed	шить
shake	shook	shaken	трясти
shine	shone	shone	светить
shoot	shot	shot	стрелять
show	showed	shown	показывать
shrink	shrank	shrunk	сжиматься
shut	shut	shut	закрывать
sing	sang	sung	петь
sink	sank	sunk	опускаться; погружаться; тонуть
sit	sat	sat	сидеть
sleep	slept	slept	спать
slide	slid	slid	скользить
smell	smelt; smelled	smelt; smelled	пахнуть; нюхать
speak	spoke	spoken	говорить

speed	sped; speeded	sped; speeded	ускорять; спешить
spell	spelt; spelled	spell; spelled	писать или читать по буквам
spend	spent	spent	тратить
split	split	split	расщеплять
spread	spread	spread	распространять
stand	stood	stood	стоять
steal	stole	stolen	красть
sting	stung	stung	жалить; жечь
strike	struck	struck	ударять; бить
strive	strove	striven	стараться
swear	swore	sworn	клясться
sweep	swept	swept	мести, сметать
swim	swam	swum	плыть
swing	swung	swung	качаться
take	took	taken	брать
teach	taught	taught	обучать
tear	tore	torn	рвать
tell	told	told	рассказывать
think	thought	thought	думать
throw	threw	thrown	бросать, кидать
undergo	underwent	undergone	проходить; подвергаться
understand	understood	understood	понимать
wake	woke	woken	просыпаться
wear	wore	worn	будить
win	won	won	выигрывать, побеждать
withdraw	withdrew	withdrawn	взять назад; отозвать
write	wrote	written	писать

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Учебное издание

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**АНГЛИЙСКИЙ ЯЗЫК
ДЛЯ ТЕХНИЧЕСКИХ ВУЗОВ**

Учебное пособие

Подписано в печать 28.04.2013.

Электронное издание для распространения через
Интернет.

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