Министерство образования и науки Российской Федерации
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«Томский государственный университет систем управления и радиоэлектроники»

КАФЕДРА ИНОСТРАННЫХ ЯЗЫКОВ

ENGLISH FOR GRADUATE STUDENTS

Themes Book

АНГЛИЙСКИЙ ЯЗЫК ДЛЯ СТУДЕНТОВ МАГИСТРАТУРЫ

Учебное пособие

ТОМСК 2014

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Introduction

Настоящее пособие составлено в соответствии с требованиями ФГОС ВПО направлений и специальностей технического университета и содержанием программы по иностранному языку для технических вузов.

Первая часть пособия (**Themes Book**) содержит 18 тем по направлениям промышленная электроника, микроэлектроника, радиотехника, системы связи, программирование и т.д. Данная часть направлена на приобретение и увеличение словарного запаса по теме и на совершенствование навыков работы с профессионально-направленным текстом. Кроме того, каждая тема включает материал для аудирования – аудио- или видеозапись с заданиями, – которые непосредственно связаны с темой. Дополнительное пособие (**HOW TO … functions**) состоит из 18 разделов, в которых делается акцент на овладении определенных навыков письменной и устной речи, с которыми молодые ученые могут столкнуться в процессе научно-исследовательской деятельности. Третья часть пособия (**Grammar Minimum**) состоит из 6 частей, по количеству тем для изучения в течение учебного года, по 3 в каждом семестре, и предназначена для совершенствования грамматических навыков составления устного и письменного высказывания на английском языке. Приложение (**Appendices**) включают в себя краткие сведения по основным формам глагола в активном и пассивном залоге и список неправильных глаголов. Планируется дополнение всех частей пособия.

Teaching Notes

Учебные программы по каждой специальности предполагают изучение 3 тем за семестр. Каждая тема посвящена отдельному аспекту, изучаемому по направлению магистратуры. Преподаватель может выбирать темы в соответствии с требованиями отдельной специальности. Тема рассчитана на 4-5 занятий. Первое занятие, и соответственно первый текст, представляют собой введение в тему и ознакомление с основными терминами. Студенты демонстрируют накопленные знания по данной теме и соотносят их с понятиями из первого текста. Второй текст более сложный и требует тщательной проработки, поэтому мы рекомендуем изучить его дома, при этом выполнив все задания после текста и переведя и поняв его содержание. Детальная проверка выполненных заданий позволит понять, насколько студенты разобрались с информацией и запомнили новый материал, а также откорректировать ошибки. Изучение рекомендованных функций речи поможет уделить внимание отдельным явлениям, с которыми студенты столкнулись в тексте или при обсуждении темы. Преподаватель также вправе выбирать те функции, которые считает наиболее уместными при изучении данной темы и всего курса в целом. Оптимальным является изучение двух функций в каждой теме. В дальнейшем эти функции должны быть продемонстрированы при выполнении заданий на говорение и письмо. Изучение грамматики проходит параллельно с изучением материала темы и также должно быть отражено при выполнении заданий на говорение и письмо. Мы рекомендуем брать один грамматический минимум за тему. При этом по инициативе преподавателя минимум может быть расширен путем использования дополнительного материала, если возникает потребность у студентов и позволяет учебное время. Аудирование должно помочь студентам усовершенствовать навыки аудирования по изучаемой теме. Оно содержит большую часть лексики по уже пройденным текстам, кроме того, оно содержит

знакомый студентам материал. Поэтому при работе над заданиями по аудированию студенты должны использовать и новые и имеющиеся знания. Тексты на прослушивание также имеют некоторое количество новой лексики для дальнейшего изучения. Мы рекомендуем дать возможность студентам проделать все задания на прослушивание самостоятельно, чтобы каждый студент имел возможность прослушать материал столько раз, сколько ему нужно, и продумать содержание услышанного. Качество проделанной работы проверяется на третьем уроке с использованием аудио- или видеоаппаратуры. Четвертый урок посвящен проверке того, насколько студенты овладели лексическим, грамматическим и языковым материалом, изученным за три урока. Мы рекомендуем посвятить его прослушиванию подготовленных устных тем. Темы заданий на говорение должны быть связаны с изучаемой темой и с направлением специализации каждого студента. Выступления могут сопровождаться мини-презентациями, что в свою очередь может быть практикой публичного выступления на английском языке и частично практикой подготовки зачетного или экзаменационного выступления. По окончании работы над темой, студенты должны выполнить письменное задание в соответствии с темой и с использованием лексики, грамматики, и функций, изученными ранее.

Themes Book

Theme 1. EARNING A DEGREE

Lead-in

You are going to read the text about Master's degree programme in University of Birmingham. Do you know anything about Masters' training abroad?

Reading and Vocabulary

Task 1. a) Read the words and phrases from the first text and tick the ones which you know. Clear up the meaning of unknown ones.

interactive digital media	embedded digital signal	innovation
media compression	processing	seamless
embedded system	communications network	sophisticated
spoken language processing	industrial studies	enhanced
image interpretation	individual project	advance
3D environment	be designed to	linkage
communications engineering	equip	requirement
advanced digital design	research	qualify
	development	secure

b) Which of the subjects or activities in the first column do you do in your study?

Task 2. Read the first paragraph and tell about 2 types of Master's degree programs which are provided by this university.

Task 3. Read the whole text and complete the table after the text with the information about the University of Birmingham.

<h1 style="text-align: center"><u>University of Birmingham</u></h1>

Electronic and Computer Engineering Masters/MSc with Industrial Studies

Electronics is at the heart of a wide range of business and entertainment systems and is vital to the growth of the global economy. This programme is designed to equip you with the knowledge and skills you will need to play a leading part in the future research, development and application of these technologies. This variant of our standard MSc in Electronic and Computer Engineering includes an industrial placement module, providing an opportunity for you to develop ideas for your individual project.

Key facts

Type of Course: Taught, continuing professional development

Duration: 18 months full-time

Start date: September/October 2012

Entry requirements

At least *an upper second-class Honours degree (диплом специалиста или бакалавра со средним баллом не ниже 4)* from a university of high international standing

International students

We accept a range of qualifications from different countries

English language requirements: TOEFL (paper-based) 580, (computer-based) 230, (Internet-based) 92, IELTS 6.5

Programme Overview

Electronics is at the heart of a wide range of business and entertainment systems. The integration of computing and communications with interactive digital media is evident in many modern innovations that are creating a revolution in business and the life of individuals.

These systems are vital to the growth of the global economy; reducing costs, improving quality and providing ever more sophisticated services. All aspects of business, from research and development to production, marketing and sales, benefit from rapid advances in such technology. Our social lives, entertainment and education are also enhanced by continuing advances in personal electronic systems, media compression and seamless connectivity using communications systems.

This degree programme is designed to equip you with the knowledge and skills you will need to play a leading part in the future research, development and application of these technologies.

You have a wide possible range of module choices in this degree programme. The linkage between modules is minimized so that students are free to create a personalized study package. Thus topics from embedded systems, spoken language processing, image interpretation and 3D environments for virtual reality and serious games, and some aspects of communications engineering can be combined in one degree programme.

In addition to the modules taken as part of a standard MSc programme, the with Industrial Studies programme includes an industrial placement module. This provides an opportunity for you to develop ideas for your individual project on a topic related to the interests of the host company. The placement takes place during the summer, following the sessional examinations. After the industrial placement you return to the University to begin an individual project.

To qualify for this degree you must meet the standard requirements for an MSc, obtain and pass an industrial placement. To obtain a placement students must pass the

January examinations at the first attempt and be selected by a company. Selection for a placement involves interviews with companies, which are arranged by the School from our extensive network of industrial contacts. The University will provide training in the preparation of a CV, and in interview technique but cannot guarantee a placement. Students, who do not meet the requirements for a degree with industrial studies, including those who are unable to secure a placement, will revert to a standard degree programme.

Compulsory Modules	Semester
Introductory Module for Computing	1
Advanced Digital Design	1
Embedded Digital Signal Processing	2
Individual Project	3
Cross Programme Options (Take one of the following)	**Semester**
Advanced Interactive 3D Environments for Virtual Reality & Serious Games	2
Small Embedded Systems	2
Computer and Communications Networks	2

№	Questions	University of Birmingham	Your university
1.	What is the name of a degree programme?		
2.	How long is the course?		
3.	What are the entry requirements?		
4.	If you are a foreigner, what else do you need?		
5.	What subjects will you study?		
6.	How is the professional development carried out?		
7.	What do you need to do to get a placement?		

Task 4. Complete the column for your university and compare with your partner.

Task 5. Find the words or phrases in the text that correspond to the following Russian ones:

1) сессия
2) цифровые носители информации
3) широкий спектр
4) программа магистратуры
5) производственная практика
6) требования для поступления
7) пройти зачисление
8) выигрывать
9) постоянный прогресс
10) высокий международный статус

Specialized Reading

Task1. Read the text and say which degree you are doing: Master of Engineering or Master of Science in Engineering.

MASTER OF ENGINEERING VERSUS MASTER OF SCIENCE

1. When deciding between the Master of Engineering versus Master of Science in Engineering degrees, the choice boils down to what an individual really wants from the future. Both of these graduate programs provide a distinct path to multiple career opportunities, but a few differences separate them. As a basic rule of thumb, the Master of Science degree includes more research based work, and the Master of Engineering degree includes more coursework.

2. After graduating with that well earned bachelor's degree in engineering, many students look to graduate school as a prerequisite to the optimum job out there. Some graduates pursue a master's after a few years in the field while others continue right after receiving their undergraduate degree. For the students who have either of these degree in mind, they may have questions over the difference between them. The differences are not plenteous, but they are important for students who have a firm grasp on their career goals. As graduates focus on certain goals they aim to accomplish in life and learn more about the degree programs, they will have a clearer understanding of which is proper for them.

MASTER OF SCIENCE IN ENGINEERING

3. A plethora of colleges offer The Master of Science in Engineering program in many different areas of technical study. A Master of Science in Engineering degree can have an area of focus in a wide range of fields, including electrical engineering, mechanical engineering, and engineering management. This type of degree usually emphasizes research and requires a thesis for completion, making it the optimum degree for graduates who wish to pursue a Doctorate of Philosophy (Ph.D.) after completing the master's program.

4. Requirements for this degree usually encompass 30 semester hours past the Bachelor of Science level. The thesis is worth anywhere from 4 to 8 credit hours depending on the college, and it must be original research. Some colleges will require that a master's student undergo a comprehensive examination. This degree is widely accepted by employers and easily recognized in all fields.

MASTER OF ENGINEERING

5. Many universities offer a Master of Engineering for students who hold a bachelor's degree in engineering. The Master of Engineering program is aimed at equipping students with technical preparation for fieldwork practice. Students in this program spend more time in actual coursework than research, so this degree does not prepare students well for a Ph.D. program. However, most employers accept a Master of Engineering as easily as a Master of Science in Engineering.

6. This degree usually requires 30 semester hours of coursework, and certain colleges require a capstone paper based on an engineering project to be presented before graduation. Some Master of Engineering programs offer credit for internships, and many require a comprehensive examination. This degree does not include a thesis, so it can normally be completed in less time than a Master of Science in Engineering.

7. Students who wish to continue education past the master's level should earn the Master of Science in Engineering, and students who want to be a step above the rest in the workplace will find a satisfying path with the Master of Engineering degree. In consider the Master of Engineering versus Master of Science, the choice basically comes down to whether a student wishes to pursue a Ph.D. or research career in engineering or an engineering career devoted to fieldwork.

Task 2. Are the following sentences true (T) or false (F) or you can't say for sure?
1) There are lots of differences between Master of Science program and Master of Engineering program.
2) All students do Master's Degree just after Bachelor's Degree.
3) Master of Science does not include any coursework.
4) To do Master of Science degree you need to accomplish Bachelor of Science degree.
5) After Master of Engineering you can't do a PhD program.
6) After both programs you have to take a comprehensive examination.
7) Master of Science program can take longer than Master of Engineering program.
8) You have to present a kind of diploma work at the end of both programs.

Task 3. What are Russian equivalents for the following words and phrases?

Master of Engineering, Master of Science in engineering, a graduate, a graduate school, a prerequisite, to pursue, an undergraduate, plentiful, electrical engineering, mechanical engineering, engineering management, to encompass, to undergo, original research, to recognize, a field, to equip with, actual, PhD, an employer, to complete, to earn, workplace, to devote, to earn a degree

Task 4. Match the following terms with their Russian equivalents.

1.coursework	a) кандидатский минимум
2.comprehensive examinations	b) единица учебной нагрузки, определенное количество которых необходимо набрать для получения зачета
3.fieldwork	c) производственная практика; преддипломная практика; стажировка
4.internship	d) совокупность работа, требуемых от студента в течение курса обучения; процесс обучения
5.capstone paper	e) диссертация; дипломная работа
6.credit hour	f) работа на местах
6.thesis	g) итоговая работа, включающая результаты использования знаний в процессе производственной практики

Task 4. Match the verbs in box A with the nouns in box B to make phrases and translate them.

A	B
do, include, receive, earn, pursue, hold, accomplish, accept, offer, complete	coursework, research work, a degree, a program, a thesis, the aim

Task 5. Find synonyms to the following words and phrases in the text.

1. many (para 1)
2. to achieve (para 2)
3. to give importance to (para 3)
4. authentic (para 4)
5. real (para 5)
6. usually (para 6)
7. sensible (para 7)
8. dedicated to (para 7)

Task 6. Match the following colloquial phrases with their Russian equivalents and use them in your own sentences.

1. to boil down to smth
2. as a basic rule of thumb
3. to have a firm grasp

4. to be a step above smb
5. in consider smth versus smth

a) быть на голову выше кого-либо
b) сводиться к чему-либо
c) рассматривая что-либо против чего-либо

d) в качестве общего правила
e) хорошо представлять себе

Task 7. Complete the table with the words from the text according to their pronunciation.

1. /ˈemfəsʌɪz/		7. /kəˈrɪə/	
2. /ɔpəˈtjuːnɪti/		8. /ˈθiːsɪs/	
3. /ˈbætʃələ/		9. /pəˈsjuː/	
4. /ɪmˈplɔɪə/		10. /əkˈsept/	
5. /ˈkɔːswəːk/		11. /ɪˈkwɪp/	
6. /əːn/		12. /ˈɪntəːnʃɪp/	

Recommended function

Study **Function 1 "HOW TO translate an English sentence".**

Listening

Junaid Merchant shares his experience as a graduate student in the Master of Science in Experimental Psychology programme in *Setan Hall Universityin Carolina, the USA.*

Task 1. a) Check you know these words.

design, original research, develop, scientist, advance, rat lab, teaching experience, opportunity, benefit, stuff, accomplish, innovation, professor, faculty, fears, experiment, conferences, thesis project, carry out, sophisticated, government services, expectations, support, motivating, conduct, animal, post-traumatic stress, resources, questions, publications, energizing, PhD programme, gain, empowering

b) Listen and watch the video and underline the words in the box that you will hear.

Task 2. Answer the questions on the video.
1. Why did he decide to do a Master's program in Setan Hall?
2. What is he expected to produce in the end of his study?
3. What does the program require from him to do?
4. What does he research?
5. What makes him feel he is a scientist?
6. What does he learn in a rat lab?
7. What does he think about his teaching experience?
8. What sort of future does he imagine?

Task 3. Decode one of the 4 parts of the listening text:
Part 1 – 00.07 "I decided to …" – 00.42 "… to accomplish what I want to do."
Part 2 – 00.42 "The programme requires …" – 01.11 "... I feel I am a scientist."
Part 3 – 01.12 "I also work …" – 02.00 "… to pursue teaching more."
Part 4 – 02.01 "Ten years from now …" – 02.18 "… the rest of my life."

Speaking
*Prepare a talk about **your studies**. Use these questions to help you:*
1. Why did you decide to do a Master's program in TUSUR?
2. What did you have to do to get a placement?
3. What do you have to do in your study?
4. What do you expect to produce in the end of your study?
5. What does the program require from you to do?
6. What do you research?
7. What subjects do you have to learn?
8. What do you learn in your labs?
9. Do you have to teach?
10. What sort of future do you imagine?

Writing
Study **Function 9 "HOW TO make a simple translation into English"** and
write a short paragraph about your studies. Use the following phrases in your text:

to be designed to/for	to be free to do smth
to equip smb with the knowledge and skills	to provide an opportunity for you to do smth
to develop ideas	
rapid advances in technology	a topic related to smth
continuing advances in smth	to meet the requirements
to play a leading part in	to pass examinations at the first attempt
a wide range of choices	to provide training
to be vital to smth	to guarantee a placement
	to secure a placement

Theme 2. MOST FAMOUS

Lead-in

Who are the most famous scientists in your sphere of study? What do you know about them?

Reading and Vocabulary

Task 1. a) This is essential vocabulary from the first text. Make sure you know the words and phrases.

number theory	sum
arithmetic series	integer
regular polygon	straightedge
natural number	compass
triangular number	heptagon
parallel postulate	heptadecagon
non-Euclidean geometry	polynomial
differential geometry	theorem
conformal map	prime
method of least squares fitting	congruence
curvature	treatise
circle	surveying

b) Check the pronunciation:

mathematician	straightedge
geometry	compass
geodesy	theorem
geophysics	observation
astronomy	plagiarism
analysis	treatise
integer	successful
heptadecagon	curvature

c) Explain the following terms:

integer	heptagon	heptadecagon
straightedge	compass	regular polygon
polynomial	natural number	prime
triangular number	magnetometer	curvature

Task 2. Read the text quickly and list the most important achievements of Carl Gauss.

Carl Friedrich Gauss (30 April 1777 - 23 February 1855) was a German mathematician, who is sometimes called the "prince of mathematics", and physical scientist who contributed significantly to many fields, including number theory, statistics, analysis, differential geometry, geodesy, geophysics, electrostatics, astronomy and optics.

He was a talented child, at the age of three informing his father of an arithmetical error in a complicated payroll calculation and stating the correct answer. In school, when his teacher gave the problem of summing the integers from 1 to 100 (an arithmetic series) to his students to keep them busy, a) … . At the age of 19, Gauss demonstrated a method for constructing a heptadecagon using only a straightedge and compass. (The explicit construction of the heptadecagon was accomplished around 1825 by Erchinger.) Gauss also showed that only regular polygons of a certain number of sides could be made in that manner (b) … .)

Gauss proved the fundamental theorem of algebra, c) … . In fact, he gave four different proofs, the first of which appeared in his dissertation. In 1801, he proved the fundamental theorem of arithmetic, d) … .

At the age of 24, Gauss published one of the most brilliant achievements in Mathematics, *Disquisitiones Arithmeticae* (1801). In it, Gauss systematized the study of number theory (properties of the integers). e) … .

In 1801, Gauss developed the method of least squares fitting, 10 years before Legendre, but did not publish it. The method enabled him to calculate the orbit of the asteroid Ceres, which had been discovered by Plazzi from only three observations. However, after his independent discovery, Legendre accused Gauss of plagiarism. Gauss published his monumental treatise on celestial mechanics *Theoria Motus* in 1806. He became interested in the compass through surveying and developed the magnetometer and f) … . With Weber, he also built the first successful telegraph.

Gauss arrived at important results on the parallel postulate, but failed to publish them. Credit for the discovery of non-Euclidean geometry therefore went to Janos Bolyai and Lobachevsky. However, he did publish his seminal work on differential geometry in *Disquisitiones circa superticies curvas*. g) … . He also discovered the Cauchy integral theorem

$$\oint_\gamma f(z)\, dz = 0.$$

for analytic functions, but did not publish it. Gauss solved the general problem of making a conformal map of one surface onto another.

Unfortunately for mathematics, Gauss reworked and improved papers all the time, therefore publishing only a fraction of his work, in keeping his motto "**pauca sed matura**" (few but ripe). Many of his results were later repeated by others, since his brief diary remained unpublished for years after his death. This diary was only 19 pages long, but later confirmed his priority on many results he had not published. Gauss wanted a heptadecagon placed on his gravestone, but the carver refused saying h) … . The heptadecagon appears, however, as the shape of a pedestal with a statue built in his honor in his home town of Braunschweig.

Task 3. Insert these sentences into the text.
1. … which states that every polynomial has a root of the form $a+bi$.
2. … which states that every natural number can be represented as the product of primes in only one way.
3. … it would look like a circle.
4. … Gauss immediately wrote down the correct answer 5050.
5. Gauss Proved that every number is the sum of at most three triangular numbers and developed the algebra of congruencies.
6. … with William Weber measured the intensity of magnetic forces.

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7. … a heptagon, for example, could not be constructed.
8. The Gaussian curvature (or "second" curvature) is named for him.

Task 4. Are the following sentences true (T) or false (F)?
1) Gauss became interested in mathematics when he started school.
2) In his dissertation he proved the fundamental theorem of algebra.
3) Gauss developed the method of least squares fitting and accused Legendre in plagiarism when he published his findings.
4) His interest in compass and magnetic field helped him develop the telegraph.
5) Gauss didn't publish his results on the parallel postulate, so he didn't get any credits in geometry.
6) Gauss made a lot of discoveries before other scientists but didn't want to publish them because he thought they were not completed.

Task 5. There were some sciences in the text mentioned. What are the people working in these fields called? Complete the table.

Fields	People
mathematics	
physics	
astronomy	
optics	
chemistry	
biology	
geography	
ecology	

Specialized Reading

Read and translate the text.

GAUSS'S LAW
1. Introduction
The electric field of a given charge distribution can in principle be calculated using Coulomb's law. But the actual calculations can become quite complicated.
2. Gauss's Law
An alternative method to calculate the electric field of a given charge distribution relies on a theorem called Gauss's law. Gauss' law states that
"If the volume within an arbitrary closed mathematical surface holds a net electric charge Q, then the electric flux **Φ**[Phi] through its surface is **Q/ε**[epsilon]$_0$"
Gauss's law can be written in the following form:
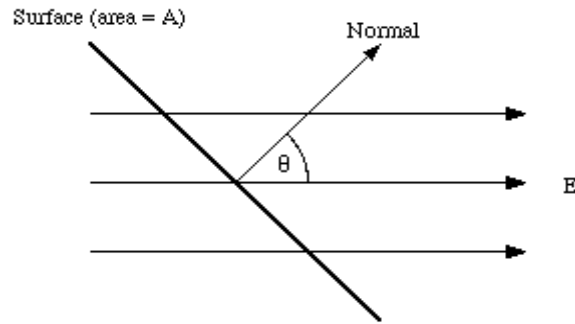
$$\Phi = \frac{Q}{\varepsilon_0}$$

Figure 1. Electric flux through surface area A.

The electric flux Φ [Phi] through a surface is defined as the product of the area **A** and the magnitude of the normal component of the electric field **E**:

$$\Phi = E\,A\,\cos(\theta)$$

Where θ [theta] is the angle between the electric field and the normal of the surface (see Fig. 1). To apply Gauss' law one has to obtain the flux through a closed surface. This flux can be obtained by integrating the second equation over all the area of the surface. The convention used to define the flux as positive or negative is that the angle θ [theta] is measured with respect to the perpendicular erected on the outside of the closed surface: field lines leaving the volume make a positive contribution, and field lines entering the volume make a negative contribution.

Example 1: Field of point charge.
The field generated by a point charge **q** is spherical symmetric, and its magnitude will depend only on the distance **r** from the point charge. The direction of the field is along the surface (see Fig. 2). Consider a spherical surface centered around the point charge **q** (see Fig. 2). The direction of the electric field at any point on its surface is perpendicular to the surface and its magnitude is constant. This implies that the electric flux Φ [Phi] through this surface is given by

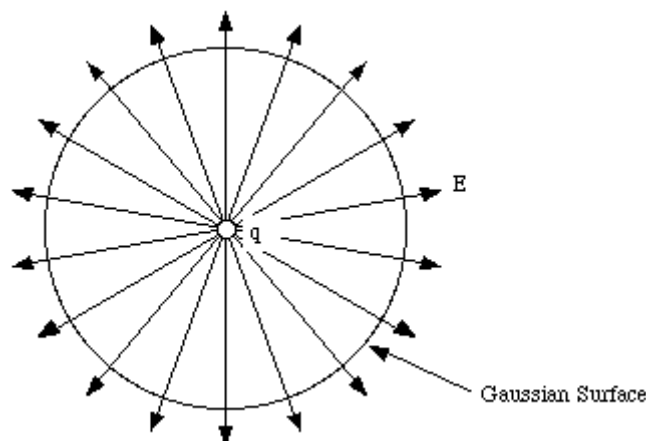$$\Phi = \int_{S} \bar{E} \cdot d\bar{s} = 4\pi r^{2} E$$

Figure 2. Electric field generated by point charge q.

Using Gauss's law we obtain the following expression

$$\Phi = 4\pi r^2 E = \frac{q}{\varepsilon_0}$$

or

$$E = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}$$

which is Coulomb's law.

Example 2: Problem 16

Charge is uniformly distributed over the volume of a large slab of plastic of thickness **d**. The charge density is ρ [rho] C/m^3. The mid-plane of the slab is the y-z plane (see Fig. 3). What is the electric filed at a distance **x** from the mid-plane?
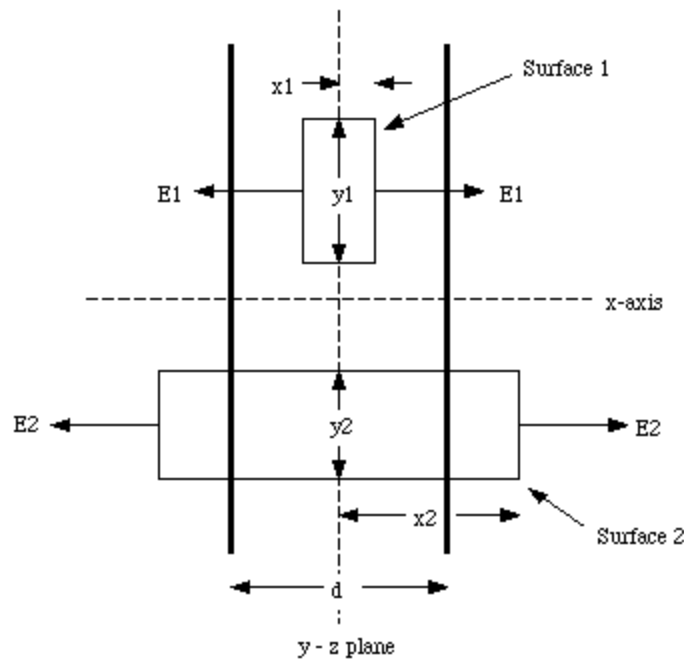
Figure 3. Problem 16.

As a result of the symmetry of the slab, the direction of the electric field will be along the x-axis (at every point). To calculate the electric field at any given point, we need to consider two separate cases: $-d/2 < x < d/2$ and $x > d/2$ or $x < -d/2$. Consider surface 1 shown in Fig. 3. The flux through this surface is equal to the flux through the planes at $x = x_1$ and $x = -x_1$. Symmetry arguments show that

$$\bar{E}(x = x_1) = -\bar{E}(x = -x_1)$$

The flux Φ [Phi]$_1$ through surface 1 is therefore given by

$$\Phi_1 = 2A_1 E(x = x_1) = 2y_1 z_1 E(x = x_1)$$

The amount of charge enclosed by surface 1 is given by

$$Q_1 = 2x_1 y_1 z_1 \rho$$

Applying Gauss' law to these equations we obtain

$$2 y_1 z_1 E(x = x_1) = \frac{2 x_1 y_1 z_1 \rho}{\varepsilon_0}$$

or

$$E(x = x_1) = \frac{\rho x_1}{\varepsilon_0}$$

Note: this formula is only correct for $-d/2 < x_1 < d/2$.

The flux Φ [Phi]$_2$ through surface 2 is given by

$$\Phi_2 = 2 A_2 E(x = x_2) = 2 y_2 z_2 E(x = x_2)$$

The charge enclosed by surface 2 is given by

$$Q_2 = d y_2 z_2 \rho$$

This equation shows that the enclosed charge does not depend on x_2. Applying Gauss's law one obtains

$$2 y_2 z_2 E(x = x_2) = \frac{d y_2 z_2 \rho}{\varepsilon_0}$$

or

$$E(x = x_2) = \frac{\rho}{\varepsilon_0} \frac{d}{2}$$

3. Conductors in Electric Fields

A large number of electrons in a conductor are free to move. The so called free electrons are the cause of the different behavior of conductors and insulators in an external electric filed. The free electrons in a conductor will move under the influence of the external electric field (in a direction opposite to the direction of the electric field). The movement of the free electrons will produce an excess of electrons (negative charge) on one side of the conductor, leaving a deficit of electrons (positive charge) on the other side. This charge distribution will also produce an electric field and the actual electric field inside the conductor can be found by superposition of the external electric field and the induced electric field, produced by the induced charge distribution. When static equilibrium is reached, the net electric field inside the conductor is exactly zero. This implies that the charge density inside the conductor is zero. If the electric field inside the conductor would not be exactly zero the free electrons would continue to move and the charge distribution would not be in static equilibrium. The electric field on the surface of the conductor is perpendicular to its surface. If this would not be the case, the free electrons would move along the surface, and the charge distribution would not be in equilibrium. The redistribution of the free electrons in the conductor under the influence of an external electric field, and the cancellation of the external electric field inside the conductor is being used to shield sensitive instruments from external electric fields.

The strength of the electric field on the surface of a conductor can be found by applying Gauss' law (see Fig. 4). The electric flux through the surface shown in Fig. 4 is given by

$$\Phi = A E$$

where **A** is the area of the top of the surface shown in Fig. 4. The flux through the bottom of the surface shown in Fig. 4 is zero since the electric field inside a conductor is equal to zero. Note that this equation is only valid close to the conductor where the electric field is perpendicular to the surface. The charge enclosed by the surface shown in Fig. 4 is equal to
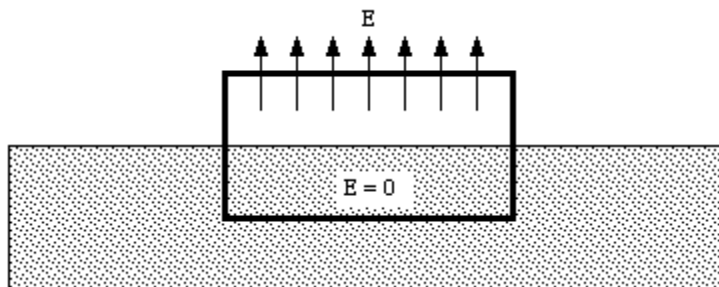
Figure 4. Electric field of conductor.

$$Q = A \sigma$$

where **σ** [sigma] is the surface charge density of the conductor. This equation is correct if the charge density **σ** [sigma] does not vary significantly over the area **A** (this condition can always be met by reducing the size of the surface being considered). Applying Gauss' law we obtain

$$\Phi = A E = \frac{Q}{\varepsilon_0} = \frac{A \sigma}{\varepsilon_0}$$

Thus, the electric field at the surface of the conductor is given by

$$E = \frac{\sigma}{\varepsilon_0}$$

Task 1. Answer the questions on the text.
  1. What does Gauss's Law state?
  2. What does the first example show?
  3. What does the second example show?
  4. What happens in the conductor in the electric field?

Task 2. Put these words into the groups: nouns, adjective and adverbs, and translate them.

complicated, a charge, normal, arbitrary, a surface, a magnitude, an angle, flux, an area, perpendicular, spherical, a constant, uniformly, a plane, density, thickness, a mid-plane, an argument, enclosed, an equation, behavior, external, excess, distribution, induced, bottom, valid, significantly.

Task. 3. How do you pronounce these symbols and what do they mean?

Symbol	Pronunciation	Meaning
Φ		
ε		
θ		
π		
ρ		
σ		

Task 4. Underline the stressed syllables in the following words. Check that you know their meaning.

distribution, calculations, complicated, mathematical, magnitude, a component, convention, measured, perpendicular, contribution, spherical, a direction, following, uniformly, symmetry, to consider, to separate, an argument, behavior, a conductor, an insulator, influence, an electron, deficit, equilibrium, redistribution, cancellation, an instrument, significantly.

Task 5. Write the words from the text to the following transcriptions.

1 ./'æksɪs/		9./ɪ'kweɪʒ(ə)n/	
2. /'æktʃʊəl/		10./'veəri/	
3./'æŋg(ə)l/		11./'ækses/	
4./'θɪərəm/		12./kən'sɪdə/	
5./'ɔpəzɪt/		13./ʃi:ld/	
6./'vɔlju:m/		14./streŋθ/	
7./'ku:ləm/		15./kləʊzd/	
8./'sə:fɪs/		16./ɪk'stə:n(ə)l/	

Task 6. Translate these phrases:

1. … relies on a theorem …
2. Gauss's law states …
3. … one has to obtain …
4. Consider a spherical surface…
5. This implies that …
6. Applying Gauss's law one obtains…
7. Note that …

Recommended function

Study **Function 10 "HOW TO say numbers and formulas"** *and say all the formulas in the text.*

Listening

You will watch a video about **Coulomb's Law.** Do you know what it says?

Task 1. What are English equivalents to the following words and phrases?

электрический заряд	постоянная
электрическая сила	величина, значение
положительный заряд	вещество
отрицательный заряд	стрелочка
нейтральный заряд	расстояние
одноименный заряд	знак (+, -)
разноименный заряд	ноль
притягиваться	числитель
отталкиваться	знаменатель
сильный	произведение
слабый	удваивать

Task 2. Underline the stressed syllables in these words.

object, distance, Coulombic, constant, electrically, neutral, representation, repel, attract, interact, quantity, multiplied, attractive, denominator, fraction, quadruple, inverse, permittivity, approximately.

Task 3. Pronounce all the formulas from the video.

Task 4. Decode one of the parts:
Part 1 – 00.28 "Matter can be …" – 01.12 "… with electrically charged objects."
Part 2 – 01.13 "The closer two charges …" – 02.41 "… also get multiplied."
Part 3 – 01.58 "Let's say …" – 02.41 "… the force between them is zero."
Part 4 – 02.41 "So, multiplying the charges…" – 03.23 "… distances are very important."

Recommended function and Speaking

*Study **<u>Function 5 "HOW TO talk about cause and effect"</u>** and prepare a talk about a scientist and a law or a discovery he made. Include some formulas. Use most of these phrases in your talk.*

… contributed significantly to …	rely on …
one of the most brilliant achievements in …	depend on …
… enabled him/her to …	seminal work on …
arrived at important results on …	can be obtained by …
can be written in the following form	with respect to …
solved the general problem of …	this implies that …
which sates …	can be found by applying …
fundamental treatise on …	If this is not the case …

Writing

*Write down **10 formulas** which you deal with in your study or work in symbols and comment on them in words.*

Theme 3. MICROPROCESSORS

Lead-in

Which of these definitions mean **"microprocessor"?** Which of them correspond to the following terms: **processor, IC, chip**?
  a) a tiny wafer of semiconducting material used to make an integrated circuit
  b) an integrated circuit that contains all the functions of a central processing unit of a computer
  c) an electronic circuit formed on a small piece of semiconducting material, which performs the same function as a larger circuit made from discrete components
  d) the part of a computer in which operations are controlled and executed

Reading and Vocabulary

Task 1. a) These are the most important words from the text. Make sure you know them.

sliver	awe-inspiring	delight
linear predictive coding	op-amp	propel
alter	monochrome	audio amplifier
emerge	impact	timer
deem	waveform generator	external data bus
support chip	ancestor	FPGA
cutting-edge	earthshaking	speech synthesizer
speech-synthesis chip	image sensor	microcode bug
compatibility	decoder	DRAM
artwork	UART	convey

b) Which of the words and phrases from Task 1are adjectives, verbs, and devices?

Task 2. The text is about 25 unique microchips. Read the beginning of the text and look at the list of them. Can you tell anything about any of them?

25 microchips that shook the world

In microchip design, as in life, small things sometimes add up to big things. Dream up a clever microcircuit, get it sculpted in a sliver of silicon, and your little creation may break free a technological revolution. Among the many great chips that have emerged from fabs during the half-century reign of the integrated circuit, a small group stands out. Their designs proved so cutting-edge, that we can't find any stronger words to describe them. Suffice it to say (достаточно сказать) that they gave us the technology that made our brief, otherwise tedious existence in this universe worth living.

We focused on chips that proved unique, intriguing, and awe-inspiring. We wanted chips of varied types, from both big and small companies, created long ago or more recently. Above all, we made a search for ICs that had an impact on the lives of lots of people--chips that became part of earthshaking gadgets, symbolized technological trends, or simply delighted people.

1. **Signetics NE555 Timer (1971)**
2. **Texas Instruments TMC0281 Speech Synthesizer (1978)**

If it weren't for the TMC0281, E.T. would've never been able to "phone home." That's because the TMC0281, the first single-chip speech synthesizer, was the heart (or should we say the mouth?) of Texas Instruments' Speak & Spell learning toy. In the Steven Spielberg movie, the flat-headed alien uses it to build his interplanetary communicator.

The TMC0281 conveyed voice using a technique called linear predictive coding; the sound came out as a combination of buzzing, hissing, and popping. It was a surprising solution for something deemed "impossible to do in an integrated circuit," says Gene A. Frantz, one of the four engineers who designed the toy and is still at TI. Variants of the chip were used in Atari arcade games and Chrysler's K-cars. In 2001, TI sold its speech-synthesis chip line to Sensory, which discontinued it in late 2007. But if you ever need to place a long, very-long-distance phone call, you can find Speak & Spell units in excellent condition on eBay for about US $50.

3. **MOS Technology 6502 Microprocessor (1975)**

4. **Texas Instruments TMS32010 Digital Signal Processor (1983)**
5. **Microchip Technology PIC 16C84 Microcontroller (1993)**
6. **Fairchild Semiconductor μA741 Op-Amp (1968)**
7. **Intersil ICL8038 Waveform Generator (circa 1983*)**
8. **Western Digital WD1402A UART (1971)**
9. **Acorn Computers ARM1 Processor (1985)**
10. **Kodak KAF-1300 Image Sensor (1986)**
11. **IBM Deep Blue 2 Chess Chip (1997)**
12. **Transmeta Corp. Crusoe Processor (2000)**
13. **Texas Instruments Digital Micromirror Device (1987)**
14. **Intel 8088 Microprocessor (1979)**

Was there any one chip that propelled Intel into the Fortune 500? Intel says there was: the 8088. This was the 16-bit CPU that IBM chose for its original PC line, which went on to dominate the desktop computer market.

In an odd twist of fate, the chip that established what would become known as the x86 architecture didn't have a name added with an "86." The 8088 was basically just a slightly modified 8086, Intel's first 16-bit CPU. The new chip's main innovation wasn't exactly a step forward in technical terms: The 8088 processed data in 16-bit words, but it used an 8-bit external data bus.

Intel managers kept the 8088 project under wraps until the 8086 design was mostly complete. "Management didn't want to delay the 8086 by even a day by even telling us they had the 8088 variant in mind," says Peter A. Stoll, a lead engineer for the 8086 project who did some work on the 8088--a "one-day task force to fix a microcode bug that took three days."

It was only after the first functional 8086 came out that Intel shipped the 8086 artwork and documentation to a design unit in Haifa, Israel, where two engineers, Rafi Retter and Dany Star, altered the chip to an 8-bit bus.

The modification proved to be one of Intel's best decisions. The 29 000-transistor 8088 CPU required fewer, less expensive support chips than the 8086 and had "full compatibility with 8-bit hardware, while also providing faster processing and a smooth transition to 16-bit processors," as Intel's Robert Noyce and Ted Hoff wrote in a 1981 article for IEEE Micro magazine.

The first PC to use the 8088 was IBM's Model 5150, a monochrome machine that cost US $3000.Now almost all the world's PCs are built around CPUs that can claim the 8088 as an ancestor.

15. **MP3 Decoder (1997)**
16. **Mostek MK4096 4-Kilobit DRAM (1973)**
17. **Xilinx XC2064 FPGA (1985)**
18. **Zilog Z80 Microprocessor (1976)**
19. **Sun Microsystems SPARC Processor (1987)**
20. **Tripath Technology TDA2020 AudioAmplifier (1998)**
21. **Amati Communications Overture ADSL Chip Set (1994)**
22. **Motorola MC68000 Microprocessor (1979)**
23. **Chips & Technologies AT Chip Set (1985)**
24. **Computer Cowboys Sh-Boom Processor (1988)**
25. **Toshiba NAND Flash Memory (1989)**

Task 3. Read Part 2 and 14. Write SS for Speech Synthesizer and IM for Intel Microprocessor next to the following statements.
1. This chip was used in several games and toys.
2. It was a modification of another chip.
3. The construction of this chip started even before the old one went into the market.
4. Two companies fabricated these chips.
5. This chip was initially used in black and white PCs.
6. You can still find these chips on sale, though they are not produced now.
7. This chip showed faster processing power than its predecessor.

Task 4. Find the words or phrases to the following explanations.
a) to be the best or most important in a particular area or domain (intro)
b) a device for connection between planets (part 2)
c) different kinds of noise, made by a device (part 2)
d) a type of computer game played on a coin-operated entertainment machine, usually installed in public businesses, such as restaurants, bars (part 2)
e) an online auction and shopping website in which people and businesses buy and sell a broad variety of goods and services worldwide (part 2)
f) the irony of circumstances (part 14)
g) under seal of secrecy (part 14)
h) engineering company (part 14)
i) great-grandparent (part 14)

Task 5. Give definitions to the following terms:
speech synthesizer, digital signal processor, operational amplifier, microcontroller, waveform generator, image sensor, data bus, support chip, MP3 decoder, audio amplifier, chip set, flash memory

Specialized Reading
Read and translate the text.
Microprocessors
1. A microprocessor -- also known as a CPU or central processing unit -- is a complete computation engine that is fabricated on a single chip. The first microprocessor was the Intel 4004, introduced in 1971. The 4004 was not very powerful -- all it could do was add and subtract, and it could only do that 4 bits at a time. But it was amazing that everything was on one chip. Prior to the 4004, engineers built computers either from collections of chips or from discrete components (transistors wired one at a time). The 4004 powered one of the first portable electronic calculators.

2. The first microprocessor to make it into a home computer was the Intel 8080, a complete 8-bit computer on one chip, introduced in 1974. The first microprocessor to make a real splash in the market was the Intel 8088, introduced in 1979 and incorporated into the IBM PC (which first appeared around 1982). If you are familiar with the PC market and its history, you know that the PC market moved from the 8088 to the 80286 to the 80386 to the 80486 to the Pentium to the Pentium II to the Pentium III to the Pentium 4. All of these microprocessors are made by Intel and all of them are

improvements on the basic design of the 8088. The Pentium 4 can execute any piece of code that ran on the original 8088, but it does it about 5,000 times faster!

3. Since 2004, Intel has introduced microprocessors with multiple cores and millions more transistors. But even these microprocessors follow the same general rules as earlier chips.

4. A microprocessor executes a collection of machine instructions that tell the processor what to do. Based on the instructions, a microprocessor does three basic things:

- Using its ALU (Arithmetic/Logic Unit), a microprocessor can perform mathematical operations like addition, subtraction, multiplication and division. Modern microprocessors contain complete floating point processors that can perform extremely sophisticated operations on large floating point numbers.
- A microprocessor can move data from one memory location to another.
- A microprocessor can make decisions and jump to a new set of instructions based on those decisions.

5. The following diagram shows an extremely simple microprocessor capable of doing those three things:

©2000 How Stuff Works
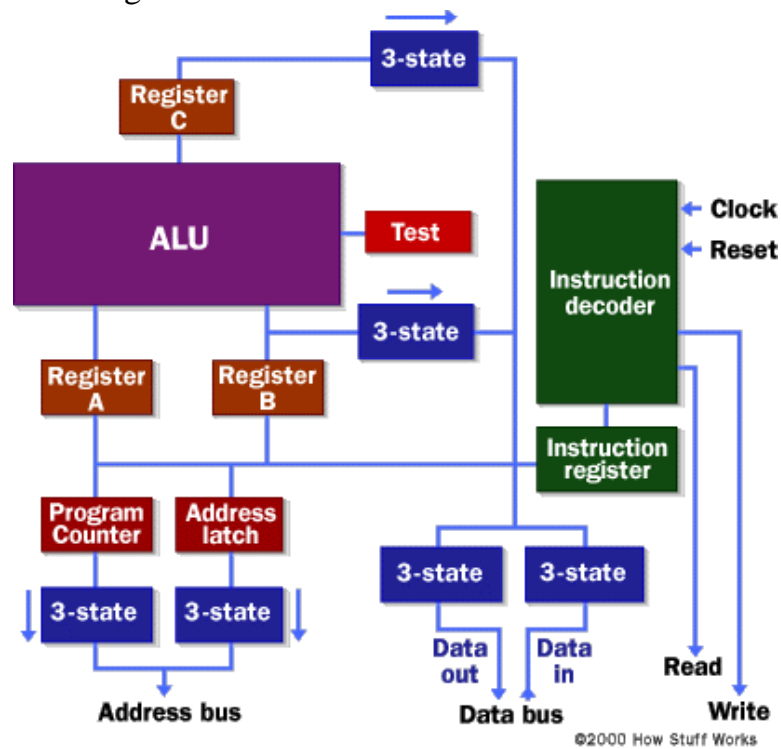
This microprocessor has:
❖ **An address bus** (that may be 8, 16 or 32 bits wide)
❖ **A data bus** (that may be 8, 16 or 32 bits wide)
❖ **An RD** (read) **and WR** (write) **line**
❖ **A clock line**
❖ **A reset line**

6. The address and data buses, as well as the RD and WR lines, connect either to RAM or ROM -- generally both. In our sample microprocessor, we have an address bus 8 bits wide and a data bus 8 bits wide. That means that the microprocessor can address 256 bytes of memory, and it can read or write 8 bits of the memory at a time. Let's assume that this simple microprocessor has 128 bytes of ROM starting at address 0 and 128 bytes of RAM starting at address 128.

7. ROM stands for read-only memory. A ROM chip is programmed with a permanent collection of pre-set bytes. The address bus tells the ROM chip which byte to get and place on the data bus. When the RD line changes state, the ROM chip presents the selected byte onto the data bus.

8. RAM stands for random-access memory. RAM contains bytes of information, and the microprocessor can read or write to those bytes depending on whether the RD or WR line is signaled. One problem with today's RAM chips is that they forget everything once the power goes off. That is why the computer needs ROM.

9. By the way, nearly all computers contain some amount of ROM (it is possible to create a simple computer that contains no RAM -- many microcontrollers do this by placing a handful of RAM bytes on the processor chip itself -- but generally impossible to create one that contains no ROM). On a PC, the ROM is called the BIOS (Basic Input/Output System). When the microprocessor starts, it begins executing instructions it finds in the BIOS. The BIOS instructions do things like test the hardware in the machine, and then it goes to the hard disk to fetch the boot sector. This boot sector is another small program, and the BIOS stores it in RAM after reading it off the disk. The microprocessor then begins executing the boot sector's instructions from RAM. The boot sector program will tell the microprocessor to fetch something else from the hard disk into RAM, which the microprocessor then executes, and so on. This is how the microprocessor loads and executes the entire operating system.

10. Even the incredibly simple microprocessor will have a fairly large set of instructions that it can perform. The collection of instructions is implemented as bit patterns, each one of which has a different meaning when loaded into the instruction register. Humans are not particularly good at remembering bit patterns, so a set of short words are defined to represent the different bit patterns. This collection of words is called the assembly language of the processor. An assembler can translate the words into their bit patterns very easily, and then the output of the assembler is placed in memory for the microprocessor to execute.

11. The number of transistors available has a huge effect on the performance of a processor. A typical instruction in a processor like an 8088 took 15 clock cycles to execute. Because of the design of the multiplier, it took approximately 80 cycles just to do one 16-bit multiplication on the 8088. With more transistors, much more powerful multipliers capable of single-cycle speeds become possible.

12. More transistors also allow for a technology called pipelining. In a pipelined architecture, instruction execution overlaps. So even though it might take five clock cycles to execute each instruction, there can be five instructions in various stages of execution simultaneously. That way it looks like one instruction completes every clock cycle.

13. Many modern processors have multiple instruction decoders, each with its own pipeline. This allows for multiple instruction streams, which means that more than one instruction can complete during each clock cycle. This technique can be quite complex to implement, so it takes lots of transistors.

Task 1. Check the meaning of the following words from the text.

chip (n)	fetch (v)
powerful (adj)	incredibly (adv)
introduce (v), introduction (n)	particularly (adv)
complete (adj)	performance (n), perform (v)
improve (v), improvement (n)	multiplier (n)

execute (v), execution (n)	overlap (v, n)
multiple (adj)	simultaneously (adv)
sophisticated (adj)	pipelining (n)
sample (n)	computation engine
assume (v), assumption (n)	floating point
permanent (adj)	boot sector
pre-set (adj)	bit pattern
signaled (adj)	clock cycle

Task 2. In which paragraph can you find this information?
- about pipelining
- the history of microprocessors
- about ROM and RAM
- their main functions
- about how the microprocessor loads and executes the operating system

Task 3. Insert these parts into the 5th paragraph next to the terms in bold.
a) an internal channel that can send data to memory or receive data from memory
b) a part of a microprocessor that lets a clock pulse sequence the processor
c) an internal communication channel that sends an address to memory
d) a part of a microprocessor that resets the program counter to zero (or whatever) and restarts execution
e) the line which tells the memory whether it wants to set or get the addressed location

Task 4. Match these terms with their definitions.
1. pipelining
2. discrete component
3. floating point number
4. boot sector
5. assembly language

a) a combination of integers and their various multipliers, which are used to show the number of operations that computer can perform;
b) a region of a data storage device that is designed to boot process of a computer to load a program (OS) stored on the same storage device;
c) a basic indivisible electronic component that is available in a singular form;
d) A technology used in processors which allows overlapping execution of multiple instructions with the same circuitry;
e) a low-level programming language for any programmable device, in which each statement corresponds to a single machine code instruction.

Task 5. Write definitions to the following terms.
ALU, ROM, RAM, BIOS, computation engine, clock cycle, multiplier.

Task 6. There are some good structures in the text. Learn them and translate sentences with them.

❖ either ... or ...

1.Prior to the 4004, engineers built computers **either** from collections of chips **or** from discrete components.

2. The address and data buses, as well as the RD and WR lines, connect **either** to RAM **or** ROM -- generally both.

❖ for + noun ... + to Infinitive ...

3.An assembler can translate the words into their bit patterns very easily, and then the output of the assembler is placed in memory **for the microprocessor to execute**.

❖ It's + adjective ... + to Infinitive ...

4. **It is possible to create** a simple computer that contains no RAM.

5. But **it's generally impossible to create** one that contains no ROM.

Task 7. Look how these phrases are used in the text and write you own sentences.

be prior to	some amount of
a splash in the market	a handful of
be capable of	be good at
to stand for	to have a huge effect on
to depend on	to allow for

Task 8. Write the words from the text to the following transcriptions.

1./ˈmʌltɪplaɪə/		8./əˈsjuːm/	
2./pəˈtɪkjələli/		9./ˈpaʊəfʊl/	
3./ˈendʒɪn/		10./dɪˈsɪʒ(ə)n/	
4./ɪmˈpruːvm(ə)nt/		11./ˈpraɪə/	
5./waɪə/		12./səˈfɪstɪkeɪtɪd/	
6./ˈpəːm(ə)nənt/		13./sɪm(ə)lˈteɪnɪəsli/	
7./kəmˈpəʊnənt/		14./ˈsaɪkl/	

Recommended function

Read **Function 12 "HOW TO define a thing and explain its use and structure"** and write full sentences with terms in tasks 4 and 5.

Listening

You will watch a video from Texas Instruments about their **Sitara ARM Microprocessors.**

Task 1. Check the meaning of these words. Watch the video and underline the words that you hear.

innovation	available	investment
performance	ecosystem	advantage
dedicated	appliance	interface
integration	hardware	portfolio
touchscreen	automation	pin-for-pin
programming	platform	peripheral
reference code	commitment	compatible

connectivity	cutting-edge	transition
strength	offering	emerge
data terminal	scalability	decoder
robust	solution	application
impact	acceleration	

Task 2. What do these abbreviations mean?
DMIPS, OpenGL, OpenVG, DSP, PROFIBUS, USB OTG, SATA, BSP, WinCE, GUI

Task 3. Answer the questions on the text.
1. What does TI offer in this video?
2. What are the advantages of these microprocessors?
3. What is the speed of chips?
4. What standards does graphics interface support?
5. What options do TI devices have?
6. What does Sitara ARM peripheral support include?
7. What sort of software support do they provide?
8. Where are these microprocessors ideal in use?
9. What are the key applications?
10. What does ecosystem of Sitara ARM MPUs include?

Task 4. Complete the part of the talk with necessary words.
First and foremost, we deliver 1) _____, optimized for performance. TI is the first to offer Cortex A8 at speeds of up to 1.5 GHz achieving 2) _____ of 3000 DMIPS. Knowing performance is more than MHz, many of our devices include dedicated 3) _____ that supports industry standards, such as OpenGL ES 1.1, OpenGL ES 2.0 and OpenVG 1.0 to deliver rich 3D graphics for superior 4) _____.

The second advantage of Sitara ARM Microprocessors is 5) _____ of the platform. We have the largest software compatible 6) _____ in the industry across the Sitara products and our devices have pin-for-pin and software 7) _____ options to the Integra and DaVinci product lines. This enables our customers 8) _____ from ARM-only offerings in the Sitara family to ARM+DSP offerings in the Integra family, to ARM + video acceleration offerings in the DaVinci family; all 9) _____ from TI. This enables maximum software and hardware reuse, easiest 10) _____, and speeds time to the market.

Task 5. Decode the part of the video:
Part 1 - 02.14 "Finally, I'd like to discuss…" – 02.37 "… your product to market."

Task 6. Watch the video again and write the words to the transcriptions.
1./kənek'tıvıtı/		9./skeılə'bılıtı/	
2./pə'rıf(ə)r(ə)l/		10./træn'zıʃ(ə)n/	
3./sə'luːʃ(ə)n/		11./ə'veıləb(ə)l/	
4./streŋθ/		12./ə'plaıəns/	
5./'ıntəfeıs/		13./əkselə'reıʃ(ə)n/	
6./kəm'pætıb(ə)l/		14./'ɔf(ə)rıŋ/	

7. /kə'mɪtm(ə)nt/		15. /rə(ʊ)'bʌst/	
8. /pɔ:t'fəʊlɪəʊ/		16. /'i:kəʊsɪstəm/	

Speaking

*Prepare a talk about **one of the most remarkable microprocessors**. Find information about when, who and where it was made; describe it and tell about its use and advantages over similar ones.*

Writing

*Read **Function 11 "HOW TO describe a thing"** and write about **one of the devices** which you deal with. Write about when, who, where it was made; describe it and tell about its use and advantages/disadvantages.*

Theme 4. NANOTECHNOLOGY

Lead-in

Read the statement. Do you agree with the author? Prove your answer.

"Nanotechnology is the base technology of an industrial revolution in the 21st century. Those who control nanotechnology will lead the industry."

-- Michiharu Nakamura, Executive VP at Hitachi

Reading and Vocabulary

Task 1. You will read the text about Nanotechnology. Make sure you know these words and word combinations.

arrange (v), arrangement (n)	break (v), breakable (adj)
property (n)	crude (adj)
cast (v)	analogue (n), analogous (adj)
grind (v)	essential (adj)
mill (v)	permit (v)
lithography (n)	precise (adj)
fabricate (v), fabrication (n)	incomprehensibly (adj)
comprise (v)	superior (adj)
fulfill (v)	emerge (v)
multitask (v)	encompass (v)
further (v, adj)	envision (v)
eradicate (v)	physician (n)
endeavor (v, n)	precursor (n)
substance (n)	fascinating (adj)

Task 2. Read the text and answer the questions after it.

Nanotechnology

1.Today, most airplanes are made from metal despite the fact that diamond (which is very expensive and breakable) is over 50 times stronger than aerospace aluminium. Nanotechnology allows us to inexpensively make unbreakable diamond in exactly the shapes we want. This would let us make a *Boeing 747* fifty times lighter

but just as strong as we can make today. Beyond inexpensively providing remarkably light and strong materials for airplanes, even space ships, nanotechnology will also provide extremely powerful computers with which to operate both those airplanes and space ships and a wide range of other activities.

2.Today's manufactured products are made from atoms. The properties of those products depend on how those atoms are arranged. For example; if we rearrange the atoms in coal we can make diamond. If we rearrange the atoms in sand we can make computer chips. Today's manufacturing methods are very crude at the molecular / nanotechnological level. Casting, grinding, milling and lithography move atoms in huge quantities. It's like trying to make things out of sugar cubes with boxing gloves on your hands; you can push the sugar cubes into heaps and pile them up, but you can't really make anything with them in the way you'd like to.

3.In the future, nanotechnology will let us remove the boxing gloves. This will allow us to make shapes from the sugar cubes (analogous to the fundamental building blocks of nature) easily, inexpensively and in most of the ways permitted by the laws of physics. This will be essential if we are to continue the current technological revolution, and will also let us fabricate an entirely new generation of products that are cleaner, stronger, lighter, and more precise than any we can produce today.

4.Nanotechnology is technology that deals with matter on the nano-scale, between one and one hundred nanometers. Imagine working on a structure 100,000 times smaller in diameter than a human hair! This is the rapidly expanding world of nanotechnology engineering, a field where a human hair is incomprehensibly large and an ant is a behemoth at 500,000 nm; a field where a nano is a billionth of a meter–a meter being approximately 39 inches long–and it takes more than 25 million nanos to comprise an inch.

5.Researcher *K. Eric Drexler* was the first person to popularize this technology in the early 1980's. Drexler was interested in building fully functioning robots, computers, and motors that were smaller than a cell. He spent much of the 80's defending his ideas against critics that thought this technology would never be possible.

6.Today, the word nanotechnology means something a bit different. Instead of building microscopic motors and computers, researchers are interested in building superior machines atom by atom. Nanotech means that each atom of a machine is a functioning structure on its own, but when combined with other structures, these atoms work together to fulfill a larger purpose.

7.*The U.S. National Nanotechnology Initiative* has large plans for nanotech. *Mihail Roco*, who is involved in this organization, explains the group's future plans by dividing their goals into four generations.

8.The first generation of nanotech is defined by passive structures that are created to carry out one specific task. Researchers are currently in this generation of the technology. The second generation will be defined by structures that can multitask. Researchers are currently entering this generation and hoping to further their abilities in the near future. The third generation will introduce systems composed of thousands of nanostructures. The last generation will be defined by nanosystems designed on the molecular level. These systems will work like living human or animal cells.

9.The emerging field of nanotechnology engineering encompasses all fields of science: biology, physics, chemistry, health and medicine, among others. Subdivisions of nanotechnology engineering include instrument development, materials engineering and bio-systems. Nanotechnologies involve constructing equipment and tools that

work at the molecular level; this requires researching both the technologies with which to do this and improvements that can be made to existing methods.

10.Scientists envision a day when cancer will be treated at the genetic level by using nanotechnology to develop a treatment regimen based on an individual's genetic code. Nanotechnology will also enable physicians to isolate substances in the body that have been identified as precursors to cancer, so that eventually the disease will become eradicated.

11.The career field of nanotechnology engineering is filled with possibilities limited only by the imagination of mankind. For those individuals who are passionate about making a difference, this fascinating new career field offers unlimited potential, both for humanitarian endeavors and for professional achievements.

1. Diamond is stronger than metal; so why aren't planes made out of diamond?
2. How can nanotechnology allow us to make lighter aircraft?
3. What does 'trying to make things out of sugar cubes with boxing gloves on your hands' mean?
4. What are the things nanotechnology deals with?
5. What are the goals of nanotechnology in the future?

Task 3. Finish the sentences.
a) The properties of today's manufactured products depend on…
b) Researcher K. Eric Drexler was the first person …
c) Instead of building microscopic motors and computers, nanotech researchers …
d) The field of nanotechnology engineering encompasses …

Task 4. Find the synonyms for the following words in the text.
1. fragile (para1)
2. features (para 2)
3. inaccurate (para 2)
4. to alter (para 2)
5. to create (para 3)
6. sphere (para 4)
7. to carry out (para 6)
8. to promote (para 8)
9. current (para 9)
10. to imagine (para 10)

Task 5. Complete the table with the appropriate words.

Noun	Verb	Adjective	Adverb
break	1)	2) 3)	-
expense	-	4) 5)	6)
7)	function	8)	9)
10)	popularize	11)	12)
13)	14)	improvable	-

Task 6. Look at these phrases from the text and make your own sentences with them.
1. … both … and …
2. It takes … to do smth…
3. … on its own
4. … permitted by the laws of physics.
5. … something a bit different…

31

Specialized reading

Read and translate the text.

Huge Potential of nanotechnology in medicine

Nanotechnology, the manipulation of matter at the atomic and molecular scale to create materials with remarkably varied and new properties, is a rapidly expanding area of research with huge potential in many sectors, ranging from healthcare to construction and electronics. In medicine, it promises to revolutionize drug delivery, gene therapy, diagnostics, and many areas of research, development and clinical application.

The ability to manipulate structures and properties at the nanoscale in medicine is like having a sub-microscopic lab bench a) …   .

Therapies that involve the manipulation of individual genes or the molecular pathways that influence their expression are increasingly being investigated as an option for treating diseases. One highly sought goal in this field is the ability to tailor treatments according to the genetic make-up of individual patients. This creates a need for tools that help scientists experiment and develop such treatments.

Imagine, for example, being able to stretch out a section of DNA like a strand of spaghetti, so you can examine or operate on it, or building nanorobots that can "walk" and carry out repairs inside cell components. Nanotechnology is bringing that scientific dream closer to reality.

For instance, scientists at the *Australian National University* have managed to attach coated latex beads to the ends of modified DNA, and then using an "optical trap" comprising a focused beam of light to hold the beads in place, b) …   .

Meanwhile chemists at *New York University (NYU)* have created a nanoscale robot from DNA fragments that walks on two legs just 10 nm long. One of the researchers, *Ned Seeman*, said he envisages it will be possible to create a molecule-scale production line, where you move a molecule along till the right location is reached, and a nanobot does a bit chemistry on it, rather like "spot-welding" on a car assembly line. *Seeman's lab* at *NYU* is also looking to use DNA nanotechnology to make a biochip computer, and to find out how biological molecules crystallize an area that is currently linked with challenges.

The work that *Seeman* and colleagues are doing is a good example of "biomimetics", where with nanotechnology they can imitate some of the biological processes in nature, such as the behavior of DNA, to engineer new methods and perhaps even improve them.

DNA-based nanobots are also being created to target cancer cells. For instance, researchers at *Harvard Medical School* in the US reported recently in Science how they made an "origami nanorobot" out of DNA to transport a molecular payload. The barrel-shaped nanobot can carry molecules containing instructions c) … . In their study, the team successfully demonstrates how it delivered molecules that trigger cell suicide in leukemia and lymphoma cells.

Nanobots made from other materials are also in development. For instance, gold is the material scientists at *Northwestern University* use to make "nanostars", simple, specialized, star-shaped nanoparticles that can deliver drugs directly to the nuclei of cancer cells. They describe how drug-loaded nanostars behave like tiny hitchhikers that after being attracted to an over-expressed protein on the surface of human cervical and ovarian cancer cells, deposit their payload right into the nuclei of those cells.

The researchers found giving their nanobot the shape of a star helped to overcome one of the challenges of using nanoparticles to deliver drugs: how to release the drugs

precisely. They say the shape helps to concentrate the light pulses used to release the drugs precisely at the points of the star.

Scientists are discovering d) … . But the problem with conventional delivery of such drugs is that the body breaks most of them down before they reach their destination.

But what if it were possible to produce such drugs in situ, right at the target site? Well, in a recent issue of Nano Letters, researchers at *Massachusetts Institute of Technology (MIT)* in the US show how it may be possible to do just that. In their proof of principle study, they demonstrate the feasibility of self-assembling "nanofactories" that make protein compounds, on demand, at target sites. So far they have tested the idea in mice, by creating nanoparticles programmed to produce either *green fluorescent protein (GFP)* or luciferase exposed to UV light.

The *MIT* team came up with the idea while trying to find a way to attack metastatic tumors, e) … . Over 90% of cancer deaths are due to metastatic cancer. They are now working on nanoparticles that can synthesize potential cancer drugs, and also on other ways to switch them on.

There are also nanofibers which are fibers with diameters of less than 1,000 nm. Medical applications include special materials for wound dressings and surgical textiles, materials used in implants, tissue engineering and artificial organ components.

Nanofibers made of carbon also hold promise for medical imaging and precise scientific measurement tools. But there are huge challenges to overcome, one of the main ones being how to make them consistently of the correct size.

But last year, researchers from *North Carolina State University*, revealed how they had developed a new method for making carbon nanofibers of specific sizes. They describe how they managed to grow carbon nanofibers uniform in diameter, f) … .

Nickel nanoparticles are particularly interesting because at high temperatures they help grow carbon nanofibers. The researchers also found there was another benefit in using these nanoparticles, they could define where the nanofibers grew and by correct placement of the nanoparticles they could grow the nanofibers in a desired specific pattern: an important feature for useful nanoscale materials.

Lead is another substance that is finding use as a nanofiber. The lead product is a synthetic polymer comprising individual strands of nanofibers, and was developed to repair brain and spinal cord injuries, but *MacEwan* thinks it could also be used to mend hernias, fistulas and other injuries.

Every thread of the nanofiber mesh is thousands of times smaller than the diameter of a single cell. The idea is to use the nanofiber material not only to make operations easier for surgeons to carry out, g) … .

Recent years have seen an explosion in the number of studies showing the variety of medical applications of nanotechnology and nanomaterials. In this article we have glimpsed just a small cross-section of this vast field.

Task 1. Insert the following parts of sentences into the text.
1. … they have stretched out the DNA strand in order to study the interactions of specific binding proteins.
2. … that make cells behave in a particular way.
3. … by using nickel nanoparticles coated with a shell made of ligands, small organic molecules with functional parts that bond directly to metals.
4. … on which you can handle cell components, viruses or pieces of DNA, using a range of tiny tools, robots and tubes.

5. … those that grow from cancer cells that have migrated from the original site to other parts of the body.
6. … that protein-based drugs are very useful because they can be programmed to deliver specific signals to cells.
7. … but also so there are fewer post-op complications for patients, because it breaks down naturally over time.

Task 2. Answer the questions.

1. What scientific dream is being achieved with the help of nanotechnology?
2. What does such term as "biomimetics" mean?
3. What nanotech innovations in medicine are described in the article? Describe each of them filling in the table.

What is it?	Who was it created by?	What was it created for?
…	…	…

Task 3. Are the following sentences True (T) or False (F)?

1) Nanotechnology is the area of research which is aimed at healthcare and electronics.
2) The researchers at NYU have created the production line for fabricating nanorobots.
3) In Harvard Medical School the nanorobot can help to destroy leukemia and lymphoma cells.
4) The studies show that in the future it will be possible to produce protein-based drugs at the place of an affected organ.
5) Nanofibers are only made of carbon.

Task 4. Give Russian equivalents to the following words and pronounce them with the correct stress and pronunciation.

atomic scale, rapidly expanding area, healthcare, to revolutionize, gene therapy, sought, to tailor treatments, coated latex beads, stretched out, binding proteins, to envisage, biomimetics, molecular payload, cell suicide, leukemia, lymphoma, nuclei, a hitchhiker, feasibility, self-assembling, luciferase, metastatic tumor, to synthesize, wound dressings, surgical textiles, tissue engineering, an artificial organ component, carbon nanofiber, a synthetic polymer, spinal cord injury, a hernia, a fistula, ligand

Task 5. Match the terms with their definitions.

1. to manipulate   a) a small piece of glass, stone or similar material
2. bead   b) a thread or filament from which a vegetable tissue, mineral substance, or textile is formed
3. biochip   c) handle or control smth in a skillful manner
4. fiber   d) a thing implanted in something else, especially a piece of tissue, prosthetic device, or other object
5. thread   e) a microchip designed or intended to function in a biological environment, especially inside a living organism
6. implant   f) a long, thin strand of cotton, nylon, or other fibers

Task 6. Write definitions to the following words.
   DNA, nanoparticles, nanofibers, nanobots, nanomaterials.

Task 7. Write the words from the text to the following transcriptions.

1./ɪgˈzæmɪn/		6./wuːnd/	
2./ˈhəːnɪə/		7./maɪkrəˈskɔpɪk/	
3./prɪˈsaɪslɪ/		8./ˈs(j)uːɪsaɪd/	
4./ɪnˈvɪzɪdʒ/		9./dɪˈziːz/	
5./ˈtɪʃuː/		10./ˈsəːdʒɪk(ə)l/	

Recommended function
   *Study **Function 2 "HOW TO distinguish a predicate".** Write out examples of different predicate forms from the text, define and translate them.*

Listening
   You are going to hear a talk **Invisible Science.**

Task 1. Match the following words from the recording with their synonyms.
1. closer   *a.* appear
2. cloak   *b.* financed
3. artificial   *c.* enormous
4. seem   *d.* cover
5. compared   *e.* very
6. huge   *f.* synthetic
7. concealing   *g.* smaller
8. extremely   *h.* nearer
9. funded   *i.* hiding
10. tinier   *j.* likened

Task 2. Listen to the recording and match the phrases to make longer ones. Sometimes more than one variant is possible.
1. developing materials that could   *a.* flowing around a rock
2. materials that redirect   *b.* in developing this idea
3. measured in   *c.* step forward
4. absorb or reflect   *d.* billionths of a meter
5. They compared the light to water   *e.* to the battlefield
6. The new discovery is a huge   *f.* how viruses are formed
7. The U.S. military is extremely interested *g.* light around things
8. bring the technology   *h.* make people invisible
9. look more closely at living cells and *i.* light
10. scientists could look at   *j.* even tinier objects

Task 3. Answer the questions on the recording.
1. What uses could an invisibility cloak have?
2. What does Professor Zhang research?
3. What did old technology allow scientists?
4. What can new technology lead to?
5. Do you think other countries will worry about America's invisibility technology?

Task 4. Decode one of the parts of the recording:
Part 1 - 00.05 "Scientists in the USA…" – 01.04 "… water flowing around a rock."
Part 2 - 01.04 "The new discovery …" – 01.56 "… and how they grow."

Task 5. Write your ideas about years, decades, centuries or "never" in respect to the possibility of the following things.

_____ **Invisibility clothing**	_____ **Talent downloads into the brain**
_____ **Time travel**	_____ **An eternal youth pill**
_____ **Holidays to Mars**	_____ **A cure for all diseases**
_____ **Carbon-zero cars and factories**	_____ **Personal backpack jets / helicopters**

Speaking
*Prepare a talk about **an achievement in nanotechnology**.*

Writing
*Study **Function 16 "HOW TO write an abstract"** and write an abstract to the article* Huge Potential of nanotechnology in medicine. **OR** *Write an abstract for one of your articles or any Russian articles of your colleagues.*

Theme 5. INSIDE A COMPONENT

Lead-in
Work with your partner and tell what components you associate these things with. What do you know about them?

a)electron gun
b)dopant
c)saturation
d)actuator
e)forward biased
f)p-type region
g)refractive index
h)bandgap
i)dot pitch
j)tunnel barrier
k)magnetic deflection
l)gain
m)electro luminescence
n)pole
o)phosphor coating
p)wavelength
q)conduction band
r)organic semiconductor
s)electric arc
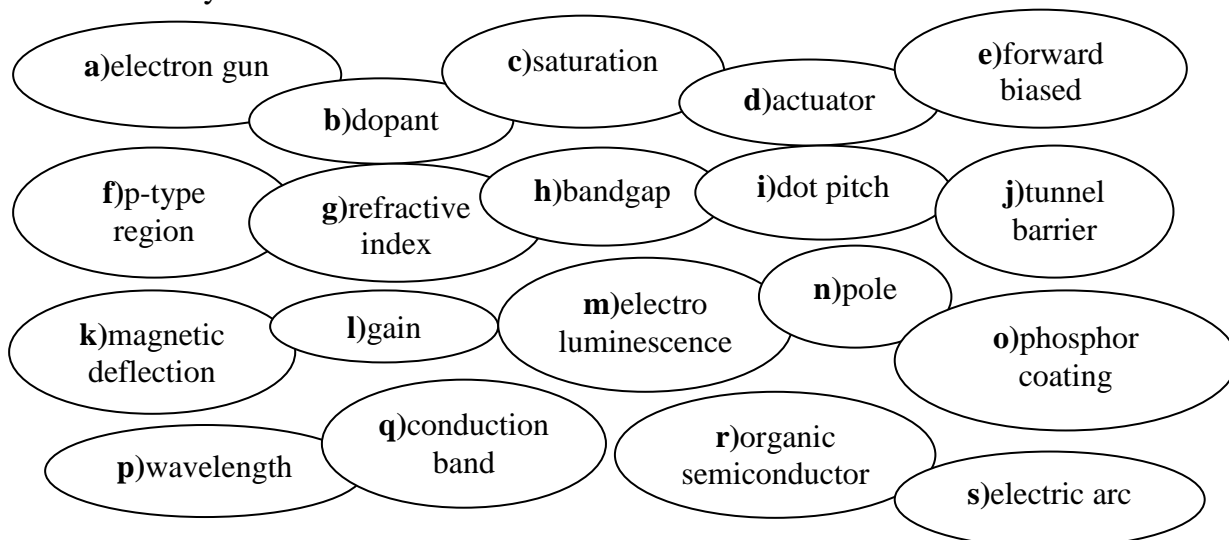
Reading and Vocabulary

Task 1. a)Check you know these words and phrases from the first text.

tunnel barrier	mismatch (n)	rely on (v)
oxide barrier	quantum (n)	passivate (v), passivated (adj)
tunnel (v, n)	defect resistant	float (v)
spintronics (n)	refractive index	preserve (v)
implication (n)	magnetic deflection	alloy (n)
spin current	electron population	permalloy (n)
ferromagnetic	dot pitch	dopant (n)
inject (v), injection (n)	spin-filtering effect	saturate (v), saturation (n)
size scaling	hurdle (v)	plane (n)
advance (v, n)		

b) Give definitions to the following terms:
tunnel barrier, oxide barrier, refractive index, magnetic deflection, saturation.

Task 2. Match the parts of the text with the headings. There is an extra heading which you don't need to use.
   a) Beyond Moore's Law
   b) The spintronics challenge
   c) Low-energy switching
   d) Enter the graphene tunnel barrier

Graphene tunnel barrier makes its debut

Researchers in the US have found yet another use for the "wonder material" graphene. Instead of exploiting the material's exceptional ability as an electrical conductor, the team has found a way to use graphene as an extremely thin "tunnel barrier" to conduction. The team says that this new application is particularly suited to developing spintronics – a relatively new technology that exploits the spin of an electron as well as its charge.

Graphene is a sheet of carbon just one atom thick and ever since the material was first isolated in 2004, researchers have been trying to create electronics devices that make use of its unique properties. Most of this effort has focused on how electrons flow in the plane of the sheet – which can behave both as a conductor and semiconductor. But now Berry Jonker and colleagues at the US Naval Research Laboratory (NRL) have shown that graphene can serve as an excellent tunnel barrier when current is directed perpendicular to the plane of carbon atoms. The spin polarization of the current is also preserved by the tunnel barrier, a finding that could have important implications for spintronics.

I

The spin of an electron can point in an "up" or "down" direction and this property could be used to store and process information in spintronics devices. Circuits that employ a spin current – electrons with opposite spins moving in opposite directions – could, in principle, be smaller and more efficient than conventional electronic circuits that rely on switching charge alone. This is because switching spins from up to down can be done using very little energy.

Spintronics devices are typically made from ferromagnetic materials and semiconductors. Ferromagnetic metals, such as iron or permalloy, have intrinsically

spin-polarized electron populations – that is, different numbers of up-spin and down-spin electrons – and thus make ideal contacts for injecting spins into a semiconductor. However, ferromagnets and semiconductors have a large conductivity mismatch, so spin is injected via a tunnel barrier – an electrically insulating barrier through which electrons tunnel quantum mechanically. The problem is that the oxide barriers normally employed as tunnel barriers introduce defects into the system and have resistances that are too high – factors that adversely affect device performance.

II
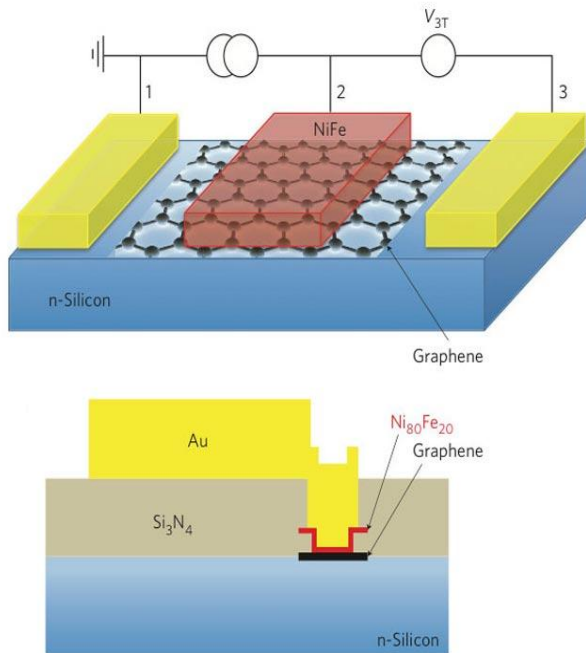
Diagrams show how graphene is used as a tunnel barrier in a spintronic device. The top image shows a layer of graphene serving as a tunnel barrier between the ferromagnetic metal contact and the silicon substrate. Contacts 1 and 3 are ohmic Ti/Au contacts. The bottom image shows that the contact is designed so that the edges of the graphene are embedded in the SiN insulator, preventing conduction through the graphene edge states, which would short out the tunnel barrier.

To overcome this problem, Jonker and colleagues decided to employ single-layer graphene as the tunnel barrier, because the material is defect resistant, chemically inert and stable. These properties can be exploited to make low-resistance graphene spin contacts that are compatible with both the ferromagnetic metal and semiconductor.

The researchers began by mechanically transferring graphene grown by chemical vapour deposition onto hydrogen-passivated silicon surfaces. They achieved this by floating the graphene on the surface of water and bringing the silicon substrate up from below. This common technique ensures that there is no oxide layer between the silicon surface and the graphene. The team then injected electron spins from a ferromagnetic nickel–iron alloy into the silicon via the graphene tunnel barrier. The voltage arising from the resulting spin polarization in the silicon was then measured using the Hanle effect, a method that is routinely employed by spintronics scientists.

III

"Our discovery clears an important hurdle to the development of future semiconductor spintronics devices – that is, devices that rely on manipulating the electron's spin rather than just its charge for low-power, high-speed information processing beyond the traditional size scaling of Moore's law," Jonker says. "These results identify a new route to making low-resistance-area spin-polarized contacts,

which are key for semiconductor spintronics devices that rely on two-terminal magnetoresistance, including spin-based transistors, logic and memory."

Using graphene in spintronics structures may provide much higher values of the tunnel spin polarization thanks to so-called spin-filtering effects that have been predicted for selected ferromagnetic metal/graphene structures. Such an increase would improve the performance of semiconductor spintronics devices by providing higher signal-to-noise ratios and corresponding operating speeds, so advancing the technological applications of silicon spintronics.

Task 3. Choose the best sentence (A or B) to interpret the sentences.

1. … Ever since the material was first isolated in 2004, researchers have been trying to create electronics devices that make use of its unique properties.
   A. *The researchers started creating electronics devices that use the properties of graphene in 2004.*
   B. *The researchers started creating electronics devices using carbon nanotubes before 2004, when graphene was first isolated.*

2. The problem is that the oxide barriers normally employed as tunnel barriers introduce defects into the system and have resistances that are too high – factors that adversely affect device performance.
   A. *Tunnel barriers made from oxides have some serious disadvantages like introducing defects into the system and high resistances which have bad effects on the effectiveness of the device.*
   B. *Oxide barriers badly affect the resistances and performance of the device.*

3. Using graphene in spintronics structures may provide much higher values of the tunnel spin polarization thanks to so-called spin-filtering effects that have been predicted for selected ferromagnetic metal/graphene structures.
   A. *Spin-filtering effects of selected ferromagnetic metal/graphene structures had been unknown but appeared to provide much higher values of the tunnel spin polarization.*
   B. *Due to spin-filtering effects of some ferromagnetic metal/graphene structures, which were supposed by some physicists, the tunnel spin polarization of devices has much higher values.*

Task 4. Answer the questions on the text.

1. Why did researchers decide to use graphene as the material for tunnel barriers?
2. What advantages does the spin of an electron give to the device?
3. What are pluses and minuses of ferromagnets and semiconductors in spintronics devices?
4. What future do the researchers envision for their finding?
5. Put these stages of employing graphene into transistors:
   a) graphene is floated on the surface of water;
   b) voltage from spin polarization in the silicon is measured;
   c) silicon substrate is brought up from below the graphene;
   d) graphene is grown by chemical vapour deposition;
   e) electron spins are injected into the silicon via graphene tunnel barrier.

Task 6. Find synonyms to the following words:

1. to use (intro)
2. one-of-the-kind (intro)
3. to maintain (intro)
4. to feed into (part 1)
5. negatively (part 1)
6. damage (part 1)
7. to place (part 2)
8. to guarantee (part 2)
9. ordinarily (part 2)
10. out of bounds (part 3)
11. approach (part 3)

Task 7. Match the parts from A and B to make phrases from the text.

1. tunnel spin
2. spin-polarized
3. low-resistance graphene
4. single-layer
5. down-spin
6. signal-to-noise
7. chemical vapor
8. hydrogen-passivated
9. ferromagnetic

a) electron populations
b) deposition
c) electrons
d) polarization
e) ratio
f) graphene
g) spin contacts
h) nickel-iron alloy
i) silicon surfaces

Specialized reading
Read and translate the text.

New Route to Electronics Inside Optical Fibers

1. In a step toward simpler, faster telecommunication systems, researchers at Penn State University and the University of Southampton, in England, have embedded high-performance electronic devices within optical fibers. Their technique involves depositing semiconductors inside ultrathin holes in the fiber. **1) …**

2. In modern telecom systems, light pulses blaze down hair-thin glass fibers carrying 40 gigabits of data per second. On either end of the fiber are semiconductor devices—lasers that create the light sent into the fiber, modulators that encode signals onto the light, and photodetectors that turn the light pulses back into electrical signals that can be routed to TVs, telephones, and computers. This setup requires coupling light from the micrometers-wide fiber core with the even narrower light-guiding structures on a semiconductor chip—an extremely difficult thing to do, says John Badding, a chemistry professor at Penn State.

3. Integrating devices in the fiber would eliminate the need for such coupling, Badding says. "This is going to enable 'all-fiber optoelectronics,' a vision where you can do all the light processing for telecom or other applications in the fiber," he says.

4. It's a vision shared by other researchers. "Marrying electronics and optics inside the same structure would streamline fiber-optic systems, making them more efficient", says John Ballato, a materials science and engineering professor at Clemson University, in South Carolina. "Until 40 years ago, a fiber was pretty much a dumb window," Ballato says. "Now we're at the level of functionality and intelligence. If you can preprocess some of the information inside the fiber by adding brains to it, you can make the external electronics simpler, easier, and maybe even faster."

5. Fiber-optic tools for spectroscopy, laser surgery, and remote sensing could all benefit from the advance, adds Badding's colleague Pier Sazio, an optoelectronics researcher at the University of Southampton.

6. The researchers start with photonic-crystal fibers. **2) …** They pump a gas that contains chemical precursors of electronic materials—silicon, germanium, or

platinum—into selected channels at high pressure while other channels are blocked with glue. Heating the fiber produces a thin, ring-shaped layer of crystalline material that coats the inside of the channels.

7.The researchers add a bit of boron or phosphorus gas to the precursor in order to make the p-type and n-type semiconductors required for most devices. By depositing semiconductor and platinum layers one at a time inside the same channels, they create concentric rings of material that act as circular diodes.
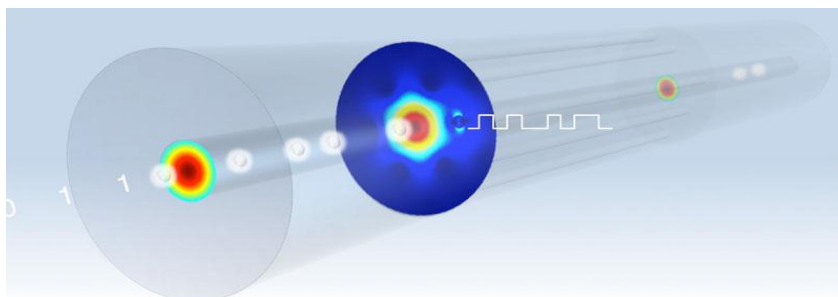
Signals: *A photodetector embedded in an optical fiber converts pulses of light in the core of the fiber into electricity.*

8.In a paper posted online this week in the journal Nature Photonics, the researchers reported metal-semiconductor junctions, called Schottky diodes. **3) …** "Right now, the researchers detect the electrical signals in a "primitive way," Badding says, "by simply putting electrodes in contact with the platinum at the ends of the fiber. You would ultimately want to do it in a more refined fashion."

9.Researchers at MIT were the first to create devices inside of a fiber, but they did so using a different method: they drew out fiber from a thick cylinder embedded with semiconductor wires. **4) …** The Penn State approach, meanwhile, yields only meters of fiber but "seems to have very nice chemical control with doping," he says. "What's particularly nice is they're using the inside of a hollow fiber as a substrate chip almost to build these things up. So they inherently have a nice smooth surface. It's thin, and it's flexible."

10.Another advantage of the Penn State scheme is that Badding and his colleagues can use many different materials and dope them to precise levels, which is something that has not been proved yet using MIT's method. In addition to silicon, germanium, and platinum, the group has been able to deposit compound semiconductors such as zinc selenide, which is used in blue laser diodes and light-emitting diodes, as well as in infrared lasers and detectors. And they're working on embedding still other materials and refining the devices.

Task 1. Insert the following sentences into the text.
   a) The diodes function as photodetectors, converting light pulses in the fiber into electrical signals.
   b) Using this scheme, they built a detector that converts optical data into electrical signals at frequencies as high as 3 gigahertz.
   c) These are fibers that contain arrays of nanometer-scale hollow channels running along their length.
   d) Ballato's group at Clemson takes a similar approach: their method produces kilometers of fiber but is limited in the kinds of semiconductors that can be used.

Task 2.Answer the questions on the text.
1. What devices have been embedded within optical fibers?
2. How would these combinations improve fiber-optic systems?
3. What spheres of science would particularly benefit from intelligent fiber-optic systems?
4. How is the process of making photodetectors inside the fiber carried out at the Southampton University?
5. What method has been used by the researchers at MIT and Clemson?

Task 3. a) Translate the words from the text.

deposit, blaze, coupling, light-guiding structure, eliminate, vision, streamline, intelligence, spectroscopy, laser surgery, remote sensing, photonic-crystal fiber, precursor, concentric ring, circular diode, ultimately, refined, draw out, yield, doping, hollow, inherently, refine, embed.

b) Which words are verbs, nouns, adjectives, adverbs?

Task 4. Match the parts of phrases from the text.

A	**B**
1.benefit from	a) selected channels
2. pump into	b) into electrical signals
3. put electrodes in contact	c) to precise level
4. embed devices within	d) the advance
5. dope materials	e) per second
6. work on	f) embedding and refining the devices
7. turn the light pulses back	g) with the platinum
8. carry some amount of data	h) optical fibers

Task 5. Find synonyms and opposites to the following words and phrases.

Synonyms
1. a method (para 1)
2. connection (para 3)
3. a dream (para 3)
4. to combine (para 4)
5. to modernize (para 4)
6. to cover (para 6)
7. finally (para 8)
8. a manner (para 8)
9. especially (para 9)
10.intrinsically (para 9)

Opposites
1. wide (para 2)
2. to lose (para 5)
3. full (para 9)
4. different (para 9)
5. inaccurate (para 10)
6. to make worse (para 10)

Task 6. Write out hyphenated compound adjectives from the text into the relevant column in the table.

noun+adjective	**noun, adj., adv.+Part.I**	**noun, adj.+noun(ed)**	**noun, number, pron., etc.+noun**
e.g.: meter-long	*e.g.: long-lasting*	*e.g.: blue-eyed*	*e.g.: p-type*
…	…	…	…

Task 7. Report the sentences in Direct Speech from the text into Reported Speech.
1. "This is going to enable 'all-fiber optoelectronics,' a vision where you can do all the light processing for telecom or other applications in the fiber," he said.
2. "Until 40 years ago, a fiber was pretty much a dumb window," Ballato said.
3. "What's particularly nice is they're using the inside of a hollow fiber as a substrate chip almost to build these things up," said Ballato.

Task 8. What are the words from the text?

1./spek'trɔskəpi/		8./prɪ'kə:sə/	
2./maɪ'krɔmɪtə/		9./'ʌltɪmətli/	
3./ə'reɪ/		10./ski:m/	
4./'faɪbə/		11./ji:ld/	
5./'saɪəns/		12./'kemɪk(ə)l/	
6./gaɪd/		13./smu:ð/	
7./zɪŋk/		14./'daɪəʊd/	

Recommended function
*Read **Function 13 "HOW TO comment on a visual aid"** and prepare a comment on the diagrams from two texts in this Module.*

Listening
You are going to watch a video about **Ferroelectric memory.**

Task 1. Match the following terms with their definitions.
1. ferroelectric material
2. electric polarization
3. non-volatile memory
4. switching

a) diverting an electrical current from one state to another
b) computer memory that can retain stored information even when not powered
c) a dielectric which, in a certain temperature range, has its own spontaneous electric dipole moment
d) the vector field that expresses the density of permanent or induced electric dipole moments in a dielectric material

Task 2. Watch the video and underline the words you hear.

electrical field, theoretical prediction, electroresistance, longterm stability, microscope, switching, permittivity, pyroelectric material, bias, simulation, phenomenon, thermistor, tip, thin film, transition temperature, piezoelectric, electrode, nanoscale

Task 3. Answer the questions on the video.
1. What does professor Xiaoqing Pan tell about in this video?
2. How does the process of switching occur in the materials?
3. Where are these materials especially important?

Task 4. Report on the following questions of the editor and write the answers of the professor in Reported Speech.
1. Can you explain what ferroelectric material is?
2. What do you still not understand about ferroelectric memory?
3. Did your model have different behavior from what you predicted?
4. What does all of that mean for making very small ferroelectric memory?

Task 5. Complete the text with the words from the box.

piezoelectric materials, charge polarization, storage capacity, electricity, magnetic computer drives, nanometer scale, switching, capacitors and thermistors, lead titanate, operating systems

    Ferroelectric materials are materials that possess a natural 1) … that can be reversed by an external electric field, known as the process of 2) … . The property of ferroelectricity has been known since 1921 and, as of 2011, over 250 compounds have been shown to display such characteristics. Research has focused on 3) … , PbTiO3, and related compounds. Of the ferroelectric materials studied as of 2011, all have been shown to be 4) … . This means that if mechanical pressure or other forms of energetic stress from audio or light energy are applied to such compounds, they will generate 5) … .

    The applications of ferroelectricity span a wide spectrum of electronics devices, from circuit components like 6) … to devices with electro-optics or ultrasound capabilities. One of the most actively researched arenas for ferroelectric materials is that of computer memory. Engineering the materials at a 7) … produces what is known as vortex nanodomains that don't require an electric field to switch polarization. Several state university systems in the United States working together through 2011 with the Lawrence Berkeley National Laboratory are perfecting the material, which would require much less electrical power than traditional 8) … do. It would also be a solid state form of data memory that functions much faster and with greater 9) … than the flash memory currently on the market, with the potential to one day store entire 10) … and software, making computer start up and processing speeds much greater.

Task 6. Decode one of the following parts.
Part 1 - 00.39 "So, I guess, to start off, I was wondering …" – 01.16 "… non-volatile memory devices."
Part 2 - 01.17 "What would you say, you still …" – 02.02 "… we can design better memory."
Part 3 - 02.03 "Maybe we can start …" – 03.52 "… switch between 0 and 1."
Part 4 - 03.53 "Was this surprising to see?" – 04.35 "… the creation of the ferroelectric switching."
Part 5 - 04.36 "What does all of this mean…" – 05.22 "… who design future memories."

Speaking
    *Prepare a talk about **some new achievement in designing a component**. Include a comment of a visual aid – a diagram, a picture or a graph.*

Writing

Study **Function 14 "HOW TO describe a process"** and write how some process proceeds inside a component.

Theme 6. HOLOGRAPHY

Lead in

☺ *QUIZ: Check how many correct answers you can give.*

Q1: In principle, it is possible to make a hologram for any _____.
 a)Light   b)Wave   c)Wavelength   d)Optics
Q2: A _____ is a structure with a repeating pattern.
 a)Diffraction grating   b)Dispersion (optics)   c)Optics   d)Holography
Q3: Light rays travelling through it are bent at an angle determined by λ, the _____ of the light and d, the distance between the slits and is given by $\sin\theta = \lambda/d$.
 a)Wavelength   b)Electromagnetic radiation   c)Diffraction   d)Electron
Q4: This method relied on the use of a large table of deep sand to hold the _____ rigid and damp vibrations that would destroy the image.
 a)Transparency and translucency b)Anti-reflective coating   c)Optics
 d)Optical fiber
Q5: The material used to make embossed copies consists of a _____ base film, a resin separation layer and a thermoplastic film constituting the holographic layer.
 a)Polyester   b)Rayon   c)Cotton   d)Nylon
Q6: The most common materials are photorefractive crystals, but also in _____ or semiconductor heterostructures (such as quantum wells), atomic vapors and gases, plasmas and even liquids it was possible to generate holograms.
 a)Quantum mechanics b)Classical mechanics   c)Condensed matter physics
 d)Semiconductor
Q7: The first holograms that recorded 3D objects were made in 1962 by Yuri Denisyuk in the Soviet Union and by Emmett Leith and Juris Upatnieks at _____, USA.
 a)Ohio State University   b)University of Michigan
 c)MichiganState University   d)Wayne State University
Q8: According to _____ theory, each point in the object acts as a point source of light.
 a)Wave   b)Wavelength   c)Diffraction   d)Holography
Q9: The recording medium has to convert the interference pattern into an optical element which modifies either the _____ or the phase of a light beam which is incident upon it.
 a)Amplitude   b)Electrical engineering   c)Measuring instrument
 d)Crest factor
Q10: A better analogy is _____ where the sound field is encoded in such a way that it can later be reproduced.
 a)Synthesizer   b)Sound recording and reproduction   c)Mixing console
 d)Audio format

Reading and Vocabulary

Task 1. a)Read and translate the following words.

beam (n)	maintain (v)
refraction (n), refractive (adj)	coherence (n), coherent (adj)
illuminate (v), illumination (n)	dimensions (n)
recording medium	intensity (n), intensify (v)
angle (n)	shortcoming
distort (v), distortion (n)	shutter (v, n)
haptic technology	magnify (v), magnification (n)
tactile (adj)	software package
air jet	forgery (n), forge (v)
ultrasonic (adj)	eliminate (v), elimination (n)
interfere (v), interference (n)	bypass (n)
prevalence (n)	swirl (n)
dispersion (n)	accurate (adj)
transparency (n), transparent (adj)	translucency (n), translucent (adj)
diffraction (n)	diffraction grating

b) Explain what these terms mean:

refraction, diffraction, distortion, interference, dispersion

Task 2. Read the text and name technologies which help to create the feeling of touching.

Touchable hologram: is it real?

The word "holography" comes from the Greek term for "whole drawing." The holographic process was developed by physicist Dennis Gabor in 1947. It was not until 1962, however, that three-dimensional viewable holograms became practical to create. This depended on expensive equipment and expert knowledge in the early years of its development. The prevalence of cheap lasers and other supplies in the early 2000s has made holography available to hobbyists on a budget.

Holography is the creation of three-dimensional images called holograms. In order to start the process, two beams of light are created by the refraction of one light beam directed at a mirror. One beam is directed at the object to be documented, while the other illuminates the recording medium. The interference between these two beams creates a ghostly 3D image when it is illuminated with a laser beam.

Each of the beams used in the process of holography have a name. The ray that lights up the item to be captured is called the object beam. It is offset by the reference beam which shines on the recording medium. Once the hologram has been developed, it is displayed by shining a laser beam through the image. It is placed in the opposite direction and at an angle identical to the reference beam.

Holography images are recorded on photographic plates. As the light beams used in holography only focus on certain objects, the surroundings are not included in the captured image. The photographic plate records the visual interference that results from the light hitting the object. It does not capture the object as it appears to the naked eye.

In order for holography to work correctly, the light beams must be stable throughout the image capture process, a state known as coherence. For this reason, lasers tend to be the most frequently used source because they are easier to keep

completely still. Other sources of light can be used, however. It is possible to use any two light sources to create a hologram as long as they can maintain a sufficient coherence length.

For a hologram to be properly displayed, light must be shined through the captured image precisely where the reference beam was originally directed. Otherwise, the image will be distorted. Once the beam is in place, the plate with the captured image can be moved to show other sides of the object as if it is still present.

If to speak about a touchable hologram it is a combination of three dimensional light projection, a sensor array and some type of tactile feedback.

This type of projection can be viewed from any angle just like a physical object even though it is composed of nothing but light. Since holograms are made of light and lack any physical substance, they cannot be touched or interacted with through any traditional means. In order to create a touchable hologram, at least two different techniques must be employed.

In order for a hologram to be felt, some type of haptic technology must be used. One way to create tactile feedback is to attach physical devices to a person's hands or body, though this can interfere with the illusion of touching a hologram. High powered air jets are another option, though ultrasonic devices can provide a similar effect. In either case, the haptic technology is used to impart a physical sensation to some part of a person's body in order to provide the illusion of touch.

The other main component necessary for creating a touchable hologram is some type of sensor apparatus. In order for the haptic technology to activate at the correct time, a computer must know where a person's hand or other body part is located. This can be accomplished through the use of a camera and specialized software, though reflective tape and other markers can make the process more accurate. Once the computer knows where a person's hand is located, it can activate the haptic technology at the correct time to create the illusion of touch.

These types of sensors can also allow a person to interact with a hologram. Since the computer responsible for generating and controlling the image and the haptic feedback knows where the person is located, it can respond accordingly. An example of this type of touchable hologram is a ball that is capable of bouncing off of someone's hand. The computer can track the location of the hand, project the hologram in the correct place, and activate the tactile feedback accordingly. If the hand is moved, the ball can be allowed to drop realistically.

Task 3. Are the following sentences true (T) or false (F)?
1) The creation of holograms involves the collision of several beams of light.
2) All sorts of light sources can be used to create a hologram even those which can't provide a sufficient coherence length.
3) The hologram image can't be distorted.
4) Touchable holograms emit smell and can be touched.
5) The usage of haptic technology in creation of holograms allows a person to touch the holograms and interact with them.

Task 4. Finish the phrases:
✓ The object beam is …
✓ The reference beam is …
✓ Touchable hologram is …

Task 5. Match the words and their definitions.

1. haptic
2. dimension
3. angle
4. refraction
5. coherence length
6. recording medium

a) the change in direction of a propagating wave, such as light or sound, in passing from one medium to another

b) a measurement of the size of something in a particular direction, such as the length, width, height, or diameter

c) the propagation distance over which a coherent wave (e.g. an electromagnetic wave) maintains a specified degree of coherence

d) a physical material that holds data expressed in any of the existing recording formats

e) the space between two straight lines that diverge from a common point

f) relating to or based on the sense of touch

Task 6. Match words from the text with their synonyms.

1. accomplish
2. accurate
3. illuminate
4. sufficient
5. viewable
6. beam
7. precisely
8. maintain
9. distort
10. capture

a) visible
b) ray
c) light up
d) support
e) misrepresent
f) achieve
g) correct
h) fix
i) exactly
j) adequate

Task 7. Fill in the gaps with appropriate prepositions from the text.

1) The word "holography" comes … the Greek term … "whole drawing."
2) It depended … equipment and expert knowledge.
3) Holography is the creation … three-dimensional images.
4) It is placed … the opposite direction and … an angle identical to the reference beam.
5) This can be accomplished … the use of a camera and specialized software.

through
on
in
from
at
for
of

Specialized reading

Task 1. Before reading the text check the meanings of the following words and phrases.

intensity, stereoscope, polarized glasses, photographic emulsion, imaging, dimensions, to magnify, light-sensitive compound, reflected light, a lens, to bypass, to develop a film, transmission hologram, reflection hologram, silver halide, holographic plate, random pattern

Task 2. Read the text and insert the parts which are missed.
Holograms and Photographs
1. The commonly and widely used way of imaging of the reality is the photography. A photograph is basically the recording of the differing intensities of the light reflected by the object and imaged by a lens. However, information about dimensions of the object is contained not only in amplitude (intensity), but also in a phase of light waves.

2. A great difference between holography and photography is the information recorded. This difference is why photographs are two dimensional (2-D) images while holograms are three dimensional (3-D) images. Photographs contain only one view point of an object. Our eyes need a minimum of two viewpoints in order to see depth. Vision using two viewpoints of an object is called stereoscopic vision. Each eye receives a slightly different view point of an object, our brain combines the two and we perceive depth. We can fool our eyes into seeing photographs in three dimensions **a) …** We can do this with a stereoscope (for pictures) or with polarized glasses (for movies). The shortcoming of stereoscopic images is that when we move our head from side to side or up and down, we still only see the same two view points, whereas we should be seeing continuously changing viewpoints of the object. The image therefore doesn't quite appear to be three dimensional. In order to make a record of a three dimensional object we need to record this continuous set of viewpoints of the object.

3. When you take a picture with a film camera, **b) …**:
   ✓ A shutter opens.
   ✓ Light passes through a lens and hits the photographic emulsion on a piece of film.
   ✓ A light-sensitive compound called silver halide reacts with the light, recording its amplitude, or intensity, as it reflects off of the scene in front of you.
   ✓ The shutter closes.

4. You can make lots of changes to this process, like how far the shutter opens, how much the lens magnifies the scene and how much extra light you add to the mix. But no matter what changes you make, the four basic steps are still the same. In addition, regardless of changes to the setup, the resulting picture is still simply a recording of the intensity of reflected light. When you develop the film and make a print of the picture, your eyes and brain interpret the light that reflects from the picture as a representation of the original image.

5. Like photographs, holograms are recordings of reflected light. Making them requires steps that are similar to what it takes to make a photograph:
   ▪ A shutter opens or moves out of the path of a laser. (In some setups, a pulsed laser fires a single pulse of light, eliminating the need for a shutter.)
   ▪ The light from the object beam reflects off of an object. The light from the reference beam bypasses the object entirely.
   ▪ The light from both beams comes into contact with the photographic emulsion, where light-sensitive compounds react to it.
   ▪ The shutter closes, blocking the light.

6. Just like with a photograph, the result of this process is a piece of film that has recorded the incoming light. However, when you develop the holographic plate and look at it, what you see is a little unusual. Developed film from a camera shows you a negative view of the original scene – **c) …** When you look at the negative, you can still get a sense of what the original scene looked like.

7. But when you look at a developed piece of film used to make a hologram, you don't see anything that looks like the original scene. Instead, you might see a dark frame of film or a random pattern of lines and swirls. Turning this frame of film into an image requires the right illumination. In a transmission hologram, monochromatic light shines through the hologram to make an image. In a reflection hologram, monochromatic or white light reflects off of the surface of the hologram to make an image. Your eyes and brain interpret the light shining through or reflecting off of the hologram as a representation of a three-dimensional object. The holograms you see on credit cards and stickers are reflection holograms.

8. If you want to see a hologram, **d) …** There are holograms on most driver's licenses, ID cards and credit cards. If you're not old enough to drive or use credit, you can still find holograms around your home. They're part of CD, DVD and software packaging, as well as just about everything sold as "official merchandise."

9. Unfortunately, these holograms -- which exist to make forgery more difficult -- aren't very impressive. You can see changes in colors and shapes when you move them back and forth, but **e) …** . Even the mass-produced holograms that feature movie and comic book heroes can look more like green photographs than amazing 3-D images.

10. On the other hand, large-scale holograms, illuminated with lasers or displayed in a darkened room with carefully directed lighting, are incredible. They're two-dimensional surfaces that show absolutely precise, three-dimensional images of real objects. You don't even have to wear special glasses or look through a View-Master to see the images in 3-D.

11. If you look at these holograms from different angles, **f) …** Some holograms even appear to move as you walk past them and look at them from different angles. Others change colors or include views of completely different objects, depending on how you look at them.

12. Holograms have other surprising traits as well. If you cut one in half, each half contains whole views of the entire holographic image. The same is true if you cut out a small piece -- even a tiny fragment will still contain the whole picture. On top of that, if you make a hologram of a magnifying glass, the holographic version will magnify the other objects in the hologram, just like a real one.

     1) … areas that were light are dark, and vice versa.
     2) … by taking two slightly different views of an object and allowing each eye to see only one image, the right image for the right eye and the left image for the left eye.
     3) … you don't have to look much farther than your wallet.
     4) … four basic steps happen in an instant
     5) … they usually just look like sparkly pictures or smears of color.
     6) … you see objects from different perspectives, just like you would if you were looking at a real object.

Task 3. Answer the questions.
1. What is the difference between photography and holography?
2. What does ***stereoscopic vision*** mean?
3. How can we see pictures in three dimensions?
4. Can you describe the process of taking pictures with a film camera?
5. What do we see unusual when we develop a holographic plate?
6. Where do we use holograms nowadays?
7. What are divisible properties of a hologram?

Task 4. Find the synonyms for the following words in the text.

1. various (para 1)
2. to comprise (para 1)
3. to get (para 2)
4. to unite (para 2)
5. to sense (para 2)
6. a defect (para 2)
7. to enlarge (para 4)

8. to remove (para 5)
9. completely (para 5)
10. fake (para 9)
11. shining (para 9)
12. exact (para 10)
13. a feature (para 12)
14. very small (para 12)

Task 5. Match the words from the text with their opposites.

1. available
2. illuminate
3. impart
4. receive
5. shortcoming
6. magnify
7. add
8. eliminate
9. precise
10. tiny

a) darken
b) transmit
c) subtract
d) inaccessible
e) enormous
f) deprive
g) create
h) inaccurate
i) diminish
j) advantage

Task 6. Complete the tables. Use the words from the text. Pay attention to the part of speech. Translate all words.

Noun	Adjective
reality	1)
2)	intense
reflection	3)
4)	different
practice	5)
6)	prevalent
refraction	7)
8)	dimensional
accuracy	9)
responsibility	10)

Noun	Verb
11)	add
magnification	12)
13)	interfere
illumination	14)
elimination	15)
16)	develop
creation	17)
18)	direct
reflection	19)
maintenance	20)
21)	distort
composition	22)
interaction	23)
location	24)
generation	25)

Task 7. Underline stress in the following words and practice reading them correctly.

- a photograph – photography – photographic
- a hologram – holography – holographic
- a stereoscope – stereoscopic

Task 8. This is the picture of a camera with its main parts. Tell about the camera describing its parts and their functions.
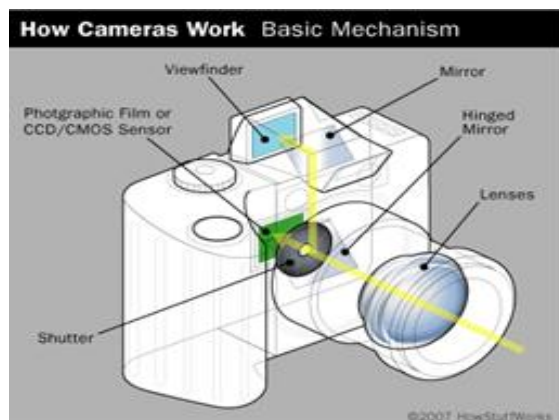
Recommended function

Study **Function 8 "HOW TO make comparison and contrast"** and write sentences comparing **3D holography** with **2D photography**.

Listening

You are going to watch a video **Fun properties of Hologram.**

Task 1. Make sure you know these words. Then watch the video and check your knowledge.

a fringe pattern, a laser pointer, to appreciate, a semicircular line, a film, swirls, interference, diffraction, width, a slit, a gap, scaling, grains of sand, to propagate, wavelength, path length, to polarize, phase difference, coherent light, to split, reflection, value, to line up

Task 2. Match the terms and their definitions.

1.	fringe pattern	a) various phenomena which occur when a wave encounters an obstacle or a slit
2.	diffraction	b) the picture which shows the behavior of interference
3.	coherent light	c) the relationship in time between the cycles of a light or sound wave and either a fixed reference point or the cycles of another system with which it may or may not be in synchrony
4.	interference	d) light waves that are "in phase" with one another
5.	phase	e) the combination of two or more electromagnetic waveforms to form a resultant wave in which the displacement is either reinforced or cancelled
6.	pathlength	f) the overall length of the path followed by a light ray or a sound wave.

Task 3. Watch the video again and match the parts of the sentences based on the video.

1. If the light is in-phase,	a)	we'll see less light reflecting.
2. If the light is out-of-phase,	b)	the image gets bigger.
3. If you change the pathlength,	c)	we'll see brighter reflections.

4. If you don't have a stable base for the hologram,
5. If you change the width of the slit,
6. If you move the laser pointer around,
7. If I pull the plate back,

d) you'll see that image is moving around for different angles.
e) fringe patterns will be moving.
f) you change the properties of interference patterns.
g) the phase will change too.

Task 4. Complete the table with appropriate words from the video.

1./ə'pri:ʃɪeɪt/		7./semi'sə:kjələ(r)/	
2./'pɑ:θleŋθ/		8./'pəʊləraɪz/	
3./kə(ʊ)'hɪər(ə)nt/		9. /vju:/	
4./vaɪ'breɪʃ(ə)n/		10./bleɪd/	
5./frɪn(d)ʒ/		11./'æŋg(ə)l/	
6./swə:l/		12./'prɔpəgeɪt/	

Task 5. Decode the following parts of the recording.
Part 1 - 00.01 "Kids today probably don't appreciate holograms…" – 01.01 "… we'll see less light reflecting."
Part 2 - 01.02 "On the bottom left there's a green laser pointer …" – 02.07 "… on vibration damping tables."
Part 3 - 02.08 "This is a configuration …" – 02.54 "… how we view them with diffraction."
Part 4 - 02.55 "To demonstrate diffraction …" 03.43 "… you can see the image."
Part 5 - 03.44 "For the longest time I didn't understand …" – 04.28 "… I can project clear across the room."

Speaking
*Prepare a talk about **one use of Holographic technology**.*

Writing
*Study **Function 7 "HOW TO deal with neologisms"** and write out all neologisms you have come across in your study and work.*

Theme 7. SOFTWARE ENGINEERING

Lead-in
- What is the difference between software and hardware? Illustrate it with examples.
- What do you think is more expensive - hardware or software?

Reading and Vocabulary

Task 1. You are going to read the text about computer software. Before reading, clear up the meaning of the following words and expressions.

hardware (n)	distinction (n)	database
application (n)	template (n)	machine code
software (n)	arbitrary (adj)	firmware
purchase (n,v)	load (v, n)	compute (v)
propose (v)	microcode (n)	computation (n),
bundle with (v)	store (v), storage (n)	alter (v)
encompass (v)	FPGA	peripheral (adj)
tailor (v)	execute (v), execution (n)	interface
array (n)	layer (n)	scripting language
compile (v), compiler (n)		

Task 2. Read the text about computer software and dwell on its three major classes.
COMPUTER SOFTWARE OR JUST SOFTWARE

The term was coined to contrast to the old term hardware (meaning physical devices). In contrast to hardware, software "cannot be touched".

The first theory about software was proposed by Alan Turing in his 1935 essay *Computable numbers with an application to the Entscheidungsproblem (Decision problem).*The academic fields studying software are computer science and software engineering. Software thus encompasses a wide array of products that may be developed using different techniques such as ordinary programming languages, scripting languages, microcode, or an FPGA (Field –Programmable –Gate- Array) configuration.

Practical computer systems divide software systems into three major classes: system software, programming software and application software, although the distinction is arbitrary, and often blurred.

System software is computer software designed to operate the computer hardware to provide basic functionality and to provide a platform for running application software. System software includes device drivers, operating systems, servers, utilities, and window systems.

System software is responsible for managing a variety of independent hardware components, so that they can work together harmoniously.

People who use modern general purpose computers usually see three layers of software performing a variety of tasks: platform, application, and user software.

Platform software: Platform includes the firmware, device drivers, an operating system, and typically a graphical user interface which, in total, allow a user to interact with the computer and its peripherals (associated equipment). Platform software often comes bundled with the computer. On a PC you will usually have the ability to change the platform software.

Application software: Application software or Applications are what most people think of when they think of software. Typical examples include office suites and video games. Application software is often purchased separately from computer hardware. Sometimes applications are bundled with the computer, but that does not change the fact that they run as independent applications. Applications are usually independent programs of the operating system, though they are often tailored for specific platforms. Most users think of compilers, databases, and other "system software" as applications.

User-written software: End-user development tailors systems to meet users' specific needs. User software includes spreadsheet templates and word processor templates. Even email filters are a kind of user software. Users create this software themselves and often overlook how important it is. Depending on how competently the user-written software has been integrated into default application packages, many users may not be aware of the distinction between the original packages, and what has been added by co-workers.

Most software has software documentation so that the end user can understand the program, what it does, and how to use it. Without clear documentation, software can be hard to use—especially if it is very specialized and relatively complex like Photoshop or AutoCAD. Developer documentation may also exist, either with the code as comments and/or as separate files, detailing how the programs work and can be modified.

Computer software has to be "loaded" into the computer's storage (such as the hard drive or memory). Once the software has loaded, the computer is able to *execute* the software. This involves passing instructions from the application software, through the system software, to the hardware which ultimately receives the instruction as machine code. Each instruction causes the computer to carry out an operation – moving data, carrying out a computation, or altering the control flow of instructions.

Task 3. Answer the questions to the text.
1. Who is the founder of the theory about software?
2. What are the academic fields that study software?
3. What are the three major classes of practical computer systems?
4. What is system software designed to?
5. What does system software include?
6. What is system software responsible for?
7. What are the three layers of software performing a variety of tasks?
8. What does platform software allow a user to do?
9. What is meant by application software?
10. What does user software include?

Task 4. Decide if each statement is true (T) or false (F).
1) Once the software has loaded, the computer is able to execute the software.
2) It is difficult for the user to understand the program as most software has no software documentation.
3) Developer documentation may also exist, either with the code as comments and/or as separate files, detailing how the program works and can be modified.
4) Software is lacking different techniques that can develop a wide array of products.
5) Platform software does not ever come bundled with the computer.
6) Depending on how competently the user-written software has been integrated into default application packages, many users may not be aware of the distinction between the original packages, and what has been added by co-workers.
7) Applications are usually independent programs of the operating system.
8) On a PC you are unable to change the platform software.
9) Email filters are a kind of user software.
10) The academic fields studying software are meteorology and design.

Task 5. Match the words in columns A and B to make the expressions.

A	B
1. software	a) code
2. hard	b) game
3. operating	c) language
4. device	d) engineering
5. platform	e) software
6. machine	f) configuration
7. video	g) drive
8. FPGA	h) system
9. application	i) package
10. scripting	j) driver

Task 6. Put the letters in the correct order to make the word that is described.

1. cedmiorco	- the collective micro programs in a CPU, used to run machine instructions
2. kpaegac	- something which consists of various components, such as a piece of computer software
3. imewrafr	- software for embedded computers
4. ecteuxe	- to run (a program or an instruction)
5. sitcdnointi	- difference
6. readharw	- the part of a computer that is fixed and cannot be altered without replacement or physical modification
7. snopascem	- to constitute or include
8. sedhetprsae	- an accounting program that displays data in rows and columns on a screen

Task 7. Complete the following sentences with the words from the box in the correct form.

interface	software	integrate	equipment	operating
system	load	computation	peripheral	code	hardware

1. You can customize the _____ in several ways.

2. The first version to run under the ProDOS _____ was called Apple Writer 2.0.

3. These programs can be _____ with your existing software.

4. If the machine doesn't operate correctly, an error _____ will appear.

5. First, switch on the machine and _____ the disk.

6. All the statistical _____ were performed by the new software system.

7. In this case, the _____ is attached to a small network with a gateway router and a few server hosts that run FTP, mail and web servers.

8. In radio installations, too, much of the _____ is amazingly compact in view of its   intricacy.

9. The term "_____" generally refers to an element having a physical structure such as   electronic, electromagnetic, optical, mechanical parts, etc.

10. Engineers from the University of Pennsylvania warn against an entirely new threat to computer security: bugs implanted in _____ devices, such as keyboards or mice.

Specialized Reading

Task 1. The words in the box all come from the main text. Make sure you know these words and expressions.

comprise (v)	server (n)	boot up (v)
current (n, adj)	computer nerd	desktop (adj)
manage (v)	release (v, n)	compatible (adj)
revamp (v)	install (v), installation (n)	multiple (adj)
interface (n)	gain (v, n)	apps (n)
scratch (n)	lack (v, n)	touchscreen
folder (n)	produce (v), production (n)	licensing fee
interim (n)	edition (n)	distribute (v)
portable (adj)	tablet (n)	

Task 2. Read and translate the text.

OPERATING SYSTEMS

An **operating system**, or "OS," is software that communicates with the hardware and allows other programs to run. It is comprised of system software, or the fundamental files your computer needs to boot up and function. Every desktop computer, tablet, and smartphone includes an operating system that provides basic functionality for the device.

Common desktop operating systems include Windows, Mac OS X, and Linux. While each OS is different, they all provide a graphical user interface, or GUI, that includes a desktop and the ability to manage files and folders. They also allow you to install and run programs written for the operating system. While Windows and Linux can be installed on standard PC hardware, Mac OS X can only run on Macintosh computers. Therefore, the hardware you choose affects what operating system(s) you can run.

Mobile devices, such as tablets and smartphones also include operating systems that provide a GUI and can run applications. Common mobile OSes include Android, IOS, and Windows Phone. These OSes are developed specifically for portable devices and therefore are designed around touchscreen input. While early mobile operating systems lacked many features found in desktop OSes, they now include advanced capabilities, such as the ability to run third-party apps and run multiple apps at once.

Since the operating system serves as a computer's fundamental user interface, it significantly affects how you interact with the device. Therefore, many users prefer to use a specific operating system. For example, one user may prefer to use a computer with Mac OS X instead of a Windows-based PC. Another user may prefer an Android-based smartphone instead of an iPhone, which runs the IOS.

Windows is a series of operating systems developed by Microsoft. Each version of Windows includes a graphical user interface, with a desktop that allows users to view files and folders in windows. For the past two decades, Windows has been the most widely used operating system for personal computers.

Microsoft Windows is designed for both home computing and professional purposes. Past versions of Windows home editions include Windows 3.0 (1990), Windows 3.1 (1992), Windows 95 (1995), Windows 98 (1998), Windows Me (2000),

Windows XP (2001), and Windows Vista (2006). The current version, Windows 7, was released in 2009.The first business-oriented version of Windows, called Windows NT 3.1, was in 1993. This was followed by Windows 3.5, 4.0, and Windows 2000. When Microsoft released Windows XP in 2001, the company simply created different editions of the operating system for personal and business purposes. Windows Vista and Windows 7 have followed the same release strategy.

Windows is designed to run on standard x86 hardware such as Intel and AMD processors. Therefore, it can be installed on multiple brands of hardware, such as Dell, HP, and Sony computers, as well as home-built PCs. Windows 7 also includes several touchscreen features, that allow the operating system to run on certain tablets and computers with touchscreen displays. Microsoft's mobile operating system, Windows Phone, is designed specifically for smartphones and runs on several brands of phones, including HTC, Nokia, and Samsung.

Mac OS X (pronounced "Mac Oh-Es Ten") is the current version of the operating system used on Apple Macintosh computers. If you happen to pronounce it "Mac OS X," computer nerds and dedicated Mac users will be quick to correct you. While the name may be a bit confusing, Mac OS X is an advanced, user-friendly operating system.

Previous versions of the Mac OS were based on the original Macintosh operating system, released in 1984. In the late 1990's, many computer users felt Windows had "caught up" to the Mac OS and Apple's operating system began to appear a bit dated. So Apple completely revamped the Mac OS and created a new operating system from the ground up.

While much of the code used to build Mac OS X was written from scratch, a lot was taken from the NEXTSTEP operating system. NEXTSTEP was a Unix-based system that ran on NeXT computers, which are no longer in production. NeXT was acquired by Apple in 1997 and Steve Jobs was hired as interim CEO. Apple developers took the Unix-based code from NEXTSTEP and combined it with the graphical user interface (GUI) of Mac OS 9. The result was a stable, high-performance operating system that had the stability of Unix and the intuitive interface of the Macintosh. Mac OS X 10.0 was released in 2001.

Linux is a Unix - like operating system (OS) created by Linus Torvalds. He developed Linux because he wasn't happy with the currently available options in Unix and felt he could improve it. So he did what anybody else would do, and created his own operating system.

When Linus finished building a working version of Linux, he freely distributed the OS, which helped it gain popularity. Today, Linux is used by millions of people around the world. Many computer hobbyists (a.k.a. nerds) like the operating system because it is highly customizable. Programmers can even modify the source code and create their own unique version of the Linux operating system.

Web hosting companies often install Linux on their Web servers because Linux-based servers are cheaper to set up and maintain than Windows-based servers. Since the Linux OS is freely distributed, there are no licensing fees. This means Linux servers can host hundreds or even thousands of websites at no additional cost. Windows servers, on the other hand, often require user licenses for each website hosted on the server.

Linux is available in several distributions. Some of the most popular distributions include Red Hat Enterprise, CentOS, Debian, openSUSE, and Ubuntu. Linux also supports several hardware platforms, including Intel, PowerPC, DEC

Alpha, Sun Sparc, and Motorola. Since Linux is compatible with so many types of hardware, variations of the Linux operating system are used for several other electronic devices besides computers. Some examples include cell phones, cable boxes, and Sony's PS2 and PS3 gaming consoles.

Task 3. Match the following words and expressions with their Russian equivalents.

1. portable device	a) состоять из
2. touchscreen display	b) разработчик
3. computer nerd	c) право пользования
4. to be comprised of	d) смартфон
5. to run application	e) переносное устройство
6. user license	f) сенсорный экран
7. to install programs	g) компьютерный фанат
8. developer	h) операционная система
9. operating system	i) запустить приложение
10. smartphone	j) устанавливать программы

Task 4. Find the words in the text with a similar meaning.
  1. suitable
  2. a trademark
  3. spreading
  4. a fan
  5. to supply
  6. a mobile phone
  7. to run
  8. to produce
  9. property
  10. progressive

Task 5. Choose the correct variant and complete the following sentences.
1. Windows 7 was released in _____.
   a) 2006
   b) 2001
   c) 2009
2. Windows can be installed on multiple brands of _____.
   a) hardware
   b) software
   c) multiware
3. Operating systems provide a graphical user _____.
   a) mouse
   b) energy
   c) interface
4. Mobile operating systems now include advanced _____.
   a) steps
   b) capabilities
   c) courses
5. Mac OS X is advanced and _____.
   a) alien
   b) user-friendly

c) ill-tempered

6. The hardware you choose affects what operating system(s) you can _____.

    a) run

    b) overlook

    c) colour

7. Operating systems are designed around touchscreen _____.

    a) output

    b) let-out

    c) input

8. Mobile devices, such as tablets and smartphones include operating systems that can run _____.

    a) applications

    b) foundations

    c) motivations

Task 6. Read the following sentences and decide if they are true (T) or false (F).

    1) Every desktop computer, tablet, and smartphone includes an operating system that provides basic functionality for the device.

    2) Linux does not enter common desktop operating systems.

    3) Since the operating system serves as a computer's fundamental user interface, it does not at all affect how you interact with the device.

    4) The first business-oriented version of Windows, called Windows NT 3.1, was in 1993.

    5) Microsoft Windows is designed only for home computing.

    6) The original Macintosh operating system was released in 1984.

    7) Linux is a Unix-like operating system created by Linus Macintosh.

    8) Microsoft's mobile operating system, Windows Phone, is designed specifically for iPhones.

    9) Each version of Windows includes a graphical user interface, with a desktop that allows users to view files and folders in windows.

    10) An operating system is hardware that communicates with the software and allows other programs to run.

Task 7. Rewrite the underlined words and expressions in the sentences using the words given in the box in the correct form.

boot	license	provide	release	nerd
run	brand	cell phone		

    1. The company <u>supplied </u>the necessary money.

    2. Certain <u>patent </u>is taken when translating material from one medium to another.

    3. Courtesy is the company's <u>trademark.</u>

    4. Have you <u>loaded</u> the software?

    5. A new programme on TV has been recently <u>produced.</u>

    6. To change to Batched Stored Procedure calls <u>execute</u> the command below.

    7. Please make sure all <u>mobile phones</u> are switched off during the performance.

    8. A rogue computer <u>fan</u> is going to shut down the country.

Task 8. Write the words from the text according to their pronunciation.

1./'sɔf(t)wəː/		10./dɪ'keɪd/	
2./'smaːtfʊn/		11./'fɪltə/	
3./fʌŋkʃə'næləti/		12./'dedɪkeɪtɪd/	
4./'græfɪk(ə)l/		13./rɪ'liːs/	
5./æplɪ'keɪʃ(ə)n/		14./meɪn'teɪn/	
6./spe'sifikəli/		15./ə'veɪləb(ə)l/	
7./æd'vɑːnst/		16./dɪstrɪ'bjuːʃ(ə)n/	
8./keɪpə'bɪlɪti/		17./kəm'pætɪb(ə)l/	
9./fʌndə'ment(ə)l/		18./kən'səʊl/	

Recommended function

Read **Function 8 "HOW TO make comparison and contrast"** and prepare a talk about the work of the operating systems Windows, Linux, Mac OS X: what distinguishes them from one another and what they have in common?

Listening Task

You are going to listen to a talk about the way **Linux is built.**

Task 1. Check you know these words and stress them correctly.

android, activate, device, collaboratively, development, contribute, patch, release, kernel, ultimate, authority, enterprise, trade, complete, support, extensive, evaluation.

Task 2. Listen and answer the following questions.

1. How many android phones running Linux are activated every day?
2. How many TV sets running Linux are sold every day?
3. What distinguishes Linux from Windows?
4. How many developers have contributed to the Linux kernel since 2005?
5. What does 'a patch' describe?
6. What are other possibilities of patches?
7. How many sections of the kernel can a senior Linux kernel developer manage?
8. Where is Linux dominating today?

Task 3. Listen again and decide if each statement is correct or incorrect. Correct the false ones.

1) The full name of the Linux creator is Leo Torvalds.
2) A new kernel comes out every 2 or 3 months.
3) There are 200 000 words in the novel "War and Peace."
4) A patch is a kernel individual unit which describes the lines that can be changed, added or removed from the source code.

5) The Linux creator does not have ultimate authority on what is accepted into the next release and what is not.

6) Google, Twitter, Facebook and Amazon are all powered by Linux.

7) About 2 patches are applied to the kernel each hour.

8) Linux is built individually by a company.

Task 4. Decode one of the 3 parts of the text you listened to.

Part 1 – 00.31 "Most of which …" – 00.48 "… to achieve all of this."

Part 2 - 01.20 "Consider that …" – 01.47 "… development process."

Part 3 - 02.28 "When the maintainer finishes …" – 02.48 "… to the kernel   each hour."

Recommended function

*Read **Function 1 "HOW TO translate an English sentence"** and translate the following sentences into Russian.*

1. It'll take my laptop a couple of minutes to boot.

2. Enter your security code to access the computer.

3. Computers become lighter, smaller and more portable every year.

4. Microsoft Word, Adobe Acrobat and CorelDraw are programs or applications.

5. The point-and-click interface made life easier for users.

6. It's important to install a virus checker.

7. Included label software integrates easily with most software applications.

 8. Of all the parts that make up the iPhone, the touchscreen is the most expensive – around 20 % of the phone's manufacturing cost.

9. She bought some new hardware for her system.

10. The device was protected by patent.

Speaking

*Characterize the work of **any operating system**. Compare it with other systems. Tell about its advantages and disadvantages, why users choose or don't choose it, if you prefer to use it.*

Writing

*Write about **your PC**. Include the following information:*

- its make and type;
- its advantages and disadvantages;
- the operating system used in it;
- how it compares with other similar models.

Theme 8. MICROPROCESSOR CONCEPTS

Lead-in

- What is the main function of a microprocessor?
- What unit of frequency is used to measure processor speed?
- What do you know about Moore's Law?

Reading and Vocabulary

Task 1. a)You are going to read the text about a microprocessor. Make sure you know these words and phrases

calculate (v), calculation (n)	ROM	workstation
configure (v), configuration (n)	RAM	perform (v),
integrated circuit	controller	performance (n)
render (v), rendering (n)	transistor	handle (v)
reside (v)	CPU	benefit (v, n)
input (v, n, adj)	GPU	electronic chip
output (v, n, adj)	enable (v)	high-end
dual-core processor	silicon	binary numeral system
quad-core processor	graphics	motherboard
process (v), processing (n)	video card	multiple
	cache	

b) Compare the following pairs of terms:
- CPU and GPU
- dual-core processor and quad-core processor
- motherboard and video card
- cache and RAM

Task 2. Read the text about different types of microprocessors and say what operations they can perform.

MICROPROCESSOR

A processor, or "**microprocessor**," is a small chip that resides in computers and other electronic devices. Its basic job is to receive input and provide the appropriate output. While this may seem like a simple task, modern processors can handle trillions of calculations per second. Microprocessors operate on numbers and symbols represented in the binary numeral system.

The central processor of a computer is also known as the CPU, or "central processing unit". This processor handles all the basic system instructions, such as processing mouse and keyboard input and running applications. Most desktop computers contain a CPU developed by either Intel or AMD, both of which use the x86 processor architecture. Mobile devices, such as laptops and tablets may use Intel and AMD CPUs, but can also use specific mobile processors developed by companies like ARM or Apple.

Modern CPUs often include multiple processing cores, which work together to process instructions. While these "cores" are contained in one physical unit, they are actually individual processors. In fact, if you view your computer's performance with a system monitoring utility like **Windows Task Manager** (Windows) or **Activity Monitor** (Mac OS X), you will see separate graphs for each processor. Processors that include two cores are called dual-core processors, while those with four cores are called quad-core processors. Some high-end workstations contain multiple CPUs with multiple cores, allowing a single machine to have eight, twelve, or even more processing cores.

Besides the central processing unit, most desktop and laptop computers also include a GPU. This processor is specifically designed for rendering graphics that are output on a monitor. Desktop computers often have a video card that contains the

GPU, while mobile devices usually contain a graphics chip that is integrated into the motherboard. By using separate processors for system and graphics processing, computers are able to handle graphic-intensive applications more efficiently.

A **dual-core processor** is a CPU with two processors or "execution cores" in the same integrated circuit. Each processor has its own cache and controller, which enables it to function as efficiently as a single processor. However, because the two processors are linked together, they can perform operations up to twice as fast as a single processor can.

The Intel Core Duo, the AMD X2, and the dual-core PowerPC G5 are all examples of CPUs that use dual-core technologies. These CPUs each combine two processor cores on a single silicon chip. This is different than a "dual processor" configuration, in which two physically separate CPUs work together. However, some high-end machines, such as the PowerPC G5 Quad, use two separate dual-core processors together, providing up to four times the performance of a single processor.

While a dual-core system has twice the processing power of a single-processor machine, it does not always perform twice as fast. This is because the software running on the machine may not be able to take full advantage of both processors. Some operating systems and programs are optimized for multiprocessing, while others are not. Though programs that have been optimized for multiple processors will run especially fast on dual-core systems, most programs will see at least some benefit from multiple processors as well.

Since the early 1970s, the increase in capacity of microprocessors has followed Moore's law; this originally suggested that the number of transistors that can be fitted onto a chip doubles in one and a half year but present technology doubles every two years, though Moore later refined the period to two years.

Task 3. Answer the questions based on the text.
1. What is a processor?
2. What is the role of the processor in a computer?
3. How many calculations can modern processors handle?
4. What do microprocessors operate on?
5. What handles all the basic instructions, such as processing, mouse and keyboard input and running applications?
6. What are computer instructions processed by?
7. What do most desktop and laptop computers include besides the central processing unit?
8. What is a GPU designed for?
9. What is the advantage of dual-core over single processors?
10. What does Moore's law suggest?

Task 4. Spot 8 inaccuracies in the expression of the information from the text.
1) The central processor of a computer is also known as GPU.
2) Since the early 1990s, the increase in capacity of miniprocessors has followed Cant's law.
3) Processors that include two cores are called triple processors, while those with four cores are called quad-core processors.

4) Modern CPUs include scarce processing cores which work together to process instructions.

5) A GPU is specifically designed for rendering photos that are output on a computer.

6) Some high-end workstations contain multiple CPUs with multiple cores, allowing a single machine to have eight, twelve, or even more processing instructions.

Task 5. Match the beginnings of the sentences with their endings.

1. Microprocessors operate on numbers and symbols	a) are called dual-core processors.
2. The central processor of a computer	b) which enables it to function as efficiently as a single processor.
3. Most desktop computers contain a CPU	c) resides in computers and other electronic devices.
4. A processor is a small chip that	d) most desktop and laptop computers also include a GPU.
5. Some operating systems and programs are	e) represented in the binary numeral system.
6. Processors that include two cores	f) developed by either Intel or AMD.
7. Besides the central processing unit,	g) is also known as the CPU.
8. Each processor has its own cache and controller,	h) optimized for multiprocessing, while others are not.

Task 6. Find 10 words connected with microprocessors. The words appear vertically, horizontally, and diagonally.

C	O	N	T	R	O	L	L	E	R
B	I	N	P	U	T	D	I	R	Y
B	U	C	A	C	H	E	O	L	C
I	H	B	J	A	F	S	U	M	I
N	A	N	O	G	S	R	T	A	R
A	E	D	X	E	C	L	P	I	C
R	A	K	C	T	P	M	U	V	U
Y	H	O	A	H	U	Z	T	O	I
S	R	A	P	K	I	U	Y	F	T
P	C	I	L	L	A	P	T	O	P

Task 7. Match the following words with their definitions. Then translate them into Russian.

1. microprocessor	a) a portable computer small enough to use in your lap
2. output	b) the information which is presented to the computer
3. motherboard	c) to control; to manage
4. laptop	d) the entire CPU of a computer on a single integrated circuit
5. controller	e) the result of calculating
6. to handle	f) results produced by a computer
7. input	g) the main circuit board for a computer
8. calculation	h) a mechanism that controls or regulates the operation of a machine
9. binary number system	i) a small piece of silicon that has a set of complicated electrical connections on it and is used to store and process information in computers
10. chip	j) a method of representing numbers in which only the digits 0 and 1 are used.

Task 8. Find five pairs of antonyms, and five pairs of synonyms.

input, monitor, to enable, low-end, multiple, cache, output, video display, quad-core, controller, device, chip, scarce, mainboard, to exclude, regulator, IC, video card, to disable, to develop, high-end, graphics card, to include, multiple, complicated, motherboard, CPU

Specialized Reading

Task 1. Read the following words and expressions, check their meaning and mark the stress.

improve (v)	core (n)	embedded system
prevalent (adj)	chairman (n)	multi-core processor
workstation	announce (n)	signal processing
utilize (v)	obstacle (n)	bus interface
manufacturer (n)	enterprise (n)	facility (n)
integrate (v)	heterogeneous (adj)	shrink (v)
upgrade (v, n)	transition (n)	release (v, n)
microcontroller (n)	execute (v)	implementation (n)
performance (n)	thread (n)	cache
semiconductor (n)		

Task 2. Read and translate the text.

MULTICORE DESIGNS

A different approach to improving a computer's performance is to add extra processors, as in symmetric multiprocessing designs, which have been popular in servers and workstations since the early 1990s. Keeping up with Moore's Law is becoming increasingly challenging as chip-making technologies approach their physical limits. In response, microprocessor manufacturers look for other ways to

improve performance in order to hold on to the momentum of constant upgrades in the market.

A multi-core processor is simply a single chip containing more than one microprocessor core. This effectively multiplies the processor's potential performance by the number of cores (as long as the operating system and software is designed to take advantage of more than one processor core). Some components, such as bus interface and cache, may be shared between cores. Because the cores are physically very close to each other, they can communicate with each other much faster than separate processors in a multiprocessor system, which improves overall system performance.

In 2005, the first personal computer dual-core processors were announced. As of 2012, dual-core and quad-core processors are widely used in home PCs and laptops while quad, six, eight, ten, twelve, and sixteen-core processors are common in the professional and enterprise markets with workstations and servers.

The desktop market has been in a transition towards quad core CPUs since Intel's Core 2 Quads were released and now are quite common although dual core CPUs are still more prevalent. This is largely because of people using older or mobile computers, both of which have a much lower chance of having more than two cores than newer desktops and because of how most computer users are not heavy users. AMD offers CPUs with more cores for a given amount of money than similarly priced Intel CPUs but the AMD cores are somewhat slower than Intel cores so the two will trade blows in different applications depending on how well threaded the programs being used are.

Historically AMD and Intel have switched places as the companies with the fastest CPU several times. Intel is currently winning on the desktop side of the computer CPU market with their Sandy Bridge and upcoming Ivy Bridge series. In servers AMD's new Opterons seem to have superior performance for their price points. This means that AMD is currently more competitive in low to mid end servers and workstations where more cores and threads are more effectively utilized since professional software often uses more, if not all available threads.

A microprocessor is a general purpose system. Several specialized processing devices have followed from the technology. Microcontrollers integrate a microprocessor with peripheral devices for control of embedded system. A digital signal processor (DSP) is specialized for signal processing. Graphics processing units may have no, limited, or general programming facilities.

At a developer's conference hosted by Intel in September 2007, Intel chairman emeritus of the board, Gordon Moore, commented: "We all know there are physical limits to Moore's Law. And Moore's Law will begin to run into these fundamental limitations in another ten to 15 years, I think." This can be interpreted to mean that he expects semiconductor rules to continue to shrink for about another decade. But what types of internal architecture are needed to get past the obstacles to multicoring even as geometry continues to shrink? One answer seems to be to mix several types of core, creating heterogeneous architectures. Floating-point operations, signal processing and other tasks that CPU cores are ill-suited to are instead executed by other cores on the same chip, which can be programmed separately. It appears that the most common implementation for microprocessors in the future will be multiple types of core, with multiple chips for each.

Switching to SoC

Microprocessor manufacturers facing demand for reduced dissipation have managed to evade the issue by multicoring, mounting multiple CPU cores of the same type. The benefits of merely adding more cores, however, begin to drop off rapidly in client systems, and as a result engineers are recognizing the advantages of architectures featuring multiple cores of multiple types. Overall chip performance is being raised by allocating processing tasks to processors designed for them, such as by integrating graphic processing units (GPU). The trend is toward a system-on-chip (SoC) implementation, with the microprocessor incorporating a variety of peripheral circuits.

Task 3. Answer the questions to the text.

1. How can a computer's performance be improved?
2. Why do microprocessor manufacturers look for other ways to improve a computer's   performance?
3. What is the advantage of a multi-core processor over a microprocessor?
4. Which processors are more widely used in home PCs: dual-core or from 6 to 16-core processors?
5. By what are floating-point operations, signal processing and other tasks executed in a CPU?
6. What is the job of microcontrollers in a microprocessor?
7. What can you say about a digital signal processor (DSP)?
8. What can you say about the implementation for microprocessors in the future according to the information of the text?

Task 4. Say whether the statements are true (T) or false (F). Correct the false ones.

1) Microprocessor manufacturers coped with the demand for reduced dissipation by multicoring, mounting multiple CPU cores of the same type.
2) Symmetric multiprocessing designs have been popular in servers and workstations since the early 1990s.
3) In 2010, the first personal computer dual-core processors were announced.
4) Quad 6-16-core processors are common in home PCs.
5) The desktop market has been in a transition towards quad-core CPUs since Intel's Core 2 Quads were released.
6) New Opterons seem to have superior performance for their price points which means that AMD is currently less competitive in low to mid end servers and workstations where more cores and threads are more effectively utilized.
7) A multi-core processor is simply a single chip containing one microprocessor core.
8) Graphics processing units may have no, limited, or general programming facilities.
9) Keeping up with Moore's Law is becoming increasingly challenging as chip-making technologies approach their physical limits.
10) Dual core CPUs are still more prevalent, because people use older or mobile computers, both of which have a much lower chance of having more than two cores than newer desktops.

Task 5. Match the abbreviations and their full forms. Translate them into Russian.

1. PC   a) Graphic Processing Unit
2. CPU   b) System-on-Chip
3. AMD   c) Digital Signal Processor
4. DSP   d) Personal Computer
5. GPU   e) Central Processing Unit
6. SoC   f) Advanced Micro Devices

Task 6. Match the Russian words with their English definitions.

1. микроконтроллер	a) a computer of a size designed to be used on a desk or table
2. модернизировать	b) a device that is outside the computer's system unit
3. кэш-память	c) integrated circuit semiconductor chip that performs the bulk of the processing and controls the parts of a system
4. встраиваемая система	d) someone who manufactures something
5. производитель	e) a microcomputer on a single chip, used to control some device
6. внешнее устройство	f) to raise to a higher grade or standard
7. настольный ПК	g) a fast storage buffer in the central processing unit of a computer
8. микропроцессор	h) a special-purpose computer system designed to perform one or a few dedicated functions, often with real-time computing constraints

Task 7. Find the words in the text with the opposite meaning.

1. deteriorate
2. decline
3. disadvantage
4. inferior
5. hold
6. homogeneous
7. public

Task 8. Fill in the gaps. Use the words from the box.

dual-core	chip	processing	bus interface
CPU	performance	microprocessor	

1. In servers AMD's new Opterons seem to have superior _____ for their price points.

2. A _____ is a general purpose system.

3. In 2005, the first personal computer _____ processors were announced.

4. Historically AMD and Intel have switched places as the companies with the fastest _____ several times.

5. A digital signal processor is specialized for signal _____.

6. A multi-core processor is simply a single _____ containing more than one microprocessor core.

7. Some components, such as _____ and cache, may be shared between cores.

Task 9. Put the words into the correct order to make sentences.
1. components, may , shared, Some, software, be, between, cores.
2. cores, very, to, close, The, physically, are, each other.
3. digital, processor, A, for, specialized, signal, is, signal processing.
4. technologies, their, physical, Chip-making, approach, limits.
5. is, general, A, purpose, microprocessor, a, system.
6. integrate, with, a, Microcontrollers, peripheral, microprocessor, devices.
7. is, to make, advantage, Software, more, of, one, than, designed, processor, core.
8. specialized, devices, followed, from, Several, processing, have, the technology.

Recommended function

Read **Function 12 "HOW TO define a thing and explain its use and structure"** and tell about main parts of a microprocessor.

Listening

You will hear some information about **Microprocessors.**

Task 1. Before listening check you know these words and stress them correctly.

microchip, install, precise, algebra, scientist, transistor, replace, microprocessor, substrate, flux, sticky, integrated circuit, infrared, microscope, dissipate, conduct, vibrate, chemical.

Task 2. Answer the following questions.
1. What is called a brain inside a computer?
2. When did the scientists build the first computer and what was its function?
3. Why is the creation of computers in 1971 defined as the biggest breakthrough?
4. What is a substrate and with what is it covered?
5. What instrument helps to verify the position of a chip?
6. Does tin conduct electricity?
7. What are tiny cylindrical pieces of tin called?
8. What is used to vibrate the columns until they fall through the holes?

Task 3. Choose the correct variant to fill the gaps.
1. A robotic arm picks up _____ caps at a time.
    a) 2   *b) 4*   *c) 6*
2. The first general computer _____ was the size of 20 refrigerators.
    a) in 1946   *b) in 1956*   *c) in 1966*
3. A giant suctioning _____ vibrates the columns.
    a) seeding-machine b) net   *c) sieve*
4. They place a microchip on each substrate and _____ light guides the machine to place the chip in precisely the right spot.
    a) laser   *b) infrared*   *c) ultra-violet*
5. A machine spreads a thick _____, then attaches the vertical columns in it from underneath.
    a) adhesive paste   *b) layer of salt*   *c) varnish*
6. The microchips with the positioned caps go into an assorting oven at _____ degrees   Celsius for about an hour.

a) 250   *b) 150*   *c) 100*

7. During _____ transistors replaced bulky vacuum tubes.
    a) the 1960s   *b) the 1970s*   *c) the 1950s*

8. All the microprocessor components are on one _____ chip.
    a) miniscale   *b) maxiscale*   *c) medium scale*

Task 4. Listen to the text again and make the sentences complete.
    1. These lines are made up vertically so they can be attached to the _____.
    2. The factory receives the microchips _____.
    3. This will hold the microchip in place until it is _____.
    4. Flux is a chemical that makes a substrate surface _____.
    5. They start with a ceramic square called _____.
    6. A robotic arm positions a chip carrying a substrate onto the pasted _____.
    7. The finished microchip goes into a bath of _____.
    8. At another factory the microprocessor unit is sorted on the electronic card which then goes into _____.

Task 5. Decode one of the 3 parts of the text you listened to.
Part 1 – 00.26 "Scientists built the first …" – 00.43 "... replaced transistors."
Part 2 - 02.10 "Next stop …" – 02.53 "… over the microchips."
Part 3 – 04.03 "A robotic arm positions …" – 04.37 "… the substrate."

Task 6. Write the words from the listening comprehension text to the following transcriptions.

1./ ˌɒp(ə)'reɪʃ(ə)n /		10./ ə'luːmɪnəm /	
2./ 'delɪkət /		11./ 'dʒen(ə)reɪt /	
3./ kəm'pəunənt /		12./ ˌelek'trɪsətɪ /	
4./ 's3ːfɪs /		13./ kə'nekʃ(ə)n /	
5./ 'kemɪk(ə)l /		14./ flʌks /	
6./ 's3ːkɪt /		15./ hiːt /	
7./ spɒt /		16./ ɪn'stɔːl /	
8./ prə'dʌkʃ(ə)n /		17./ 'ʌv(ə)n /	
9./ 'selsɪəs /		18./ tɪn /	

Speaking
    *You are to deliver a talk on the theme **"Microprocessor"**. The listeners are not much good at the subject. Make your speech most understandable for them using the simplest language. Dwell on the following items.*
- A chip is a small sliver of silicon.
- The appearance of the microchip in the 1970s is an inevitable scientific advance.
- The work of the central processing unit (CPU).
- The division of the processors according to the number of the cores.
- Cache and controller as parts of each processor.
    *Use the following chart in your talk. You can read **Function 13 "HOW TO comment a visual aid".***

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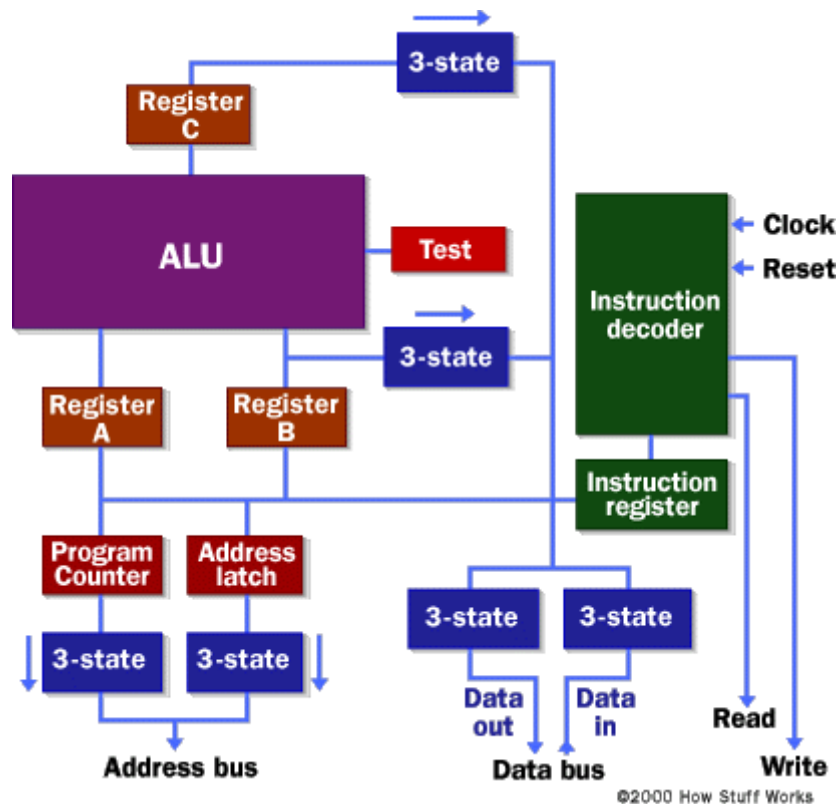
Recommended function and Writing

Read **Function 9 "HOW TO make a simple translation from Russian into English".** *Translate the following text into English*

Микропроцессор характеризуется:

1) тактовой частотой, определяющей максимальное время выполнения переключения элементов в ЭВМ;

2) разрядностью, т.е. максимальным числом одновременно обрабатываемых двоичных разрядов.

Разрядность МП обозначается m/n/k/ и включает:

m - разрядность внутренних регистров, определяет принадлежность к тому или иному классу процессоров;

n - разрядность шины данных, определяет скорость передачи информации;

k - разрядность шины адреса, определяет размер адресного пространства. Например, МП i8088 характеризуется значениями m/n/k=16/8/20;

3) архитектурой. Понятие архитектуры микропроцессора включает в себя систему команд и способы адресации, возможность совмещения выполнения команд во времени, наличие дополнительных устройств в составе микропроцессора, принципы и режимы его работы. Выделяют понятия микроархитектуры и макроархитектуры.

Микроархитектура микропроцессора - это аппаратная организация и логическая структура микропроцессора, регистры, управляющие схемы, арифметико-логические устройства, запоминающие устройства и связывающие их информационные магистрали. Макроархитектура - это система команд, типы обрабатываемых данных, режимы адресации и принципы работы микропроцессора.

В общем случае под архитектурой ЭВМ понимается абстрактное представление машины в терминах основных функциональных модулей, языка ЭВМ, структуры данных.

Theme 9. ROBOTS

Lead-in
- When was it the first time that you have learnt any information about robots (in a film, in a book, on TV)?
- Can you give examples of any robot in your life?
- What exactly do robotics engineers do?

Reading and Vocabulary

Task 1. You are going to read the text about robots. Check if you understand the following words and expressions.

coin (v, n)	labour (n)	advance (v, n)
challenge (v, n)	autonomous (adj)	march into (v)
drudgery (n)	hazardous (adj)	resist (v), resistant (adj)
humanoid (n)	vehicle (n)	robotic butler
operate (v), operation (n)	desert racer	robonaut
explore (v), exploration (n)	shipwreck	artificial intelligence
slave (n)	spy plane	rover (n)
household (adj)	brainless (adj)	smart (adj)
entertain (v), entertainment (n)	unmanned (adj)	probe (n)
industry (n), industrial (adj)	monitor (v)	patrol (v, n)

Task 2. Read the text about robots and comment on their role in human life.
ROBOTS
Ever since the Czech writer Karel Capek first coined the term "robot" in 1921, there has been an expectation that robots would someday deliver us from the drudgery of hard work. The word - from the Czech "robota", for hard labour and servitude - described intelligent machines used as slaves in his play R.U.R. (Rossum's Universal Robots).

Today, over one million household robots, and a further 1.1 million industrial robots, are operating worldwide. Robots are used to perform tasks that require great levels of precision or are simply repetitive and boring. Many also do jobs that are hazardous to people, such as exploring shipwrecks, helping out after disasters, studying other planets and defusing bombs or mines. Robots are increasingly marching into our lives. In the future, robots will act as carers, medics, companions, entertainers, security guards, traffic police and even soldiers.
Domestic invasion
Despite the longevity of the robot concept, robotic butlers that roam our homes and relieve us from housework still seemed far from reality until very recently.

Instead, the vast majority of robots worked in factories performing the industrial functions of brainless machines.

However, a combination of increased computing power and advances made in the field of artificial intelligence, or AI, have now made software smart enough to make robots considerably more useful. A recent report published by the United Nations revealed that sales of domestic robots had tripled in a single year. What's more, they were well on their way to outstripping their industrial cousins.

While a large portion of the household robots were made up of robotic vacuum cleaners, mops, lawn mowers, pool cleaners, security bots and even robotic baby-rockers - the real boom was in entertainment robots. Suddenly people were happy to pay for robots that had no specific functional value. Instead these bots, such as Sony's Aibo robotic dog and its robo-pups served as robo-pets and companions, rather than slaves. This is partly because many domestic chores still pose a real challenge for robots, in terms of dexterity and intelligence, even with seemingly simple chores such as ironing.

Movers and shakers

Away from the domestic front, the modern bot can take many other forms. Some are even designed to change their form, such as shape-shifting tetrabots or self-cloning robots. And while we often think of robots being humanoid, such as Honda's Asimo and Sony's Qrio, there is as much interest, if not more, in emulating other creatures like insects, lobsters, alligators, snakes and fish. A robot guard dragon has even been created.

Whether they have two legs, many legs, or no legs at all, considerable advances have been made in robot locomotion, including bipedal walking, rambling, crawling, rock-climbing, slithering and swimming.

There are also wheeled bots that work as autonomous vehicles, such as the desert racers that compete in the DARPA Grand Challenge to be the fastest to cross a desert without any human control.

Robot wars

One area where even more advances in autonomy have been made is the development of unmanned aerial vehicles, or UAVs. These are essentially remotely-controlled spy planes that are capable of flying themselves if they lose contact with their pilot. These planes can also be used to monitor forest fires. Some robots have even learnt to fly of their own accord.

The Pentagon has started arming some UAVs, making them capable of responding with firepower against aggressive attacks - so-called unmanned combat vehicles, or UCVs. Robots that act as battlefield spies have also been designed. Also aiming to remove humans from dangerous situations are space agencies, such as NASA (National Aeronautic and Space Administration), who have developed many space exploration robots. For example, the robonaut is a remotely-operated robot, designed to perform dangerous space walks in the place of an astronaut.

In addition, NASA has already sent robotic rovers to Mars, developed robotic dirt scoopers, "flying eyes" and probes for interplanetary exploration and even sent droids off to try to explore asteroids. Space probes such as Huygens (which landed on Titan) and Russia's Venera 9 (which landed on Venus) are sometimes considered robots too.

And it's not just other planets that robots are good for exploring. Robotic submarines, also known as remotely operated vehicles, or ROVs, have now become important way of exploring the deep ocean or ice-capped waters, while heat resistant

robots are now used to patrol and monitor the activity in volcanoes. A robotic rover has even been used to explore Egyptian pyramids.

Task 3. Read the following sentences and decide if they are true (T) or false (F).

1) Many robots do jobs that are dangerous to people such as exploring shipwreck.

2) In the future robots will act as security guards, traffic police and even soldiers.

3) A combination of increased computing power and advances made in the field of artificial intelligence are an obstacle in the creation of useful robots.

4) According to the recent report published by the United Nations, the sales of domestic robots had doubled in a single year.

5) First robots were described as intelligent machines used as slaves in the play by Karel Capek "Rossum's Universal Robots."

6) The Pentagon has started arming some UAVs making them capable of responding with water against aggressive attacks.

7) The vast majority of robots worked in factories performing the industrial functions of brainless machines.

8) ROVs are remotely operated vintages.

9) Cold resistant robots are now used to patrol and monitor the activity in volcanoes.

10) NASA has already developed robotic dirt scoopers for interplanetary exploration.

Task 4. Choose the best answer (A, B or C) to the following questions.

1. What kind of robots have produced real boom of late?
a) household
b) space
c) entertainment

2. What do entertainment robots serve as?
a) slaves
b) companions
c) cleaners

3. What kind of tasks are robots used to perform?
a) repetitive
b) impressive
c) constructive

4. What are wheeled bots the fastest to cross?
a) a swamp
b) a mountain
c) a desert

5. Which of the following is not used in the text as a characteristic feature of robots?
a) heat resistant
b) remotely-operated
c) motor-driven

6. How many household robots are operating worldwide today?
a) over 5 million
b) over 1 million

c) over 2 million

7. Which of the kitchen utensils are not mentioned in the text?

a) vacuum-cleaners

b) ovens

c) mops

8. To which planet have robotic rovers been sent already by NASA?

a) Mars

b) Jupiter

c) Venus

9. Which of the following wonders of the world has a robotic rover been used to explore?

a) Niagara Falls

b) Pizza Tower

c) Egyptian pyramids

10. What does the abbreviation UAV mean?

a) universal artificial vehicle

b) unmanned aerial vehicle

c) unaccompanied combat vehicle

Task 5. Match the words from the text with their synonyms.

1. household	a) progress
2. hazardous	b) to observe
3. to explore	c) work
4. to perform	d) amusement
5. labour	e) clever
6. advance	f) domestic
7. intelligent	g) to investigate
8. vehicle	h) dangerous
9. entertainment	i) to execute
10. to monitor	j) transport

Task 6. Replace the underlined words with the words from Task 5.

1. What are your household duties?
2. We live in an age of rapid technological advance.
3. The price will include the labour and materials.
4. Each student's progress is closely monitored.
5. Are you the driver of this vehicle?
6. A computer can perform many tasks at once.
7. It was typical family entertainment.
8. It would be hazardous to invest so much.
9. These ideas will be explored in every detail in Chapter 7.
10. She was intelligent but suffered from a lack of ambition.

Task 7. Choose one word in each line that is semantically different from the rest. Here is an example for you.

1. dangerous	gleeful	risky	hazardous
2. shipwreck	catastrophe	lobster	disaster
3. rod	rover	scooper	probe
4. form	compile	coin	flee

5. vehicle	transport	spinach	carrier
6. riot	advance	progress	success
7. independent	profound	autonomous	self-governing
8. operate	run	control	smack
9. movement	locomotion	convergence	conveyance
10. kernel	reason	intelligence	mind

Specialized Reading

Task 1. a) Make sure you know these words.

military	endure	circuit board
wire	endurance	laparoscopic surgery
application	transplant	automation
advance	assemble	automated
advanced	hazardous	sophisticated
conduct	palletize	dispensing job
environment	monitor	humanoid
accurate	package	longevity
accuracy	space shuttle	navigate
inaccessible	goods	facility
utilize	conceive	dispense

a) Which of them are nouns, verbs and adjectives?

Task 2. Read and translate the text.

TYPES OF ROBOTS

Robots are used for a variety of purposes in today's society. Industrial robots have played critical roles in manufacturing plants since the 1980s and have been increasingly used in military and medical applications. Today's robots are known to be more efficient and accurate than human beings in conducting repetitive tasks that require a high degree of accuracy. Such tasks include assembling components, painting, and conducting very precise operations that humans cannot perform.

Given below are some of the types of robots that have been conceived by humans, many of which are already in active use.

Industrial Robots

Robots today are being utilized in a wide variety of industrial applications. Any job that involves repetitiveness, accuracy, endurance, speed, and reliability can be done much better by robots; which is why many industrial jobs that used to be done by humans are increasingly being done by robots. For example, for the past 30 years or so robots have progressively taken over the *fully automated production lines of the automobile industry*, wherein a chassis of a vehicle is transported along a conveyor belt and is welded, affixed, painted, and assembled by a succession of robot stations. Some of the other industrial jobs robots are performing are palletizing and packaging goods, dispensing jobs, laboratory applications, and robots that pick miniscule electronic components from trays or strips and accurately place them on printed circuit boards in the electronics industry.

Mobile Robots

Also known as Automated Guided Vehicles, or AGVs, mobile robots are used for transporting material over large building complexes, such as hospital grounds,

container ports, and warehouses, using wires or markers placed in the floor, or lasers, or vision, to sense the environment they operate in. An advanced form of the AGV is the SGV, or the Self-Guided Vehicle, like PatrolBot Gofer, Tug, and Speci-Minder, which can be taught to autonomously navigate within a space, or do it by being given a map of the area. These robots can conduct non-repetitive tasks in complex environment, and have gained the label "intelligent robots" in recent years.

Robots Used in Agriculture

Although the idea of robots planting seeds, plowing fields, and gathering the harvest may seem straight out of a futuristic science fiction book, nevertheless there are several robots in the experimental stages of being used for agricultural purposes, such as robots that can pick apples, prune grapevines, transplant seedlings, and so on. In fact, there already is a type of robot that shears sheep in Australia.

Telerobots

These robots are used in places that are hazardous to humans, or are inaccessible or far away. A human operator located at a distance from a telerobot controls its action, which was accomplished with the arm of the space shuttle. Some other examples of telerobots are *laparoscopic surgery* being done with the help of a telerobot, or doctors using remotely located robots to communicate with their patients, which enables them to treat patients anywhere in the world. This has the potential of patients in remote places of the world, without adequate medical facilities, being able to consult doctors across the world, or even in the next town, and the doctors in turn having the ability to monitor them.

Service Robots

The Japanese are in the forefront in these types of robots. Essentially, this category comprises any robot that is used outside an industrial facility, although they can be sub-divided into two main types of robots: one, robots used for professional jobs, and the second, robots used for personal use. Amongst the former type are the above mentioned robots used for military use, then there are robots that are used for underwater jobs, or robots used for cleaning hazardous waste, and the like.

Personal use robots

Personal use robots are becoming more and more popular, with increased sophistication in Artificial Intelligence and with them becoming increasingly affordable, and are being seen in areas like care giving, pet robots, house cleaning and entertainment. Although it is more expensive and difficult to make highly intelligent and sensitive machines, but service robots designed with minimal intelligence are already fairly common, such as the vacuum cleaning robots.

Another area where personal use robots are being introduced is in the care for the elderly. In countries where there are increasing numbers of the aged with comparatively fewer numbers of young people to provide them with care, due to low birth rate and increased longevity, such as is the case in Japan and a growing number of Western countries, robots are increasingly thought to be the answer. These robots are being designed to provide physical services such as carrying bedridden elderly people (or even the handicapped), or washing for them, and doing various other day-to-day tasks. And then there are robots being designed to provide mental services, such as offering the therapeutic effect of interacting with the often lonely elderly people.

Hence, the trend is towards developing more and more sophisticated humanoid types of robots, with human-like physical features and intellectual abilities.

Task 3. Answer the questions based on the text.

1. What is the characteristic of the jobs that can be done by robots in industry?

2. In what industry are robots most progressively used?

3. In the construction of what detail of a car or a plane are robots being especially utilized?

4. Into what operations are robots involved when a chassis is transported along a conveyor?

5. What are mobile robots used for?

6. What can you say about the use of robots in agriculture?

7. Is the use of telerobots in laparoscopic surgery possible?

8. What are other examples of the use of telerobots in medicine?

9. What nation is in the forefront of the use of service robots?

10. What kind of robots does the category of service robots comprise?

Task 4. Look at the statements below. Decide if each statement is correct (A) or incorrect (B).

1) Service robots can be sub-divided into 3 main types of robots.

2) Robots used for professional jobs can be utilized for military use, underwater jobs, cleaning hazardous waste.

3) Scientists fully gave up the idea of creating robots planting seeds, plowing fields, and gathering the harvest.

4) There is already a type of robot that shears sheep in Australia.

5) Some mobile robots can be taught to autonomously navigate within a space, or do it by being given a map of the area.

6) For the past 10 years or so robots have progressively taken over the fully automated production lines of the automobile industry.

7) People do not control telerobots in action.

8) Personal use robots are becoming increasingly affordable, and are being seen in areas like caregiving, house cleaning and entertainment.

9) In Japan the longevity is decreasing due to high birth rate.

10) The trend, today, is towards developing more and more sophisticated humanoid types of robots with human-like physical features and intellectual abilities.

Task 5. In the text find the English equivalents to the words below.

1. предприятие	7. недоступный
2. повторяемый	8. телеробот
3. эффективный	9. первый план
4. область применения	10. включать
5. сваривать	11. уровень сложности
6. вспахивать	12. «электронный мозг»

Task 6. Match the verbs (1-10) with the nouns (A-J) and make up sentences of your own with each combination of the words.

1. to assemble	a) fields
2. to conduct	b) popular
3. to package	c) sheep
4. to transport	d) the label
5. to gain	e) machines
6. to plow	f) components

7. to shear	g) operations
8. to treat	h) goods
9. to become	i) patients
10. to make	j) material

Task 7. Match the words with the opposite meaning.

1. accuracy	a) disassemble
2. advanced	b) expiration
3. hazardous	c) immovable
4. repetitive	d) amateur
5. assemble	e) inaccuracy
6. inaccessible	f) retard
7. professional	g) non-repetitive
8. mobile	h) unsophisticated
9. sophisticated	i) safe
10. endurance	j) accessible

Task 8. Make up questions to which the following statements will be the answers.
1. In manufacturing, medical and military industries.
2. Palletizing and packaging goods, dispensing jobs, laboratory applications.
3. Self-Guided Vehicle.
4. "Intelligent Robots."
5. Robots that can pick apples, prune grapevines, transplant seedlings.
6. In laparoscopic surgery.
7. Japan is.
8. Robots used for professional jobs, and robots used for personal use.
9. Vacuum cleaning robots.
10. In the care for the elderly.

Task 9. Translate the following sentences into Russian.
1. Most robots today are programmed to complete tasks on their own or via human direction.
2. Mobile robots are referred to as autonomous or self-gained vehicles and are taught to navigate the space they are required to work around or in.
3. Telerobots are also useful in nuclear power plants where they, instead of humans, can handle hazardous material or undertake operations potentially harmful for humans.
4. The Japanese were the first to invest heavily in the development and commercial deployment of service robots.
5. The creation of the amazing walking humanoid named Asimo gave the impetus for several others, such as the house-helping robot named Wakamaru, and Aibo, the robot dog.
6. Telerobots are also being increasingly used for military purposes, for instance the Unmanned Aerial Vehicle used for surveillance and also fire at targets.
7. Robots have progressively taken over many of the production line roles in the automobile industry than human operators previously dominated.

Listening

You are going to listen to a talk about the **Origin of robots**.

Task 1. Before listening to the text, match the words in the left column with their definitions in the right one.

1. servitude	a) to produce again
2. origin	b) productive work
3. cognate	c) to oppose or refuse to accept something
4. labour	d) the point at which something comes into existence or from which it derives
5. conduct	e) the act, manner, or process of carrying on
6. to inundate	f) the state of subjection to a master; slavery
7. serfdom	g) related or analogous in nature, character, or function
8. to reproduce	h)) the feudal system that includes serfs
9. to revolt	i) the process of being extinct
10. extinction	j) to fill or cover completely

Task 2. Listen to the talk and answer the questions.

1. Who is invited to the studio and to what is the programme devoted?
2. How often do the talks take place?
3. How does Prof. Markel describe robots?
4. In what field of medicine do some scientists think to create robots as helping hands?
5. Who is the father of the brainchild called "robot"?
6. In what play was the word "robot" used for the first time?
7. What does the word "rabota" mean in Old Church Slavonic?
8. In what other languages does the word "rabota" have its cognates?
9. What does Flatow mean by asking "wasn't Capek on Hitler's most-wanted list?"
10. What idea is hidden in the words "….he frustrated Hitler."
11. What information about Karel Capek and the origin of the word "robot" have you derived from the conversation?

Task 3. Choose the correct variant and complete the following sentences.

1.The programme of the talk is called _____.
   a) Science World   b) Science Diction   c) Science Today
2. The programme is conducted on _____.
   a) Sunday   b) Friday   c) Saturday
3. Prof. Markel is the director at the center _____.
   a) for history of biology   b) for history of literature c) for history of medicine
4. According to the description of Prof. Markel robots are mechanical beings clad in _____.
   a) cotton   b) wood   c) metal
5. The word "robot" is the brainchild of the novelist and playwright Karel Capek who lived in _____.
   a) Poland   b) Hungary   c) Czechoslovakia
6.The title of the play "RUR" can be deciphered: _____.
   a) Real Universal Rest b) Rats Use Ropes   c) Rossum's Universal Robots
7.The word "robot" has _____.

a) *a Latin origin*   b) *a Greek origin*   c) *a Slavonic origin*

8.The play in which the word "robot" first appeared was titled _____.

    a) *RUR*   b) *Louvre*   c) *Tour*

9.Karel Capek died of _____.

    a) *a war wound*   b) *flue*   c) *cholera*

10.Capek did not name robots "labours" because _____.

    a) *the word "labour" sounded too bookish in his opinion*

    b) *the word "labour" was a bit outdated*

    c) *the word "labour" was a jargon word*

Task 4. Listen to the text again and complete the following sentences.

    1. That means it's time for our monthly, well, sort of _____ _____, as we call it.

    2. When Capek named these _____, he first came up with the Latin word "labouri", for "labour."

    3. The word also has _____ in German, Russian, Polish and Czech.

    4. Well, it comes from an Old Church Slavonic word, _____, which means _____ of forced labour.

    5. They couldn't have _____ .

    6. And even some people think about _____ robots, which help in modern _____ or even the conduct of surgery.

    7. It was the _____ of a wonderful Czech _____, novelist and journalist named Karel Capek.

Task 5. Decode one of the 3 parts of the text.

Part 1 – 00.47 "Well, you know, we all think …" – 01.21 "… Universal Robots."

Part 2 - 02.20 "But he worried …" – 03.02 "… killed in this play."

Part 3 - 04.00 "And he was a very active …" – 04.29 "… Thank you, Howard."

Task 6. Write the words from the listening comprehension text to the following transcriptions.

1./ˈɔrɪdʒɪn /		9./ˈsɜːvɪt(j)uːd /	
2./ˌsaɪənˈtɪfɪk /		10./ˈleɪbə /	
3./mɪˈkænɪk(ə)l /		11./ˌbaɪəʊtekˈnɒlədʒɪ /	
4./ˈsɜːdʒ(ə)rɪ /		12./ˌfɪzɪˈɒlədʒɪ /	
5./ˌendʒɪˈnɪərɪŋ /		13./ˈkriːtʃə /	
6./ˈpleɪraɪt /		14./ɪkˈstɪŋkʃ(ə)n /	
7./ˈbreɪntʃaɪld /		15./dɪˈmɒkrəsɪ /	
8./ˌɪntrəˈdjuːs /		16./ɪkˈstɪŋ(k)ʃ(ə)n/	

Recommended function and Speaking

    Read ***Function 17 "HOW TO make a presentation"*** *and prepare a mini-presentation about **a robot** which you deal with in your studies or any robot you like. Include the following:*

- describe a robot
- tell about its use

- tell about why it was made this way
- compare it with similar ones

Recommended function and Writing

Read ***Function 5 "HOW TO talk about cause and effect"****. Write 10 sentences about different robotic devices and why they are used.*

Theme 10. ROBOTICS TECHNOLOGIES

Lead in

Look at the picture. What type of robot is it? What do you know about technologies used in such robots?

Reading and Vocabulary

Task 1. a) Read and translate the following words and phrases from the text.

advance (v, n),	track (v, n)	real-time navigation
advanced (adj)	overview (n)	walking system
flexible (adj)	navigation (n)	self-driving vehicle
flexibility (n)	localization (n)	augmented reality
robust (adj)	3D vision	complex algorithm
absorb (v)	mapping system	tendon-drive actuator
absorption (n)	autonomous robot	torque-controlled actuator

b) Can you explain the technologies named in the box?

Task 2. Read the text and check your ideas about the picture.

I.Humans have sensors and a memory to scan the environment and remember when they return to the same place. The human system for navigation can be replicated to robots using many electronics and programming lines.

Researchers from Bristol University have been working together with Samsung Electronics since 2009 and the result is an advanced humanoid robot **Roboray** with real-time navigation with 3D vision capabilities and a memory to remember places from where it has been before.

Its efficient movements are based on maps. These maps are built with 3D visual real-time systems developed in the labs of Bristol University. The system stores information with places to be used next time when the robot operates in the same place.

This new mapping system means a step closer to the next generation of autonomous robots that can operate in new places without any other information stored in his memory.

II.Navigation

Samsung Roboray has a flexible and more stable walking system with instability in relation to the ground. Mapping in real-time for a human-like robot involve a higher complexity, compared with a self-driving vehicle, which shows a greater stability in relation to a fixed point while a robot has a less contact with the ground. Technology developed at Bristol University was used in robotics as well as augmented reality or commercial applications, a rapid 3D system that creates a map of environment while moving. A high definition camera and complex algorithms are key attributes of the advanced navigation system. SLAM (simultaneous localization and mapping) uses real-time technology for mapping based on Kalman filter with features including a robust localization in 6D and loop closing for relocalization.

III.Design

It has a height of 140 centimeters and weight 50 kilograms. Up to 53 actuators work intensively aiming to ensure a high flexibility in the movements. Each leg has six actuators while in each hand there are twelve actuators. All tendon-drive actuators are torque controlled and can absorb impact for more natural walking and energy efficient behavior.

On its head there is a stereo camera that captures image from the environment. Since the robot has a human-like walking system that uses gravity and falling at every step, objects from the environment are found in constant motion from up to down and left to right. The computer vision algorithm has to track all these objects for a clear overview. Inside of his brain the robot maps the environment and navigates without traditional technology for navigation like GPS.

With an advanced design, movement systems, and no GPS system for navigation, Samsung Roboray can be used in research to understand how similar robots work with tools or in fields typically meant for people.

Task 3. Answer the questions to the text.
1. In what way is Roboray different from its analogues?
2. What sort of navigation is used in Roboray?
3. What are the robot's dimensions?
4. Where can this robot be used?
5. Do you what Kalman filter and localization in 6D are?

Task 4. Match the parts of phrases.
1. simultaneous localization and	a)	algorithm
2. computer vision	b)	behavior
3. high definition	c)	mapping
4. energy efficient	d)	navigation system
5. human-like	e)	capabilities
6. advanced	f)	walking system
7. 3D vision	g)	camera

Task 5. Find the words similar to the following.
1. surroundings (part I)
2. to function (part I)
3. characteristics (part II)
4. position updating (part II)
5. activity (part III)
6. catch (part III)
7. instruments (part III)

Task 6. Think of some more examples of robots and technologies used in them. Use these phrases and tell about them:
- be based on
- in relation to
- be aimed at smth
- can be used in/to

Specialized reading

Task 1. Read the text and summarize the content of it in 3 sentences.
I. What is FlowBotics Studio?
FlowBotics Studio is a new robotics software development platform: it boasts the powerful FlowStone graphical programming language, and includes many demo robotics projects to get you started. It can be used to control just about any robotics platform, data acquisition board, motor controller, servo board, sound card, or webcam.

FlowBotics Studio includes hundreds of built-in components that allow you to interface your PC to many of the standard computer peripherals and, using the FlowStone programing language, you can quickly create new components for new hardware. **1) …**

Using the FlowStone programming language is as easy as dragging new components out of the library into the project's schematic, and making green links to connect one component's output of another one's input. FlowStone even has support for writing custom modules in Ruby, a traditional procedural language.

II. FlowBotics Studio Demo Projects
There is a growing collection of pre-made demo projects for use with your robotics hardware: the demos range from GUIs for simple interface card and sensor — **2) …**— to full-blown robotics control applications — **3) …** the project calculates the inverse kinematics and moves the robot immediately.

The projects also have a powerful pattern sequencer component that is used to build reusable patterns that allow you to program the gait of a walking robot within minutes or hours, instead of days or weeks.

Since the demo projects are open source, they can be modified to tailor a specific purpose or parts can be extracted for use in new projects, and the new demos will be

available through FlowBotics updates.

Graphics in FlowStone

The FlowStone programming language includes a powerful graphics engine that allows you to make custom graphical objects by using standard bitmaps or by drawing your own shapes on the screen. **4) …**

Video in FlowStone

Using FlowStone, you can record and playback video from your webcam and, using some of the video processing modules, can do motion detection, colour detection and facial recognition. The graphics engine you can even display live video inside your project's GUI.

Audio in FlowStone

FlowStone also has a powerful audio engine that allows you to record and playback sounds, and even generate some of your own. You can import WAV and MP3 files and process the audio using signal processing modules like EQ: **5) …**

Interface to the outside world

FlowStone has a huge range of supported computer interfaces, from data acquisition boards, home automation, webcams, soundcards, networking, serial ports and USB devices. There are thousands of supported devices, including parts from Lynxmotion, Phidgets, Pololu, and Robot Electronics and also parts implementing standard Bluetooth, Xbee, Modbus, TCP/IP, UDP/IP, HID, RS232, RS485, CAN Bus, SPI, I2C, X10, DMX512, and other popular protocols.

III. Applications

Hobby Robotics

Use FlowBotics Studio to control your hobby robotics, using the pre-made demo projects for many of the Lynxmotion kits or build your own projects just for fun.

STEM Education

FlowBotics Studio is the perfect tool for education. **6) …** The rapid development capabilities of the software mean that you can achieve much more in a short lesson than you could with traditional programming tools.

Science: Use FlowBotics Studio to create applications for science experiments, test and measurement, data logging, graphs, saving files to disk and more.

Technology: FlowBotics Studio can be the heart of your design for things like home automation, A/V recording, video processing, audio processing, more.

Engineering: Use FlowBotics Studio to create mechatronic engineering systems including control systems, SCADA (supervisory control and data acquisition), human-machine interface, and autonomous robot systems.

Math: Use FlowBotics Studio to teach mathematics, from binary numbers and boolean algebra to trigonometry functions and graphs.

Data Acquisition

Want an easy way to capture data from the outside world? The FlowStone language has built in support for many popular data acquisition devices: for example, you can use a Phidgets Sensor Interface Kit 8/8/8 to sample analog and digital signals.

Robotics

The serial port communication in FlowStone allows you to connect to a wide range of low-cost robots. You can use Inverse Kinematics (IK) and Proportional Integral Derivative (PID) modules to manage movement and create impressive interactive user interfaces to control your robot live.

Digital Signal Processing

By connecting to external analog I/O devices, you can stream high data rate signals directly into FlowStone. The Stream data components and DSP code component can then be used to create complex signal processing, and all this happens in real time.
You can even tweak your algorithms and user interface live – while your data continues to stream. **7) …**

Image Processing
The FlowStone language has many video functions built in. You can easily connect to external webcams, record video to disk and perform complex tasks like motion, colour and face detection with ease.

Home Automation and Security
Using the X10 home automation system, you can create a completely customized home automation or alarm system.
Using passive infrared sensors, check for motion and trigger lights and cameras. Use FlowBoard and the GSM module to send SMS alerts back to you if key events occur.
8) …

Industry
FlowStone is even used in industry for creating complex applications from test and measurement, SCADA, data logging, machine control and even UAVs.

Task 2. Insert these parts of the text in appropriate places.
  a) … you can even create your own synthesizer sounds using the built in oscillators and filters.
  b) You can also easily create new projects with custom GUI screens, knobs, buttons, switches, etc. that will run live from within FlowBotics Studio without needing to wait for compilation.
  c) It is simple enough that it can be used by children from secondary and high school, but also powerful enough to be used by university students for undergraduate and graduate studies.
  d) … that have visual representations of your robots that can be manipulated directly with the mouse:…
  e) Switch on and off appliances or lighting.
  f) … that give you access to real-time analogue and digital signals…
  g) Using this system, you can build entirely custom interfaces for your projects and integrate photographs, drawings, and graphs.
  h) This makes the development process extremely quick as you see the effects straight away.

Task 3. Are the sentences true (T) or false (F)?
  1) You can use FlowBotics Studio to control all robotics platforms and many more devices.
  2) If you need to use your own switches or buttons, you have to compile them before using FlowBotics Studio.
  3) You can find different demo projects even if you have very complicated robotics hardware.
  4) All FlowBotics updates are free.
  5) Using FlowStone programming language you can create your own interfaces with graphs or drawings.
  6) You can import WAV or MP3 files but you can't process sounds.
  7) FlowBotics Studio isn't powerful enough to be used in graduate studies.

8) Unfortunately, there are no features to control movements of robots.
9) In home automation this software is usually used in alarm systems.
10) The use of FlowBotics Studio in industry and engineering is very limited.

Task 4. Give Russian equivalents to the following terms from the text.

robotics platform, data acquisition, motor controller, servo board, custom GUI screen, procedural language, full-blown robotics control application, inverse kinematics, pattern sequencer component, powerful graphics engine, video processing module, home automation, mechatronic engineering system, Boolean algebra, proportional integral derivative, stream data component, DSP code component, alarm system

Task 5. Mark the stress in these words and translate them.

programming, component, dragging, schematic, analogue, manipulated, reusable pattern, updates, facial recognition, engine, synthesizer, oscillator, implementing, capability, measurement, mechatronic, phidget, sample, interactive, stream, customized, trigger, compilation.

Task 6. Find the words in the text that are similar to these ones.

1. integrated (part I)
2. user-written (part I)
3. compute (part II)
4. walking (part II)
5. change (part II)
6. adjust (part II)
7. take out (part II)
8. add (part II)
9. produce (part II)
10. accomplish (part III)
11. self-controlled (part III)
12. catch (part III)
13. transfer (part III)
14. tune (part III)
15. turn on (part III)
16. take place (part III)

Task 7. What do these acronyms stand for? Give their Russian equivalents.

GUI, TCP/IP, UDP/IP, HID, RS232, CAN bus, DMX512, SCADA, DSP, UAV.

Task 8. Complete the table with appropriate words.

Noun	Verb	Adjective
1)	-	ease
vision	-	2)
3)	4)	modified
interaction	5)	6)
customer	7)	8) 9)
impression	10)	11)
12)	move	-
13)	oscillate	-
14)		
15)	apply	applied 16)

Task 9. Find the words in the text that match this phonemics.

1./ˈsiːkw(ə)nsə/		10./ˈendʒɪn/	
2./ɔːˈtɒnəməs/		11./rekəgˈnɪʃ(ə)n/	
3./ˌækwɪˈzɪʃ(ə)n /		12./ˈsɜːvəʊ/	
4./ˈsɪnθɪsaɪzə/		13./ˈɒsɪleɪtə(r)/	
5./ɪnˈvɜːs/		14./pəˈrɪf(ə)r(ə)l/	
6./bəʊst/		15./mekəˈtrɒnɪk/	
7./ˌtrɪgəˈnɒmɪtri/		16./prəˈsiːdʒərəl/	
8./ˈkæptʃə/		17./ˈælgərɪð(ə)m/	
9./əˈlɜːt/		18./əˈplaɪəns/	

Recommended function

Read **Functions 3 "HOW TO deal with modal verbs"** and write 10 sentences with modal words and phrases to tell about possibilities with FlowBotics Studio.

Listening

You are going to watch a video about **Computer Vision**.

Task 1. a) Read and translate the words.

research, location, brains, automation, obstacle, flexibility, resolution, dangerous, graphics, pattern, recognize, unmanned, downsampled, navigation, vision, triangulate, schematic, patrol, picture, aircraft, zip-code, vehicle, identify, representation, optical, number, broadside, mail, envelope, figure out

b) which of them are nouns, verbs, adjectives?

Task 2. Watch the video and underline the words you hear.

Task 3. Answer the questions to the video.
1. Why is it important to improve computer vision technologies?
2. What is pattern recognition?
3. What is optical character recognition?
4. How are scientists developing computer vision?
5. How is this work realized in robots?
6. What is the ultimate goal for robots with a good computer vision system?

Task 4. Complete the phrases used in the video.

1. to patrol
2. unmanned
3. to recognize things
4. to do optical
5. to extract out
6. to identify
7. high-resolution
8. low-resolution

a) character recognition
b) a zip-code
c) vehicle
d) dangerous locations
e) image
f) from an image
g) domain
h) the patterns and images

Task 5. Complete this extract from the video with the following phrases.

recognize the images,   big step,   get around,
human vision, stereo vision,   identify obstacles

The team is also planning to put these programs in robots. So they will be able to 1) _____ while they do their jobs. This little guy has two eyes, just like a person, so he sees in 2) _____. "Stereo vision works like 3) _____ – the robot has two cameras, two eyes. It can use those two cameras to triangulate on objects to know how far they are. They robots will ultimately be able to 4) _____ in their path, be able to know what the obstacle is, where it is and how to 5) _____ it." Teaching a machine to recognize images takes a lot of maths and a lot of hard work but it's a 6) _____ towards making computers even smarter.

Task 6. Match the words from the video with this phonemics.

1./tæŋk/		7./ˈrekəgnaɪz/	
2./ˈbrɔːdsaɪd/		8./ˈeəkrɑːft/	
3./ˈneɪvi /		9./ˌreprɪzenˈteɪʃ(ə)n/	
4./ˈenvələʊp/		10./ˈviːɪk(ə)l/	
5./əˈdres/		11./ˈpɪks(ə)l/	
6./traɪˈæŋgjʊleɪt /		12./ˈɔbstək(ə)l/	

Task 7. Decode one of the parts of the video.

Part 1 – 00.11 "This week LabTV travels to …" – 00.56 "… just from an image."
Part 2 – 00.57 "Pattern recognition … " – 01.22 "… one goes there."
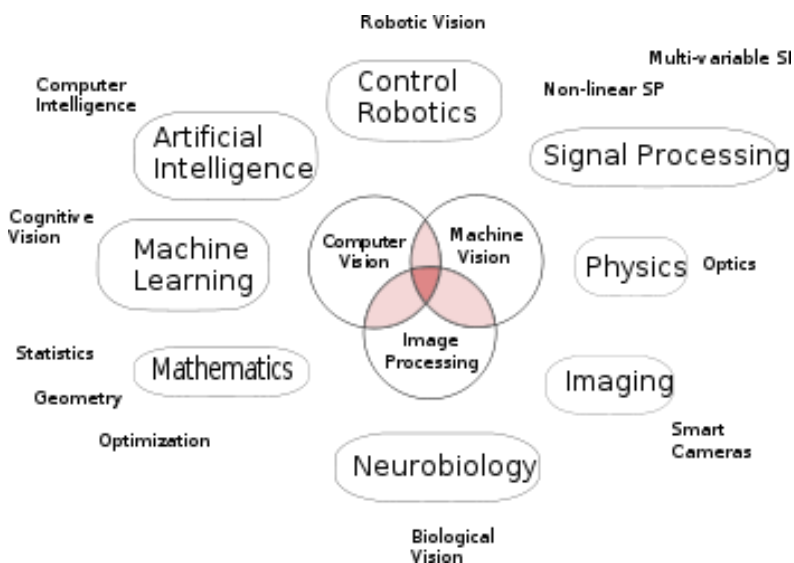Part 3 – 01.23 "Computers are pretty good at …" – 01.52 "…who that is."
Part 4 – 01.53 "That's because …" – 02.23 "… we were looking at."
Part 5 – 02.24 "The team is also …" 02.53 "… less pixels."

Recommended function and Speaking

Read **Function 13 "HOW TO comment on a visual aid"** and prepare a talk about **Computer Vision**. Use this diagram and some ideas given.

- What is it? What is it for?
- What areas are related to it?
- What are its specific parts?
- Where is it used?

Theme 11. GADGETS

Lead-in
Do you know when the first mobile phone was invented? What was your first mobile phone? What could you do with that phone?

Reading and Vocabulary

Task 1. Read the words and give the Russian equivalents.

a press event	to give smb a heads up about smth
groundbreaking (adj)	to feature smth
carrier (n)	to be different in every way
dumb phone	to set the standard
smartphone	to drop a call
quaint (adj)	to make a call, to place a call
matter (v, n)	to tuck the antenna inside the handset
means (n)	to have a great run
gateway (n)	to make a hole in smth
awesome (adj)	the tech business
gorgeous (adj)	the likes of AT&T
bezel (n)	addict (v), addiction (n), addictive (adj)
iteration (n)	to run on Android

Task 2. Read the article from "Wired" magazine. What are the main ideas of the article?

Cellphones That Changed Our World Forever
Motorola engineer Martin Cooper made telecommunications history when he placed the first cellphone call 40 years ago. And who did he call, you ask? His rivals at Bell Labs, of course.

Still, it took another decade for the mobile phone to reach the masses, because Motorola didn't make the DynaTAC available until March 1983. And in an example of just how quaint the tech business was back then, Motorola had a press event 10 years *before* the phone was on sale.

This brings us to April 3, 1973, when the company that eventually brought us the Razr and Droid introduced the mobile phone. Forty years later, we're still dropping calls like bad habits and struggling to get a signal inside a supermarket. Not that it matters, because we rarely use our phones to make phone calls. Instead, they're a gateway to our digital lives, a means of doing everything from sending texts to updating our status, to posting photos and listening to music.

Thousands of phones have come and gone, and most of them seem to run on Android. But the number of handsets that could be called truly groundbreaking is surprisingly small. Here they are.

Motorola DynaTAC 8000X -- 1983

The DynaTAC was the first commercially available cellphone and the culmination of all the research Cooper had done since joining Motorola in 1954.

The phone resembled those the military used in the field. The *svelte* handset weighed 28 ounces and was 10 inches tall, not including the antenna nearly as long as the phone. It wasn't exactly something you could *shove* in a pocket or purse. Still, it wasn't attached to a car and you could walk around with it.

Such mobility wasn't cheap. The DynaTAC would make a $4,000 hole into your bank account. But that didn't stop early adopters from diving into the chic world of mobile calling. The phone had *a cameo* alongside Gordon Gekko in *Wall Street* and with über-preppy Zack Morris on the teen drama *Saved By the Bell*

Nokia 3210 -- 1999

The Nokia 3210 was, for many people, the *gateway drug* of phones. It also was among the first to tuck the antenna inside the handset. (The Toshiba TCP-6000 was the first, but that was the phone's only claim to fame.) The little Finnish *candybar* phone was the first mobile communication device of the masses.

Its monochromatic screen did more than give you a heads up about incoming calls. It introduced a generation to the greatest mobile-phone game ever: *Snake*. The addictive game, based on computer game from the 1970s, featured a snake that grew as it ate pixels. The object was to make the longest snake possible without having it eat itself.

Nokia sold 160 million T9-enabled 3210s before replacing it with 3310 in late 2000.

Sony Ericsson T68I -- 2002

The T68i was the bridge between dumb phones and smartphones and, it could be argued, the most awesome cellphone ever. It included such groundbreaking features at Bluetooth, two-way MMS, simple WAP browsing and e-mail. And it had a cool color screen, a first for Ericsson.

The phone was so far ahead that it appeared in the Bond film *Die Another Day*. If it was good enough for 007, it was good enough for you. And it proved that people wanted more from their phones than calls and texts. Although the phone never saw the sales numbers of the Nokia 3210, it enjoyed a *cultlike* following.

Motorola RAZR -- 2004

The Razr was the first *must-have* phone. The thin flip phone was stylish and, if the commercials were to be believed, would stick like a knife if dropped onto the floor.

While throwing the phone at walls like a knife was a bad idea, the Razr had a great four-year run, selling 130 million units.

The Razr looked like it was straight out of the future. The numerical keyboard was cut from a single piece of metal. Its *clamshell* aluminum body and colored glass screen were gorgeous. And the damn thing worked like a charm. It was the last dumb phone that truly mattered.

Never mind that it also was the last Motorola phone that truly mattered.

Apple iPhone – 2007

This is the phone that changed everything. It was the first smartphone with features people wanted, even if they didn't know it yet. It was different in every way, from its *stunning* design to its ease of use to the things it would allow us to do.

Of course, we didn't see that at first. All we could do was *gripe* about an app store with empty shelves, a single button on the bezel and the fact we couldn't cut-and-

paste anything. It seems so quaint now, when so much of what iOS pioneered has become the norm for smartphones.

No less important was how Apple changed how handset makers dealt with carriers. The balance of power shifted from the likes of AT&T and Verizon to Apple and Samsung.

Nearly six years and five iterations later, the iPhone still sets the standard.

Task 3. Find the answers to the questions in the text.
1. What company introduced the first mobile phone?
2. What was the first commercially available cellphone?
3. How did the author describe DynaTAC?
4. What was the most special about Nokia 3210?
5. What groundbreaking features did Sony Ericsson T68i include?
6. Why was RAZR the first must-have phone?
7. Why was the first iPhone different in every way?

Task 4. Match the nouns with their attributes.

1. the tech	a) calls
2. a press	b) game
3. incoming	c) screen
4. groundbreaking	d) touchscreen
5. bank	e) business
6. the addictive	f) device
7. monochromatic	g) account
8. stunning	h) event
9. capacitive	i) design
10. the mobile communication	j) features

Task 5. Match the parts of the phrases.

to type on; to post; to update; to give smb; to make; to run on;	one's status; smth available; one's phone; a heads up about incoming calls; Android; photos;

Task 6. There are some slang words and phrases in the text. Match them with their meanings.

1. glossy and slim
2. a small but very bright and popular thing
3. a flip-up phone
4. to complain about smth
5. strongly advisable to have

a. to throw or put very carelessly
b. a device that makes its owner addictive to it
c. something that becomes a craze for a lot of people
d. shocking
e. having the size of a chocolate bar

Specialized Reading

Task 1. a) Read and translate these words and phrases.

affordable gadgets	a great tablet for e-books and watching movies
the best gear	incredibly glossy design
an incredible value	cheap Android and Windows Phone handsets
a stunning display	responsive keyboard
battery life	streaming video
budget tablet	video chatting
to increase storage	work in the cloud
solid	desktop applications
competitive phone	beyond the reach of smb/smth
broke geek	pre-loaded backup suite
competitive	dollar-store headphones

b) use other adjectives with the following nouns from the box:
phone, video, applications, display, keyboard, gadgets, design, geek, tablet

Task 2. Read the article from "Wired" magazine. Make the one-sentence summary.
9 Awesome Gadgets for Broke Geeks

Gadgets cost money. A lot of money. And now that you've paid your taxes, you probably have no money. But that doesn't mean denying yourself the joy of a shiny new gizmo to replace the worn-out junk you should have thrown last year.

There are plenty of affordable gadgets out there if you know where to look, and they'll satisfy your geek needs without making your wallet empty. We're not talking dollar-store headphones and flea market copies, either. We've tested this stuff and know it's all quite reliable. You aren't getting the best laptop or hottest phone, but none of this stuff will disappoint you.

Tablet: Amazon Kindle Fire HD, $200

The 7-inch Amazon Kindle Fire HD is an incredible value and a great tablet for e-books, watching movies and consuming the tons of content you can get from Amazon. Don't look to it for perfect productivity, but you do get a stunning display, around 10 hours of battery life, Amazon goodies like X-Ray and a solid ecosystem of content -- all for as little as $200. The Google Nexus 7 is another great budget tablet if you're looking for authentic Android. An entry-level 7 costs as much as the Kindle, but the price rises quickly if you start increasing storage and add mobile data.

Phone: iPhone 4, $1 with two-year contract

Sorry, but the iPhone 5 is beyond the reach of a broke geek. Accept that fact, move on and get yourself an amazing phone for the cost of a fast-food hamburger.

We hear you came back there complaining that the iPhone 4 is almost three years old. So what? It remains a powerful and competitive phone, with a 3.5-inch Retina Display, 5MP camera, and incredibly glossy design. You can run the latest version of iOS and access Apple's robust app ecosystem.

Sure, the iPhone 4 is an old phone. But it's a very, very good old phone and better than a lot of the cheap Android and Windows Phone handsets out there.

Laptop: Chromebook, $250 and up

Put aside the extremely expensive Chromebook Pixel, Google's Chromebooks are almost criminally cheap. Only $250 gets you a very functional Samsung Chromebook, and another two Benjamins lift you up to the Samsung Series 5 550.

These are solid performers with responsive keyboards and trackpads and plenty of battery life. They're great for watching streaming video, video chatting and working in the cloud. And you can share them, too, because Chromebooks support multiple user logins.

You won't be able to run any desktop applications, so forget about Photoshop and the like. But if you're broke and want a solid, cheap laptop that will connect you to all of the Internet goodness, Google's devices are for you.

Portable Storage: HGST Touro Mobile Pro, $70 to $90

External hard drives are as expensive as they are necessary. But if you've got a lot of data and not a lot of money, go with the HGST Touro Mobile Pro. It offers performance as well as low price but is a total steal at less than a C-note.

The drive is fast (7,200 rpm) and it comes in 500 GB and 750 GB models. It's a mobile drive in a svelte package that draws power over the USB 3.0 port. HGST has included some extras — you get a pre-loaded cloud backup suite with the drive and 3 GB of free storage to try it out. Plus, the drive is protected with a 2-year warranty. You get a lot for a little with this.

E-Reader: Barnes & Noble Nook Simple Touch GlowLight, $120

The Barnes & Noble Nook Simple Touch GlowLight is one of the best deals going on e-readers, especially if you read in the dark. Sure, you could get the Kindle Paperwhite, but for the same price, the Nook is totally ad-free. You'll also appreciate the light-up touchscreen and physical page-flip buttons and good library integration. Just keep in mind that Barnes & Noble's ecosystem isn't as strong as Amazon's.

Task 3. Find the answers to the questions in the text.
1. How long is battery life of "Amazon Kindle Fire HD"?
2. Can you run the latest version of iOS at iPhone 4?
3. What is your opinion about the iPhone 4? Is it a powerful and competitive phone?
4. How much is Samsung Chromebook?
5. Can you use Barnes & Noble Nook Simple Touch GlowLight in the dark?

Task 4. Match the gadgets with descriptions.
1.Portable Storage: HGST Touro Mobile Pro;   **4.**Nexus 7;
2. Amazon Kindle Fire HD;   **5.** Chromebook;
3.Barnes & Noble Nook Simple Touch GlowLight;   **6.**iPhone 4

a) It was the first mainstream e-reader with a glowing screen. The front-lit display contains LEDs at the top of the screen which illuminate the display so you can continue to comfortably read when the ambient light grows too dim.

b) The changes Amazon has made in order to stay at the head of the budget tablet pack have produced a machine that's just plain better all around.

c) It has a higher-resolution display, a brand-new front-facing camera, an improved back camera with flash, double the RAM of the iPhone 3GS, and the same A4 processor that powers the iPad.

d) It's a mobile drive, so the case is svelte and the available capacities aren't gigantic — 500GB and 750GB. However, it draws its power over the USB 3.0 port, so you won't need to plug it into a wall. The drive is fast (7,200rpm) and it is faster in writing files than reading them.

e) It is not going to fully replace your Mac or Windows PC. It's not going to be your next gaming machine (unless all you do is play Angry Birds, Cut The Rope and other casual games). It won't run Photoshop, Outlook, iTunes and all the rest. The reality is that it wasn't built for any of that. This is simply a relatively cheap, durable, laptop.

f) Most notably, there's Google's own device, a consumer favorite that's set new expectations for how a $200 tablet should look and perform.

Task 5. Match the words with definitions.

1.	headphones	a)	costing a lot of money
2.	battery	b)	a panel of keys that operate a computer or typewriter
3.	display	c)	a small portable computer that accepts input directly on to its screen rather than via a keyboard or mouse
4.	sleek	d)	the retention of retrievable data on a computer or other electronic system
5.	gadget	e)	completely finished by continued use
6.	worn-out	f)	small mechanical device or tool, especially an ingenious or novel one
7.	storage	g)	a mobile phone
8.	expensive	h)	neat or fashionable in appearance
9.	keyboard	i)	a network of remote servers hosted on the Internet and used to store, manage, and process data in place of local servers or personal computers
10.	tablet	j)	a container consisting of one or more cells, in which chemical energy is converted into electricity and used as a source of power
11.	handset	k)	a device consisting of a pair of earphones joined by a band placed over the head, for listening to audio signals such as music or speech
12.	the cloud	l)	an electronic device for the visual presentation of data or images

Task 6. Explain what these terms mean.

a.	trackpad	e.	retina display
b.	tablet PC	f.	cloud
c.	e-book	g.	mobile data
d.	app system	h.	page-flip buttons

Task7. Match the adjectives with their opposites.
expensive, unreliable, best, new, weak, stunning, worst, shiny, worn-out, dim, cheap, powerful, solid

Task 8. Match the words in the text with this phonemics.

1./ɔːˈθentɪk/		6./ɪnˈkredɪb(ə)l/	
2./svelt/		7./rɪˈspɔnsɪv/	
3./kəmˈpetɪtɪv/		8./fliː/	
4./əˈfɔːdəbəl/		9./ˈlaɪbrəri/	
5./ˈvəːʃ(ə)n/		10./prɔdʌkˈtɪvɪti/	

Recommended function

Read **_Function 8 "HOW TO make comparison and contrast"._** *Compare the two devices in the box, using adjectives from the list below.*

affordable, expensive, best, incredible, great, new, weak, stunning, worst, shiny, worn-out, cheap, powerful, competitive, responsive.

Features	Kindle Fire HD Tablet	Google Nexus 7
Screen Size	7"	7"
Display Technology	HD LCD	HD LCD
Resolution/Pixel Density	1280x800, up to 720p HD	1280x800 (216ppi) HD
Processor	Dual-core, 1.2GHz OMAP4460	Quad-core Tegra 3 this is the first quad-core 7-inch tablet
Storage	16GB on device Plus free cloud storage for all Amazon content	16 GB internal storage (actual formatted capacity will be less)
Operating System	Android	Android 4.1 Jelly Bean this is the first Jelly Bean tablet
Battery	11 hours of continuous use	Up to 8 hours of active use

Listening

You are going to listen to **David Pogue's talk "Pogue tests the Apple iPhone".**

Task 1. Read the words and phrases. Make sure you know their Russian equivalents.

the weekly tech critic, to review gadgets and stuff, the tech trends for next year, carry your voice over the Internet, a phone line, an ordinary telephone, cable modem, a regular phone, hear a dial tone, a fake-out, a WAV file, next door neighbor, dial your home number, add a new feature, VOIP (Voice Over IP) service, land-line home-phone service, make free phone calls, to wear a headset

Task 2. Part 1. 00.00 - 02.04
a) Watch and listen to the beginning of the talk and answer the questions.
      What does David do? What's his job?
      Where does he work?
      What is he mostly doing this year?
      What questions was he answering?
b) Watch the video again and answer the questions to the video.

00.07-00.20	What question interests David most?
	Where did he find the image of volcano?
00.21-01.14	What new feature of the Internet is he speaking about?
	Does he mention any services or companies?

01.15-01.50   Which phone service is David talking about?
                     Which software does he mention?
                     Why do people prefer Skype to an ordinary phone?

Task 3. Part 2. 02.12-05.54
a) Be sure you know the words and phrases.
          cool features; design the phone; the first thing it changed was that..., another thing was that…, experience being online all the time; 60-dollar-a-month cellular card for laptop; to check one's email; wireless base stations; to broadcast about 150 feet across; to dial a number; at random; to download right to the phone; to erase smth.
b) Listen to David Pogue talk. Answer the questions.
          What device is he talking about?
          What does he think about Apple company in the fall of 2006?
          What famous person does he mention?
          What services is he speaking about?

Task 4. Decode one of the parts of the presentation:
Part 1 – 00.12 "I think…"– 01.08 "…said OK."
Part 2 – 01.09 "I'm going to…" – 02.14 "… feet across."
Part 3 – 02.15 "It's absurd…" – 03.08 "… like this?"
Part 4 – 03.09 "They have…" – 03.43 "… right."

Recommended function
          Read **Function 10 "HOW TO say numbers and formulas".** *Study the data about Apple iPhone 2007 and Apple iPhone 5. Describe one of these handsets.*

Apple iPhone 2007	Announced 2007, January.	Released 2007, June
General	2GNetwork	GSM 850 / 900 / 1800 / 1900
	SIM	Mini-SIM
Body	Dimensions	115 x 61 x 11.6 mm (4.53 x 2.40 x 0.46 in)
	Weight	135 g (4.76 oz)
Display	Type	TFT capacitive touchscreen, 16M colors
	Size	320 x 480 pixels, 3.5 inches (~165 ppi pixel density)
	Multitouch	Yes
	Protection	Corning Gorilla Glass, oleophobic coating
Sound	Alert types	Vibration, proprietary ringtones
	Loudspeaker	Yes
	3,5 mm jack	Yes
Memory	Card slot	No
	Internal	4/8/16 GB
Data	GPRS	Yes
	EDGE	Yes
	WLAN	Wi-Fi 802.11b/g
	Bluetooth	Yes, v2.0, headset support only
	USB	Yes, v2.0
Camera	Primary	2 MP, 1600x1200 pixels
	Video	No
	Secondary	No

Features	OS	iOS, upgradable to iOS 3.1.3
	CPU	412 MHz ARM 11
	GPU	PowerVR MBX
	Sensors	Accelerometer, proximity
	Messaging	SMS (threaded view), Email
	Browser	HTML (Safari)
	Radio	No
	GPS	No
	Java	No
	Colors	Black
		- Google Maps; Audio/video player; TV-out; Organizer; Document viewer; Image viewer; Predictive text input
Battery		Non-removable Li-Ion battery
	Stand-by	Up to 250 h
	Talk-time	Up to 8 h
	Music play	Up to 24 h
Misc	SAR US	0.97 W/kg (head) 0.38 W/kg (body)
	SAR EU	0.97 W/kg (head) 0.69 W/kg (body)

Apple iPhone 5 Announced 2012, September	
GSM	GSM model: SM/EDGE
SIM Card	Nano-SIM iPhone 5 is not compatible with existing micro-SIM cards.
Weight and Dimensions[1]	Height: 4.87 inches (123.8 mm) Width: 2.31 inches (58.6 mm) Depth: 0.30 inch (7.6 mm) 3.95 ounces (112 grams)
Display	4-inch (diagonal) Retina display 1136-by-640 resolution 326 ppi
Cellular and Wireless	UMTS/HSPA+ DC-HSDPA CDMA model: CDMA EV-DO Rev. A and Rev. B LTE3 2.4GHz and 5GHz) Wi-Fi (802.11a/b/g/n; 802.11n on Bluetooth 4.0 GPS and GLONASS
iSight Camera	8 megapixel; Autofocus; Tap to focus; LED flash; Backside illumination sensor; Five-element lens; Face detection; Hybrid IR filter f/2.4 aperture; Panorama
FaceTime Camera	1.2MP photos ; 720p HD video; Backside illumination sensor
Intelligent	Siri;

Assistant 4	Use your voice to send messages, set reminders, and more.
Video Calling5	FaceTime iPhone 5 to any FaceTime-enabled device over Wi-Fi or cellular
Video Recording	10 80p HD video recording; 30 fps; Tap to focus while recording; LED light; Improved video stabilization; Take still photos while recording video; Face detection
Headphones	Apple EarPods with Remote and Mic; Storage and travel case

Speaking

*Talk about **telecommunications development**. What technological changes have occurred in the last decade? What groundbreaking handsets have appeared in the last decade?*

Theme 12. NETWORK BASICS

Lead–in

You are going to read the text about Network Basics. What do you think it means? What components does it include?

Reading and Vocabulary

Task 1. You will read the text about Network Basics. Make sure you know these words and word combinations.

remote control	stable (adj)	telephone jack
purchase (v, n)	spindle (n)	switch (v, n)
expansion card	reliable (adj)	rectangular (adj)
mold onto (v)	coaxial cable	hub (n)
commonplace (adj, n)	occur (v)	router (n)
suitable (adj)	fiber (n)	flexible (adj)
mainstream (adj)	familiar (adj)	available (adj)
proximity (n)	intend (v)	restoration (n)
broadband (adj)	receptacle (n)	contain (v)
satisfy (v)	reduce (v)	occasionally (adv)
arrange (v)	application (n)	obvious (adj)
plug into (v)	unplug (v)	frequency (n)

Task 2. Read the text and name most common physical components of networks.
NETWORK BASICS

A computer network is created by connecting PCs together via cables, connecting hardware, and network software components (this software is built into Windows). Networks allow the connected computers to share data, software and resources. Computers which are linked together on a network can:
- Exchange files and documents internally.
- Share hard disk space and other drive resources (floppy, CD-ROM, tape backup, etc.)
- Print to shared printers

- Share an Internet connection
- Provide communication (email, audio and video conferencing, network-based fax services, etc.)
- Enable remote control of connected hardware devices (entire offsite computers, cameras, devices installed as expansion cards and peripherals, etc.)
- Run software installed on a separate machine
- Provide data collection, manipulation, use, and storage between machines

Networks have become commonplace in mainstream home/business computing. Broadband (fast) Internet connections are now prevalent in many homes, and most business computing systems make use of a connected network of machines. The Internet itself is a large network which average computer users make use of on a daily basis.

PHYSICAL COMPONENTS OF A NETWORK:

The network infrastructure provides the stable and reliable channel over which our communications can occur. Devices and media are the physical elements or hardware of the network. Hardware is often the visible components of the network platform. And now we will consider some of them.

Network expansion cards:
- Also called "NICs" (network interface cards)
- Network expansion cards have a cable connector which looks similar to those on modems (found on the back panel of the computer - see our network card hardware lesson if this is not familiar). They have a single cable receptacle which is slightly larger than a phone line connector, with 8 connecting wires (rather than the 2 wires found in telephone jacks).
- Modems are a form of network expansion card: they allow computers to connect to distant network machines via a phone line, but they are typically not used when putting machines together to form a LAN.
- Other variations of network cards include wireless network devices that use no physical cabling to transfer data, and special network cards that plug into your existing telephone lines (these cards work differently than a modem, but have a similar connector).

Network cabling:
- Cat 5: The most common type of cabling is called "Cat 5" (category five). Cat 5 cables have a rectangular clip end that looks like an enlarged telephone cable tip. Cat 5 cables contain 8 wires - as opposed to the 2-4 wires found in telephone cables (only 4 are *actually used*). The telephone look-alike clips on Cat 5 cabling are called "RJ-45" connectors (the technical name for telephone connectors is "RJ-11").
- Cables may be purchased in pre-cut lengths, with the clip ends molded onto each end of the cable. These types of cables are suitable for use when connecting small numbers of machines within close proximity to one another in a home and small office environment. Bulk cable and Cat 5 tips may be purchased separately to satisfy longer and more specific cable length needs. Cat 5 cable is typically sold on a spindle or in a box, in continuous lengths of 1000 feet.
- Coaxial cable ("coax") is another type of cable used to connect computers together on a network. Coaxial cable is an older standard than Cat 5, but it is still in common use with cable Internet connections. The back of a cable modem is connected to the incoming coax cable provided by your cable

company, and the computer is connected to that modem via its network card and a length of cat 5 wire.

- Fast fiber optic cables are used in larger networks, and although they work in much the same way as the above types, they will not be covered specifically in this lesson.

Hubs, routers, and other connectivity hardware:

- Hubs: all of the computers on a network are plugged into a box called the "hub". Hubs typically contain 4-24 jacks, and can be linked together via an "uplink" port to accommodate larger systems. Another form of hub is called a "Switch". Switches provide the same basic functionality as a hub, but they are slightly smarter, directing network traffic and information to the specific machines they are intended (rather than broadcasting info to the entire network). Because switches reduce the total amount of information being sent across the network, they perform faster, and are used in situations where speed is critical, or where large amounts of data are being sent between computers. Switches are slightly more expensive than basic hubs.
- Routers: routers are most commonly used to share Internet connectivity. Routers allow you to have a single broadband connection to the Internet (cable, dsl, t1, etc.) and share it between many computers. Many of the small routers available at office supply stores and computer shops *also contain a built in hub or switch* - providing a single piece of hardware that connects all of your networked computers together and to the Internet.
- There are also other components such as patch bays, rack units, and print servers. For example, a patch bay or patch panel allows circuits to be arranged and rearranged manually by plugging and unplugging the patch cords. Equipment can be inter-connected in various configurations. They provide a flexible way of routing restoration for a variety of circuit types. In a typical setup, the connection consists of a shorter cable plugged into the front side of the patch panel and a longer cable plugged into the back.

Occasionally, some components may not be so visible. In the case of wireless media, messages are transmitted through the air using invisible radio frequency or infrared waves. Services and processes are the communication programs, called software, that run on the networked devices. A network service provides information in response to a request. Services include many of the common network applications people use every day, like e-mail hosting services and web hosting services. Processes provide the functionality that directs and moves the messages through the network. Processes are less obvious to us but are critical to the operation of networks.

Task 3. Answer the questions to the text.
1. What actions does a network allow the connected computers to do? What can computers do?
2. What network expansion cards do you know?
3. What is the most common type of cabling?
4. What are the differences between coaxial cable and Cat 5?
5. Where are all of the computers on a network plugged into?
6. What are the differences between switches and hubs?
7. Why are routers needed? What do they allow to do?
8. What can you say about other connectivity hardware?

Task 4. Are the following sentences true (T) or false (F)?
1) Devices and media are often the invisible of the network platform.
2) A phone line connector is slightly larger than a single cable receptacle of modem.
3) Modems allow to connect to distant network machines via a phone line and they are used to form LAN
4) Wireless network devices use physical cabling to transfer data.
5) Cat 5 cables have more wires than telephone cables.
6) If you need longer and more specific cable length you can buy separately bulk cable and Cat 5 tips.
7) Coaxial cable is an older standard than Cat 5 and it is used to connect computers together on a network.
8) Hubs can be connected together via an "uplink" port to accommodate smaller systems.

Task 5. What are Russian equivalents to the following phrases?
to share data, entire offsite computer, to run software, Broadband Internet connection, mainstream home, visible component, rather than, telephone jack, to transfer data, rectangular clip end, enlarged telephone cable tip, pre-cut length, close proximity, bulk cable, "uplink" port, patch bays, rack units, patch cord.

Task 6. Match up the words which have a similar meaning.
1. commonplace   a) to happen
2. prevalent   b) demand
3. to occur   c) adaptable
4. to plug into   d) widespread
5. to purchase   e) appropriate
6. suitable   f) ordinary
7. to reduce   g) to diminish
8. flexible   h) regeneration
9. restoration   i) to embed
10. request   j) to buy

Task 7. Match the English terms with their definitions.
1. A network

a) a type of cable that has an inner conductor surrounded by a **tubular** insulating **layer**, surrounded by a tubular conducting **shield***.

2. Network Interface Card

b) the most used form of Internet access because of its high access speeds; it is offered in four different forms, DSL (or Digital Subscriber Line), also fiber-optic, cable, and satellite.

3. Local Area Network

c) a computer networking device that links network segments or network devices.

d) a group of computers connected together in a way that allows information to be exchanged between the computers.

4. Broadband Internet service

e) a network of computers that are in the same general physical location, usually within a building or a campus.

5. A coaxial cable

f) a number of circuits, usually of the same or similar type, which appear on jacks for monitoring, interconnecting, and testing circuits in a convenient, flexible manner.

6. A Cat-5 cable

g) Every computer (and most other devices) is connected to a network through it. In most desktop computers, this is an Ethernet card (normally 10 or 100 Mbps) that is plugged into a slot on the computer's motherboard.

7. A hub

8. A network switch

h) a twisted pair cable for carrying signals. This type of cable is used in structured cabling for computer networks such as Ethernet. The cable standard provides performance of up to 100 MHz. It is also used to carry other signals such as telephony and video.

9. A router

10. A patch bay

i) a device for connecting multiple Ethernet devices together and making them act as a single network segment. It has multiple input/output (I/O) ports, in which a signal introduced at the input of any port appears at the output of every port except the original incoming.

j) a device that forwards data packets between computer networks, creating an overlay internetwork. A router is connected to two or more data lines from different networks.

Notes:
shield - тех. ширма, щит, щиток.
layer - слой, пласт; прослойка; прокладка
tubular - трубчатый, в форме трубы

Specialized Reading

Task 1. Check the meaning of the following words from the text.

accomplish (v), accomplishment (n)	vendor (n)	route (v), router (n)
embedded security	throughput (n)	obvious (adj)
forwarding table	forward (v)	header (n)
encrypt (v), encryption (n)	firewall (n)	crucial (adj)
subscribe (v), subscription (n)	obtain (v)	outstanding (adj)
design for (v), design (n)	feature (n)	broadband (adj)
deploy (v), deployment (n)	beef up (v)	purchase (v, n)
configure (v), configuration (n)	unfamiliar (adj)	plug in (v)
perform (v), performance (n)	determine (v)	

Task 2. Read and translate the text. You will see the numbers in the text; you need to match the numbers with the name of the part of the text.

a) Routers for Home & Small Business
b) Are Routers Expensive?
c) Why Would I Need a Router?
d) Wired and Wireless Routers

All about Broadband/ICS Routers

A router is a device that forwards data packets along networks. A router is connected to at least two networks, commonly two LANs or WANs or a LAN and its ISP's network. Routers are located at gateways, the places where two or more networks connect, and are the critical device that keeps data flowing between networks and keeps the networks connected to the Internet.

When data is sent between locations on one network or from one network to a second network the data is always seen and directed to the correct location by the router. The router accomplishes this by using headers and forwarding tables to determine the best path for forwarding the data packets, and they also use protocols such as ICMP to communicate with each other and configure the best route between any two hosts. The Internet itself is a global network connecting millions of computers and smaller networks — so you can see how crucial the role of a router is to our way of communicating and computing.

I. For most home users, they may want to set-up a LAN (local Area Network) or WLAN (wireless LAN) and connect all computers to the Internet without having to pay a full broadband subscription service to their ISP for each computer on the network. In many instances, an ISP will allow you to use a router and connect multiple computers to a single Internet connection and pay a nominal fee for each additional computer sharing the connection. This is when home users will want to look at smaller routers, often called broadband routers that enable two or more computers to share an Internet connection. Within a business or organization, you may need to connect multiple computers to the Internet, but also want to connect multiple private networks — and these are the types of functions a router is designed for.

II. Not all routers are created equal since their job will differ slightly from network to network. Additionally, you may look at a piece of hardware and not even realize it is a router. What defines a router is not its shape, color, size or manufacturer, but its job function of routing data packets between computers. A cable modem which routes data between your PC and your ISP can be considered a router. In its most basic form, a router could simply be one of two computers running the Windows 98 (or higher) operating system connected together using ICS (Internet Connection Sharing). In this scenario, the computer that is connected to the Internet is acting as the router for the second computer to obtain its Internet connection.

Going a step up from ICS, we have a category of hardware routers that are used to perform the same basic task as ICS, albeit with more features and functions. Often called broadband or Internet connection sharing routers, these routers allow you to share one Internet connection between multiple computers.

RP614 Web Safe Router

Internet — Cable/DSL modem —

Notebook PC with FA511Ethernet Adapter

Desktop PC with FA311 PCI Adapter

Desktop Mac with

This image shows the flow of data to multiple computers sharing one high speed Internet connection.

Broadband or ICS routers will look a bit different depending on the manufacturer or brand, but wired routers are generally a small box-shaped hardware device with ports on the front or back into which you plug each computer, along with a port to plug in your broadband modem. These connection ports allow the router to do its job of routing the data packets between each of the computers and the data going to and from the Internet. Depending on the type of modem and Internet connection you have, you could also choose a router with phone or fax machine ports. A wired Ethernet broadband router will typically have a built-in Ethernet switch to allow for expansion. These routers also support NAT (network address translation), which allows all of your computers to share a single IP address on the Internet. Internet connection sharing routers will also provide users with much needed features such as an SPI firewall or serve as a DHCP Server.

III. Wireless broadband routers look much the same as a wired router, with the obvious exception of the antenna on top, and the lack of cable running from the PCs to the router when it is all set up. Creating a wireless network adds a bit more security concerns as opposed to wired networks, but wireless broadband routers do have extra levels of embedded security. Along with the features found in wired routers, wireless routers also provide features relevant to wireless security such as Wi-Fi Protected Access (WPA) and wireless MAC address filtering. Additionally, most wireless routers can be configured for "invisible mode" so that your wireless network cannot be scanned by outside wireless clients. Wireless routers will often include ports for Ethernet connections as well. For those unfamiliar with Wi-Fi and how it works, it is important to note that choosing a wireless router may mean you need to beef up your Wi-Fi knowledge-base. After a wireless network is established, you may possibly need to spend more time on monitoring and security than one would with a wired LAN.

Wired and wireless routers and the resulting network can claim pros and cons over each other, but they are somewhat equal overall in terms of function and performance. Both wired and wireless routers have high reliability and reasonably good security (without adding additional products). However —and this bears repeating — as we mentioned you may need to invest time in learning more about wireless security. Generally, going wired will be cheaper overall, but setting up the router and cabling in the computers is a bit more difficult than setting up the wireless network. Of course, mobility on a wired system is very limited while wireless offers outstanding mobility features.

IV. Below is a sample price comparison of routers and expected features as well as current pricing in U.S. dollars from online vendors found through Price Watch in August 2009.

ROUTER	PORTS	Manufacturer Description / Features	PRICE
NetGear WGR614 Wireless Cable/DSL Router	4	802.11g router offers wired and wireless connections. Up to 54 Mbps of wireless throughput. Four RJ-45 Ethernet ports allow for wired connections to the network. It includes a double firewall, WPA and 128-bit WEP encryption	$25
Linksys WRT110-RM Draft-N 802.11N Wireless Broadband Router	4	Internet-sharing Router with 4-port switch and Wireless Access Point. Much to Wireless-N, but also works great with Wireless-G and - faster than Wireless-G when connected B devices	$30
Linksys EtherFast BEFSR81 Broadband Router	8	Simply connect the Linksys BEF-SR81 Wireless Router 8 Port 10/100 Switch to your DSL or Cable Modem and all the computers in your home or office can share the Internet all at the same time.	$80
D Link Systems NetDefend VPN Firewall	8	D-Link answers the need for a Broadband VPN Router. The DIR-130 is a simple-to-deploy routing VPN and firewall solution designed specifically for the Small Office / Home Office	$90

Today you can purchase a basic sub $90 broadband router that will enable you to share your broadband Internet connection with multiple computers in your home or small office. Before buying a router, however, you need to take into consideration the type of Internet connect you have, and how many ports you will need for individual computers, and of course, make the choice between wired or wireless. It is always a good idea to purchase a router with extra ports in case you need to connect additional computers at a later date.

Notes to the text

ISP - *Internet Service Provider*
ICMP - *Internet Control Message Protocol*
ICS - *Internet Connection Sharing*
NAT - *Network Address Translation*
DHCP - *Dynamic Host Configuration Protocol*
WPA - *Wi-Fi Protected Access*
MAC address - *Media Access Control address*
WEP - *Wired Equivalent Privacy*
DSL - *Digital Subscriber Line*
VPN - *Virtual Private Network*

Task 3. Match definitions with their terms (from NOTES).

1) a method for connecting multiple computers in a LAN to the Internet through a single connection and a single IP address.
2) a security protocol for wireless local area networks (WLANs) defined in the 802.11b standard. It was designed to give wireless networks the equivalent level of privacy protection as a comparable wired network.
3) a family of technologies that provide Internet access by transmitting digital data over the wires of a local telephone network.
4) it supports packets containing error, control, and informational messages.
5) a hardware address that uniquely identifies each node of a network.
6) it refers to a company that provides Internet services, including personal and business access to the Internet.
7) a Wi-Fi standard that was designed to improve upon the security features of WEP.
8) an Internet standard that enables a local-area network (LAN) to use one set of IP addresses for internal traffic and a second set of addresses for external traffic.
9) a protocol for assigning dynamic IP addresses to devices on a network.
10) extends a private network and the resources contained in the network across public networks like the Internet.

Task 4. Answer the questions to the text.

1. What is the task of the router?
2. For what do home users apply broadband routers?
3. Are all routers created equal? How can you define it is a router?
4. What are Internet connection sharing routers? How do they look? And what are their functions?
5. What are the differences and similarity between wireless broadband routers and wired routers?
6. What is the most expensive router you see in the table? Why does it have such price?

Task 5. Are the following sentences True (T) or False (F)?

1) To determine the best path for forwarding the data packets, router uses headers and forwarding tables.
2) ISP permits you to use a router and connect multiple computers to a single Internet connection and pay a nominal fee.
3) A cable modem can be considered a router.
4) Internet connection sharing routers don't provide users such features as an SPI firewall or serve as a DHCP Server.
5) When a wireless network is set up you need to spend less time on monitoring and security than one would with a wired LAN.
6) Setting up the router and cabling in the computers is a bit more difficult than setting up the wireless network.

Task 6. Complete the tables with suitable words. Pay attention to the part of speech.

Noun	Verb		Noun	Adjective
subscription	1)		reason	9)
2)	accomplish		10)	individual

comparison	3)		security	11)
4)	determine		12)	equal
choice	5)		invisibility	13)
6)	differ		14)	important
configuration	7)		mobility	15)
8)	obtain		16)	typical

Task 7. Match up the words which have a similar meaning.

1. to realize
2. to mention
3. lack
4. to expect
5. vendor
6. albeit
7. as opposed to
8. to bear
9. to obtain
10. to deploy

a) manufacturer
b) as distinct from
c) to get
d) although
e) absence
f) to understand
g) to suggest
h) to spread out
i) to refer
j) to carry

Task 8. Write the words from the text to the following transcriptions.

1./ˈpɜːtʃəs /		8./rɪˌlaɪəˈbɪlətɪ /	
2./ˈθruːput /		9./ˈiːkwəl /	
3./ˈfiːtʃə /		10./fəˈmɪlɪə /	
4./ˈmenʃ(ə)n /		11./ˈɔbvɪəs /	
5./beə /		12./ˈrɪəlaɪz /	
6./dɪˈtɜːmɪn /		13./ˈkruːʃ(ə)l /	
7./kənˈfɪgə /		14./ˈmʌltɪpl /	

Recommended function

Read **_Function 12 "HOW TO define a thing…"_** and write full sentences with terms in task 3 (exercise below the text All about Broadband/ICS Routers) and 7 (exercise below the text Network Basics)

Listening

You are going to listen to *ABC News* about how **NBN pricing speed bumps could slow digital development.**

Task 1. Check the meaning and stress of these words. Watch the video and underline the words that you hear.

warn (v)	facilitate (v)	reward (n)
ration out (v)	consumer (n)	utility (n)
plain (adj)	recover cost	sign (v)

undermine (v)	artificially (adj)	encourage (v)
charge (v)	capacity (n)	waste (n)
retail (n)	replicate (v)	NBN
benefit (n)	limit (v)	take-up (v)
wholesale (n)	reap (v)	household (n)
tier (n)	deliver (v)	ADSL broadband
former chief	equal (adj)	aim (n)

Task 2. Listen to the recording and match the phrases to make longer ones.

1. consumers won't take advantage of
2. encourage consumer
3. choose to ration it out
4. recover
5. an important step towards
6. get use out of the network
7. it doesn't make
8. adapt over time to
9. either through
10. doubled remote

a) charging more for higher speeds
b) making sure
c) take-up in the early stages
d) the increasing speed needs of new applications
e) their costs efficiently
f) download speeds
g) which is where the benefits come
h) much sense
i) the network's true capacity
j) the regulatory process

Task 3. Answer the questions on the text.

1. What will NBN Co's pricing policy undermine?
2. What is the NBC Co's pricing policy?
3. What high speed does the National Broadband Network promise?
4. NBN Co sells wholesale access to the internet service providers. How much is that access currently priced?
5. Why does John de ridder think NBN has got the wrong idea?
6. How much money could NBN waste if the pricing model encourages most households to take up the 12 megabits per second?
7. What does telecommunications analyst Paul Budde say about NBN's policy on price and speed?
8. Is there a political need for the Government to limit speed to 12 megabits?

Task 4. Decode the part of the recording.

Part 1 - 2.59 "Telecommunications analyst Paul Budde says…." – 4.18 "…..the minimum service can be lifted to 25"

Task 5. Listen to the recording again and write the words to their transcriptions.

1./wɔːn/		7./ˈsɜːvɪs/	
2./ɪnˈkʌrɪdʒ/		8./ˈsæt(ə)laɪt/	
3./kənˈsjuːmə/		9./ˌɑːtɪˈfɪʃ(ə)l/	
4./tʃɑːdʒ/		10./ˈprəʊses/	
5./ˈæktʃʊəlɪ/		11./ɪɡˈzekjutɪv/	
6./fəˈsɪlɪteɪt/		12./pleɪn/	

Speaking

*Prepare a talk about one of the most **remarkable routers**. Find information about when, who and where it was made; describe it and tell about its use and advantages over similar ones.*

Writing

*Read **Function 11 "HOW TO describe a thing"** and write about **one of the devices** which you deal with. Write about when, who, where it was made; describe it and tell about its use and advantages/disadvantages.*

Theme 13. TELECOMMUNICATIONS NETWORK

Lead-in

What is a telecommunications network?

How does the development of telecommunications technologies influence human life? Tell about the advantages and disadvantages of this process.

Reading and Vocabulary

Task 1. You are going to read the text. Make sure you know these words and word combinations.

node (n)	internet relays
origin (n), originate (v)	real-time fashion
refer (v)	set up (v)
switch (v, n)	reliable (adj)
service provider	multiple locations
residential customer	approach (n)
wireless equipment	maintain (v), maintenance (n)
efficient transmission	secure (adj), security (n)
function (v, n)	enclosed setting
initiate (v)	encrypt (v), encryption (n)
a given point	be similar to (adj)
terminate (v, n), termination (n)	wire (v, n), wiring (n)
achieve (v), achievement (n)	involve (v)
hack (v), hacker (n)	credential (n)

Task 2. Translate the following word combinations.
as well as, from a point of origin to a point of termination, most people are familiar with, institutions of higher learning, government agencies are also likely to use, extensive use of the Internet, granting users access credentials, the chances for the network to be hacked.

Task 3. Read the text and answer the questions after it.
What is a telecommunications network?
A telecommunications network is a collection of nodes and links that is capable of carrying audio, visual, and data communications. While the term was once used to

refer only to the collection of switches and wiring used by telephone service providers to provide audio connectivity to residential and business customers, it is now understood to include Internet, microwave, and wireless equipment as well as the more traditional forms of telephony. There are several different classes of telecommunication networks, with each of them having a slightly different focus.

The main function of any telecommunications network is to provide efficient transmission of information from a point of origin to a point of termination. A telephone call is the easiest way to understand the function. A call is initiated at a given point, with the signal routed through a series of nodes that may involve a combination of wired switches, Internet relays, and wireless nodes. The signal eventually terminates at a local switch, where is it then routed to the equipment used by the intended recipient. This process takes place within seconds, and establishes a connection that allows the parties to interact in a real-time fashion.

Today, there are several basic types of telecommunications networks in use. Along with the PSTA, or public switched telephone network, that most people are familiar with, there is also the Internet, a medium that is increasingly used for both voice and visual communications. Private computer networks are a common tool in many businesses today, as well as many institutions of higher learning. These basic types are all classified into several categories, which include such options as wide area networks, local area networks, and virtual private networks.

A telecommunications network, that is set up as a wide area network, or WAN, allows for controlled but reliable communication between nodes that are geographically located across large distances. Businesses that operate multiple locations around a country, or even around the world, are likely to make use of this network model. Government agencies are also likely to use this approach to maintaining communications with branch offices and field personnel.

With a local area network, or LAN, the focus is on providing the same secure communications as with a WAN, just on a smaller geographical area. This type of telecommunications network offers phone, data, and Internet capability within an enclosed setting and from a limited number of devices connected to the network. One example would be a hotel, where the phones and Internet access are all routed through a network located within the hotel. Connections to larger networks are only achieved by going through the LAN first.

Virtual private networks, or VPNs, are similar to wide area networks, but with one exception. This type of telecommunications network makes extensive use of the Internet to create and maintain connectivity. Security is established by granting users access credentials. Those credentials can be used from any device capable of connecting with the Internet, but the communications is encrypted in a manner that minimizes the chances for the network to be hacked.

Task 4. Answer the questions to the text.
1. What is a telecommunications network?
2. What things does this term (telecommunications network) include?
3. What is the main function of any telecommunications network?
4. How is a telephone call realized? And how much time does this process take?
5. How many basic types of telecommunications networks are there?
6. What does WAN allow to do?
7. What is the difference between LAN and VPN?

Task 5. Are the following sentences true (T) or false (F)?
1) The PSTA and the Internet are both used for voice and visual communications.
2) A telephone call isn't the simplest way to understand the function of telecommunications network.
3) Private computer networks are a common tool in many businesses and institutions of higher learning.
4) Wide area network allows realizing communication between nodes that are located across small distances.
5) Government agencies use network model for providing communications with branch offices and field personnel.
6) The focus of LAN is on providing the secure communications, just on a smaller geographical area.
7) If you want to connect to larger networks, it isn't achieved by going through a network located within the hotel.
8) With VANs access credentials can be used only from special device which can be connected to the Internet.

Task 6. Complete the tables with suitable words. Pay attention to the part of speech.

Noun	Verb
communication	1)
2)	explain
access	3)
4)	operate
termination	5)
6)	use
7)	achieve

Noun	Adjective
security	8)
9)	reliable
extension	10)
11)	efficient
vision	12)
13)	local
function	14)

Task 7. Choose the best equivalents of the words on the left from the words on the right.
1. access   a) admission   b) approach   c) improvement
2. achievement   a) success   b) goal   c) attainment
3. reliable   a) faithful   b) dangerous   c) safe
4. common   a) general   b) usual   c) simple
5. establishment   a) building   b) institution c) organization
6. efficient   a) effective   b) outstanding   c) functional
7. origin   a) termination   b) reason   c) beginning
8. wireless   a) no portable   b)cordless   c) copper
9. fashion   a) routine   b) mode   c) schedule

Specialized reading

Task 1. Read and translate the text. Which of these aspects have been mentioned?
- Security
- Equipment
- Bandwidth
- Area of coverage
- Personnel involved
- Speed of data transmission
- Internet protocols used in LANs and WANs

LAN vs. WAN Comparison - Difference between LAN and WAN

The two most popular network types today are LAN (Local Area Network) and WAN (Wide Area Network). These two networks are generally classified on the basis of their coverage area. Given below are few points that differentiate these two networks.

Typically, a local area network exists in a house or a university campus, while a wide area network exists over many office buildings separated by a vast distance. The office buildings in a WAN may be in different countries or even continents. For example, the headquarters may be in USA, the regional office may be in the UK, and the branch office may be in India. The workers in these three buildings use a Wide Area Network to collaborate with each other. The Internet can also be considered as a WAN, with the Ethernet being a classic example of WAN. Let us have a look at the two structures and their differences.

In a LAN setup, devices are connected to a switch or a hub. Shared devices are also connected to a switch that is centrally located. In case the devices need to be connected to the Internet, the switch is then connected to the ISP and thus, to the Internet. The data that is shared amongst these devices is stored in servers. If more devices need to be added, an extra hub or switch can be added.

Local Area Network (LAN) has higher bandwidth, thus is faster when compared to a WAN. The maximum speed of a LAN can be 1000 megabits per second. As LAN is faster, it is widely preferred for sharing computers in a network. The network is easy to set up, most computers and laptops manufactured today come with the RJ45 port built-in on the motherboard, which is used to connect to the network. In case of older machines that do not have this port, a separate NIC (Network Interface Card) will be required to be installed. This card fits in the PCI slot on desktops, and the PCMCIA slot on laptops.

The main advantage of using LAN is the ease of sharing. Computers, if connected to the same LAN, can even share a printer. The biggest hurdle that a firm faces while connecting computers in a LAN is the monitoring of traffic for the Internet. If there is too much load put on only one computer or on a shared device, the network speed may reduce. This can be circumvented by using a LAN traffic monitor, whose function is to keep a track of the bandwidth used. On the basis of setup and maintenance cost breakup, LAN is considered to be cheaper as compared to a WAN setup.

In a WAN setup, computers that are present at different locations are interconnected. The devices are connected to the router and the routers are interconnected via T1 standards. This makes it difficult to expand a WAN network.

Wide Area Network has a lower bandwidth, thus slowing the network. The speed of a WAN can go up to 150 megabits per second. This means the speed of a WAN is one-tenth the speed of a LAN. Though WAN is slower, it is used widely to share data. The best example of WAN is the Internet. The data on the Internet is accessible across continents. However, a WAN cannot share computer peripherals, so a computer in one country cannot use a printer in another country. To set up a WAN, a modem and a router is needed. Thus, if an additional device needs to be added to the network, a router needs to be configured and connected to the others in the network. As the numbers of devices in a WAN are greater than those connected in a LAN, there is a greater need for a monitoring device. A special-purpose computer is used, whose only purpose is to send and receive data from the Internet. Leased lines or satellites are used to connect devices in a WAN.

The main difference between a Local Area Network (LAN) and a Wide Area Network (WAN), besides the technology used, is that generally you have control of all the resources for a LAN, but not for a WAN. For example, for a single company LAN (not connected to another LAN or to the Internet); that company can provide physical security for the entire LAN and all the connected computers. They can provide background checks for all the people that have access to all of the equipment. They can establish security policies and procedures that can be enforced on all the equipment. All of the threats to the system come from within (assuming adequate physical security).

As soon as the LAN is connected to another LAN or the Internet and becomes a WAN, all of that changes. The company does not know what physical protections have been made to the rest of the WAN, only its small portion. In the case of an Internet connection, they have no idea who might try to access their LAN. The entire threat model changes. Not that any of the threats from the LAN-only environment have gone away, but many more have been added. One can think of the threat profile for a LAN as being a subset of the threat profile for a WAN.

This threat profile is what helps to decide what security measures are appropriate. In terms of network management, within a self-contained LAN, there probably is no need to have network management protocols encrypted, or special authentication done for those protocols (unless you are worried that insiders may attempt to "manage" your network for you). On the other hand, you probably do not want your network management protocols to traverse the Internet without protection. Nor do you want your computers on a remote segment to respond to network management requests that are not authenticated. So, as with any computer system or network, the first steps are to identify what the threats to your system or network are and what needs to be protected. Then you can go about devising ways to provide the required   protection.

While each of the two have their own advantages and disadvantages, there is also a distinct factor that helps one choose between a LAN and a WAN setup, and that is distance. If the locations to be connected are far apart, there is no point considering a LAN setup, as in spite of whatever advantages it may offer, it is not possible.

Task 2. Make sure you know the following words and phrases.

coverage area	hurdle (n)	to fit in a slot
differentiate (v)	monitoring (n)	subset (n)
headquarter (n)	circumvent (v)	authentication (n)
collaborate (v)	maintenance cost breakup	traverse (v)
setup (n)	route (v), router (n)	assume (v)
hub (n)	to share data	appropriate (adj)
shared device	leased lines	attempt (v, n)
a track of bandwidth	in spite of (conj)	a remote segment
manufacture (v)	enforce (v)	request (v, n)
motherboard (n)	threat (n), threaten (v)	peripheral (n)

Task 3. Answer the questions to the text.
1. Where are WANs and LANs used? Please, give a detailed answer.
2. How can devices be connected in a LAN setup in some cases?
3. What is the main benefit of using LAN?
4. Why is LAN considered to be cheaper than a WAN setup?

5. What is the biggest difficulty of a LAN and how can it be circumvented?
6. How are devices connected in a WAN setup?
7. What is the difference between the speed and security of WAN and LAN?
8. Generally, what security needs have to be considered in a network management environment?

Task 4. Use the expressions from the box and complete the following sentences.

sharing	fits	bandwidth	maintenance cost breakup		traffic
monitor	a switch	accessible	manufactured	a router	

1. The function of using a LAN ……… is to keep a track of the bandwidth used.
2. The ease of ……… is the main advantage of using LAN.
3. Most computers and laptops …....... today come with the RJ45 port, which is used to connect to the network.
4. Network Interface Card …….. in the PCI slot on desktops, and the PCMCIA slot on laptops.
5. The data on the Internet is ………. across continents, but WAN cannot share computer peripherals.
6. A modem and ………. is required to set up a WAN.
7. LAN is faster as compared to a WAN because it has higher …….
8. In a LAN setup devices are connected to ……….
9. Setup and ………… of a LAN are cheaper as compared to a WAN.

Task 5. Complete the tables with suitable words. Pay attention to the part of speech.

Noun	Verb
choice	1)
2)	receive
setup	3)
4)	add
maintenance	5)
6)	store
reduction	7)

Noun	Adjective
continent	8)
locality	9)
10)	different
access	11)
12)	easy
use	13)
region	14)

Task 6. Define the meaning of the following words (the nouns, the adjectives or the verbs, the adverbs) in these sentences. Translate them.

Security wise, LAN can be more **secure** due to the fact that all the computers are within a specific area and are **physically** easier to **secure**. The data on a wide area network needs to pass across public phone lines in order to **reach** its intended **destination**. The data is then **vulnerable** to attack by anyone with the right skills to **penetrate** your network. Unlike LAN, there is just no physical way of securing it, which is why electronic **features** are the only **defense** structure in place.

LANs are very common nowadays, it is commonplace in a work environment and even at home. It is necessary to **implement** a local area network in order to connect **multiple** computers to the internet using a **single** DSL line. With regards to speed, LAN **usually** operates at much higher rates compared to WAN. This is largely due to the **proximity** of the computers and the **lack** of congestion in most

cases. It is common to **experience up** to 80 or 90 mbps in a LAN while achieving 10 to 20mbps is already a great **achievement** for WAN.

Task 7. Match up the words which have a similar meaning.

1. to reach   a) to get into
2. vulnerable   b) to perform
3. to penetrate   c) closeness
4. feature   d) usual case
5. security   e) to achieve
6. commonplace   f) characteristic
7. to implement   g) absence
8. multiple   h) protection
9. proximity   i) defenseless
10. lack   j) numerous

Task 8. Write the words from the text to the following transcriptions.

1./ˈkʌv(ə)rɪdʒ/		15./trəˈvəːs/	
2./dɪfəˈrenʃɪeɪt/		16./məˈʃiːn/	
3./vɑːst/		17./rɪˈkwʌɪə/	
4./ˈhedkwɔːtə/		18./ˈhəːd(ə)l/	
5./kəˈlæbəreɪt/		19./ˈmeɪnt(ə)nəns/	
6./hʌb/		20./səːkəmˈvent/	
7./əˈmʌŋst/		21./ðʌs/	
8./prɪˈfəː/		22./ˈpəːpəs/	
9./pəˈrɪf(ə)r(ə)l/		23./kənˈfɪgə/	
10./ˈsætəlaɪt/		24./rɪˈsɔːs/	
11./prəˈsiːdʒə/		25./θret/	
12./ˈædɪkwət/		26./əˈsjuːm/	
13./ˈmeʒə/		27./əˈprəʊprɪət/	
14./aɪˈdentɪfaɪ/		28./ɔːθentɪˈkeɪʃ(ə)n/	

Recommended function and Writing

Study **_Function 8 "HOW TO make comparison and contrast"_** *and write some sentences about LAN and WAN making comparison between them.*

Listening

You are going to listen to *BBC News* about **New broadband for Africa.**

Task 1. Before listening match the following words from the recording with their meaning.

1. hardly anyone   a) thinks will happen
2. bandwidth   b) send out again
3. predicts   c) connection speed
4. broadband   d) wires that receive or transmit communication signals
5. live   e) almost no-one

6. delivered   f) high speed internet
7. satellite   g) capable of being done
8. redistribute   h) communication systems from space
9. aerials   i) carried
10. feasible   j) at the same time as broadcast

Task 2. Listen to the recording and answer the questions.
1. How has situation with mobile phones in Africa changed over the past fifteen years?
2. What is the next big thing Moez Daya predicts? And what will it allow to do?
3. How can broadband be delivered?
4. How will local operators be able to redistribute the product?
5. What broadband does Moez Daya consider feasible in Africa?
6. What could it mean for Africa within two years?

Task 3. Listen to the recording again and match the phrases to make longer ones.
1. This will allow   a) entirely achievable and feasible
2. Have been laid   b) counterparts
3. A twenty dollar subscription c) sensible
4. Four megabits a second is   d) streaming
5. Probably commercially   e) for a bandwidth
6. Chinese or American   f) around the coast

Task 4. Decode the recording:
Part 1 - 00.04 "Just fifteen years ago…" – 00.39   "….. by satellite."
Part 2 - 00.39 "Local operators…." - 01.11 "……on their mobile phones."

Task 5. Listen to the recording again and write the words to their transcriptions.

1./striːm/		7./ˈəːrɪəl/	
2./lʌɪv/		8./kəˈməːʃ(ə)l/	
3./ɪgˈzekjʊtɪv/		9./ˈfiːzɪb(ə)l/	
4./ˈfɔːməli/		10./səbˈskrɪpʃ(ə)n/	
5./tʃiːf/		11./ɪnˈtaɪəli/	
6./ˈkaʊntəpɑːt/		12./əˈtʃiːvəbl/	

Speaking
Prepare a talk about **an achievement in telecommunication networking technology**.

Recommended function and writing
Study **_Function 2 "HOW TO distinguish a predicate"_** and write out examples of **different predicate forms** from the text and translate them.

Theme 14. THE FUTURE OF WORK

Lead-in

Work in groups. Share information on how people can use new technologies for their work. Do you know what **Generation Y** means?

Reading and Vocabulary

Task 1. Read the words and phrases and give the Russian equivalents.

to pick up the phone	to manage smth *v*
iGeneration	to send a text message
a part-time job	to text message
real-world business experience	to text smb back
having hundreds of Facebook friends	to send emails to smb
tech savvy; to be tech savvy	to interact with co-workers
coworker	to email
flexible; workplace flexibility	to found online business
to relate to smb	paid internship

Task 2. You will now read an article about Gen Y-ers and their way of working. Before reading, discuss in your group the following statements:

"Experts say because members of the iGeneration are so naturally tech savvy, they will do things bigger, better and at a younger age than previous generations."
Do you agree with the experts? Prove your answer.

Task 3. Read the article. What are the main ideas?

Gen Y-ers bring their distinct style of communicating to the job

There probably isn't a company in America that isn't wrestling with managing different generations. Baby boomers, Gen X, millennials: they all seem to want something different. Now, here comes the iGeneration, also known as Generation Z, with its own distinct way of walking, talking and working.

Generational expert Cam Marston says: "They will have to get used to email and, God forbid, picking up the cellphone and calling. But at the same time, employers will have to get used to the fact that they may choose to text message even if they're standing next to you."

Teens want the workplace to accommodate them — their schedules, opinions and style of interaction — just as their technology does. Yet most are open to the lessons the business world may offer.

Lee Orlinsky, 17, took a part-time job at Einstein's in Plantation about a year ago, and says he, too, has learned from real-world business experience. He has discovered that having hundreds of Facebook friends doesn't teach you interpersonal skills and sometimes you have to interact with co-workers and customers "whether you like them or not." Yet, Lee realizes he brings something to the workplace even the millennial generation doesn't always offer: "I can relate to the teens that come in."

Even more, Lee has helped move supervisors toward the style of communication the iGeneration expects. He will text a message his supervisor to learn his work schedule for the week or express a conflict or interest in extra hours. "It's

easier for her, she doesn't have to stop what she's doing to talk to me," he said. "She can text me back on her own time."

Experts say because members of the iGeneration are so naturally tech savvy, they will do things bigger, better and at a younger age than previous generations. Sure, there will be workplace slackers. And then there will be entrepreneurs like Ryan Breslow. At 17, he already has worked for three years at Publix, has secured two paid internships at high-tech marketing firms and has founded three online businesses.

Task 4. Find the answers to the questions in the text.
1. What does Cam Marston do?
2. Is Cam Marston the Gen Y-er? Prove your answer.
3. What has Lee learned from real-world business experience?
4. Why does Lee prefer to text message his supervisor?
5. Is Ryan Breslow a workplace slacker (халтурщик)? Prove your answer.

Task 5. Find synonyms to the following words and phrases in the text.
1. struggle
2. boss, manager
3. people who are 14-19 y.o.
4. colleagues
5. specific
6. practical studies
7. to suit
8. businessman

Recommended function
Read **Function 18 "HOW TO keep a discussion"** and discuss the following topics with your partner or in groups.
1. Facebook can teach you interpersonal skills.
2. Members of the iGeneration are obsessed by on-line connectivity.
3. Cellphone is crucial to business communication.

Specialized Reading

Task 1. Read the words and give the Russian equivalents.

a software marketing manager	a middle ground
high-tech marketing firm	to work virtually
via laptop	to develop face-to-face interpersonal
connected to the Internet via laptop and	skills
aircard	to use the technology advantage
remote working	to take a course online
roughly 75 percent	the live stream
in order to	an information technology professional
face time	a trust issue
boomer boss	to get ahead

Task 2. Answer the questions.
1. What is "remote working"?
2. What words is it derived from? Is it a neologism? Give the Russian equivalent.
3. "We're more creative in our own space than in an office with no windows." Do you agree?

Task 3. Read and translate the article.

Working at home vs. the office: The face time faceoff

It's a blue sky day in South Florida and Erik Bortzfield, a software marketing manager, would love to be ocean side on a beach chair connected to the Internet via laptop and aircard. A year out of college, Bortzfield, 23, has discovered the rules of the workplace typically don't allow remote working, but he is convinced his generation will make it happen. "When people my age start to own and manage companies, I think you'll start to see a noticeable change," he says.

Millennials will be change makers, says Dan Schawbel, managing partner of Millennial Branding. By 2025, Generation Y will make up roughly 75 percent of the world's workforce, a Business and Professional Women's Foundation study shows. With such a large presence, expect them to put pressure on companies to shift how people work, Schawbel says: "Gen Y wants to rip apart work styles and create new relationships with the office that are more flexible."

It's not that Gen Y-ers don't see value in coming to the office some of the time. But because they are networked, they believe reporting to an office from 9 to 5 every day in order to call and send emails to people in other places makes absolutely no sense. Many are asking: "Why are bosses insisting on face time?" — and planning for the day when they will make the office rules.

Amanda Delprete, a 24-year-old PR account executive, says her generation wants to use the technology advantage. In college, she and her friends took one or more courses online or sat in their dorms watching the live stream. "It was not mandatory for us to be physically in class," she says. "Now, we come into the workplace and there's an insistence on face time and we don't get it. We're more creative in our own space than in an office with no windows."

Leadership consultant Jane Goldner says boomer bosses trying to lead this new chaotic environment and still keep a handle on things will need to find a middle ground acceptable to all. Rather than just insist on face time, they will need to explain why it is important. "Without it, you might not be building the alliances you need to get ahead." Even more, she adds: "When you work virtually, you don't develop face-to-face interpersonal skills. That's a huge skill set missing in the workplace."

Richard Fleites, an information technology professional, believes the generational conflict over face time remains a trust issue. There remains a belief that if you're not in the office, you're napping or downing martinis during business hours, he says.

Sorraya, a 34-year-old attorney, discovered getting the flexibility is possible — but it has to be earned. She's worked from libraries, hotel rooms, court rooms rather than return to her office. But she's proved her value. "You're not going to start day one and work from home one morning a week. If you become trusted, you get more flexibility."

By understanding Gen Y-ers' need for workplace flexibility, companies are better able to recruit and grow young talent for the future, workplace experts say. Adam, a Miami attorney, says he's much happier as a lawyer at United Auto Insurance Company where he can work from the courthouse or home at times rather than at a big law firm where the emphasis on face time at the office during and after hours was much greater.

Meanwhile, Bortzfield, the software marketing manager, looks forward to the day when he's the boss: "If it's the nicest day of all time, I'm going to say, 'everyone works from home or wherever today. Let me know if you need anything.'"

Task 4. Answer the questions.

1. What are Erik Bortzfield's ideas about new style of work?
2. Have you ever heard about a beach chair connected to the Internet via laptop and aircard? Is it useful invention?
3. Do Gen Y-ers see value in face time? Prove your answer.
4. What experts are mentioned in the article? What are their names? What are the names of their firms or organizations?
5. Why do millennials believe reporting to an office from 9 to 5 every day in order to call and send emails to people in other places makes absolutely no sense?
6. What problems are discussed in the article?

Task 5. a) Note the advantages and disadvantages of remote working in the table. Give reasons for good and bad points of remote working. Fill in the table.

Remote working	
Advantages You don't need to report to an office from 9 to 5 every day …………………	**Reasons** You are networked …………………
Disadvantages ………………… 	**Reasons** …………………

b) Add your own ideas to the table.

Task 6. Read the sentences from the texts, find the verbs and identify the predicate and its tense. Translate the sentences. Use Appendix "English Tenses".

1. There probably isn't a company in America that isn't wrestling with managing different generations.
2. But at the same time, employers will have to get used to the fact that they may choose to text message even if they're standing next to you.
3. Teens want the workplace to accommodate them.
4. Lee has helped move supervisors toward the style of communication the iGeneration expects.
5. Erik Bortzfield, a software marketing manager, would love to be ocean side on a beach chair connected to the Internet via laptop and aircard.
6. But because they are networked, they believe reporting to an office from 9 to 5 every day in order to call and send emails to people in other places makes absolutely no sense.
7. Expect them to put pressure on companies to shift how people work,
8. Many are asking: "Why are bosses insisting on face time?"
9. I'm going to say, 'Everyone works from home or wherever today. Let me know if you need anything.'

Task 7. Identify the functions of **have** *(**main verb; modal verb; auxiliary verb; verbal noun; participle). Translate the sentences.***

1. He has discovered that having hundreds of Facebook friends doesn't teach you interpersonal skills and sometimes you have to interact with co-workers and customers "whether you like them or not.

2. It's easier for her, she doesn't have to stop what she's doing to talk to me.

3. Sorraya discovered getting the flexibility is possible — but it has to be earned.

4. At 17, he already has worked for three years at Publix, has secured two paid internships at high-tech marketing firms and has founded three online businesses.

Recommended function

*Read **Function 7 "HOW TO deal with neologisms"** and find examples of **neologisms** in both texts. What words are derived from? What is their Russian equivalent? Write down 8-10 more neologisms from the subjects you study or work with. Analyze them.*

Listening

You are going to listen to the presentation of **Sherry Turkle. Sherry Turkle** is the Professor of *Massachusetts Institute of Technology*.

Task 1. Make sure you know the words and phrases.

to text smb for good luck, getting the text, rock, embody, TED Talk, to be on the cover, WIRED magazine, to experiment with smth, chat room, online virtual community, to explore, to unplug, to be excited, the virtual world, the real world, fast-forward, cellphone, technology mobile communication, odd, disturbing, to seen familiar, to email, board meeting, go on Facebook, the skill of doing smth, to matter, to relate to smb, to put one's attention, to pay attention, bits

Task 2. Study this information and listen to the first part of the recording –up to 03.03 and answer the questions.

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1. Place of presentation: TED conference. TED (Technology, Entertainment and Design) is a global set of conferences, formed to disseminate "ideas worth sharing."

2. Sherry Turkle is the author, most recently, of "Alone Together: Why We Expect More From Technology and Less From Each Other."

3. The title of subject in MIT: "Technology and Self: Science, Tech and Memoir".

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1. What course of lectures does Sherry read? What is her speciality?
2. What has Sherry studied?
3. Who has she interviewed?
4. What has she found?

Task 3. Answer the questions to the second part of the video (03.04 – 05.09)

1. When do people text or do email?
2. What is the important new skill that people talk to Sherry?
3. What do children complain about?
4. What does Sherry say about «being alone together'?
5. What is the thing that matters most to people?

Task 4. Decode one of the 4 parts of the presentation:
Part 1 - 03.04 "So just take…" – 03.33 "…it can be done."
Part 2 - 03.33 "People explain…" – 04.08 "…into our phones."
Part 3 - 04.08 "Why does this…" – 04.40 "…they want to be."
Part 4 - 04.40 "People want to…" – 05.09 "…to each other."

Task 5. Read the words combinations and give Russian equivalents.
catch off guard; a profound question; sip of; add up to; big gulp of real conversation; gather; discreet bits of information; for kids growing; the bedrock of development

Task 6. Listen to the next part and fill in prepositions.
07.36 – 09.02

    I was caught _____ guard when Stephen Colbert asked me a profound question, a profound question. He said, "Don't all those little tweets, don't all those little sips _____ online communication, add _____to one big gulp _____ real conversation?" My answer was no, they don't add up. Connecting _____ sips may work _____ gathering discreet bits _____ information, they may work _____ saying, "I'm thinking _____ you," or even _____ saying, "I love you," - I mean, look _____ how I felt when I got that text _____ my daughter - but they don't really work _____ learning about each other, _____ really coming to know and understand each other. And we use conversations _____ each other to learn how to have conversations _____ ourselves. So a flight _____ conversation can really matter because it can compromise our capacity _____ self-reflection. For kids growing up, that skill is the bedrock _____ development.

Task 7. Listen to the next part of the text and fill in the gaps. Define the tense of the verbs.
09.02 – 10.08

    Over and over I hear, "I _____ rather _____ than talk." And what _____ is that people get so used to being short-changed out of real conversation, so used to getting by with less, _____ _____ _____ almost willing to dispense with people altogether. So for example, many people _____ with me this wish, that someday a more advanced version of Siri, the digital assistant on Apple's iPhone, _____ _____ a best friend, someone who _____ _____ when others _____. _____ this wish _____ a painful truth that _____ _____ in the past 15 years. That feeling that no one _____ me is very important in our relationships with technology. That's why it's so appealing to have a Facebook page or a Twitter feed - so many automatic listeners. And the feeling that no one _____ me make us want to spend time with machines that seem to care about us.
10.09 – 11.00

    _____ _____ robots, they call them sociable robots, that are specifically designed to be companions - to the elderly, to our children, to us. _____ we so _____ confidence that we will be there for each other? During my research I _____ in nursing homes, and I _____ in these sociable robots that _____ _____ to give the elderly the feeling that they were understood. And one day I _____ and a woman who _____ a child _____ _____ a robot in the shape of a baby seal. It seemed to be looking in

her eyes. It seemed to be following the conversation. It _____ her. And many people _____ this amazing.

11.01 – 11.37

But that woman _____ _____ to make sense of her life with a machine that no experience of the arc of a human life. That robot _____ a great show. And we're vulnerable. People experience pretend empathy as though it were the real thing. So during that moment when woman _____ _____ that pretend empathy, I _____ _____, "That robot can't empathize. It _____ _____ death. It _____ _____ life."

Recommended function and speaking

*Study **Function 3 "HOW TO deal with modal verbs"** and talk about how you imagine **your career ladder**. Use modal verbs and tell about the following:*
- what sort of company it is;
- your working hours;
- your duties;
- your prospects.

Writing

*Write your own short article (8-10 sentences) about **new technologies in the workplace.***

Theme 15. SOFTWARE ENGINEERING CHALLENGES

Lead-in

This is the beginning of the text about software engineering. Read it and say why you think the author started the text like this.

"Of all the monsters that fill the nightmares of our folklore, none terrify more than werewolves, because they transform unexpectedly from the familiar into horrors. For these, one seeks bullets of silver that can magically lay them to rest. "

Reading and Vocabulary

Task 1.a) Read the words and phrases and give the Russian equivalents.

software engineering	order-of-magnitude
nontechnical manager	productivity
be capable of doing smth	reliability
missed schedule	simplicity
blown budget	the nature of the software problem
flawed product	encouraging innovations
software costs	startling breakthrough
to make software costs drop	to be under way
as rapidly as	a consistent effort to develop
computer hardware costs	innovations
to exploit	to propagate
	straightforward

b) Make your own sentences with them to see how they are used.

Task 2. Read the continuation of the text. What is the main idea of the article?
"No Silver Bullet"
The familiar software project, at least as seen by the nontechnical manager, has something of this character; it is usually innocent and straightforward, but is capable of becoming a monster of missed schedules, blown budgets, and flawed products. So we hear desperate cries for a silver bullet - something to make software costs drop as rapidly as computer hardware costs do.

But, as we look to the horizon of a decade hence, we see no silver bullet. There is no single development, in either technology or in management technique, which by itself promises even one order-of-magnitude improvement in productivity, in reliability, in simplicity. In this article, I shall try to show why, by examining both the nature of the software problem and the properties of the bullets proposed.

Skepticism is not pessimism, however. Although we see no startling breakthroughs - and indeed, I believe such to be inconsistent with the nature of software - many encouraging innovations are under way. A disciplined, consistent effort to develop, propagate, and exploit these innovations should indeed yield an order-of-magnitude improvement. There is no royal road, but there is a road.

The first step toward the management of disease was replacement of demon theories and humorous theories by the germ theory. That very step, the beginning of hope, in itself dashed all hopes of magical solutions. It told workers that progress would be made stepwise, at great effort, and that a persistent, unremitting care would have to be paid to a discipline of cleanliness. So it is with software engineering today.

Task 3. Answer these questions on the text.
1.What problems are discussed in the article?
2.What is the author going to show in this article?
3.What does the author think about the progress of software engineering today?

Task 4. The author uses some words in a figurative sense. Give the meaning of these words and phrases.
- "silver bullet"
- "one order-of-magnitude improvement"
- "royal road"
- "There is no royal road, but there is a road."

Task 5. Work in pairs and discuss Fred Brook's ideas with your partner.
Fred Brooks published his essay in 1986. 20 years after the initial publication Brooks has revisited his original ideas. He wrote:
"No Silver Bullet" proved provocative. It predicted that a decade would not see any programming technique which would by itself bring an order-of-magnitude improvement in software productivity. The decade has a year to run; my prediction seems safe."

Task 6. Match two parts of the phrase.
1. blown   a)   schedule
2. startling   b)   product

3.	nontechnical	c)	effort
4.	flawed	d)	innovation
5.	missed	e)	budget
6.	encouraging	f)	manager
7.	consistent	g)	breakthrough

Task 7. Translate the sentences.

1. A disciplined, consistent effort to develop, propagate, and exploit these innovations should indeed yield an order-of-magnitude improvement.

2. There is no single development, in either technology or in management technique, that by itself promises even one order-of-magnitude improvement in productivity, in reliability, in simplicity.

3. "No Silver Bullet" proved provocative.

4. It predicted that a decade would not see any programming technique which would by itself bring an order-of-magnitude improvement in software productivity.

5. The decade has a year to run; my prediction seems safe.

Specialized Reading

Task 1. Read the words and phrases. Give the Russian equivalents.

within a decade	complexity
improvement in reliability	conformity
divide the problems into two categories	changeability
the problems facing software engineering	invisibility
the production of software	high-level languages
improve software development	time-sharing
reduce accidental problems to zero	to clarify requirements
solve some problems	deadline
the process of software development	target
a 10 times improvement in smth	

Task 2. Read and translate the extract from the lecture. What is the lecture goal? What are the main ideas?

Why is software engineering so hard?

Thesis of Fred Brooks's "No Silver Bullet". Kenneth M. Anderson, University of Colorado, Lecture 2

1. Lecture Goals

Introduce thesis of Fred Brooks's "No Silver Bullet"

- Classic essay by Fred Brooks discussing "Why is SE so hard?"

2. No Silver Bullet

"There is no single development, in either technology or management technique, which by itself promises even one order-of-magnitude improvement within a decade in productivity, in reliability, in simplicity." — Fred Brooks, 1986

i.e. There is no magical cure for the "software crisis".

3. Why? Essence and Accidents

- Brooks divides the problems facing software engineering into two categories:

essence: difficulties inherent in the nature of software;

accidents: difficulties related to the production of software;

- Brooks argues that most techniques attack the accidents of software engineering.

4. An Order of Magnitude

- In order to improve software development by a factor of 10:

first, the accidents of software engineering **would have to account for 90% of the overall effort;**

second, tools would have to **reduce accidental problems to zero.**

- Brooks doesn't believe that the former is true…

and the latter is nigh impossible because each new tool or technique solves some problems **while introducing others.**

5. The Essence

- Brooks divides the essence into four subcategories: complexity, conformity, changeability, invisibility.

6. What about "X"?

- Brooks argues that past breakthroughs solve accidental difficulties: High-level languages, Time-Sharing, Programming Environments, OO Programming, Design…

7. Promising Attacks on the Essence

- Buy vs. Build

Don't develop software when you can avoid it.

- Rapid Prototyping

Use to clarify requirements.

- Incremental Development

Don't build software, grow it.

- Great designers

Be on the lookout for them, when you find them, don't let go!

8. No Silver Bullet, Take 2

- Brooks reflects on No Silver Bullet, ten years later.

    - Lots of people have argued that their methodology, technique, or tool is the silver bullet for software engineering. If so, they didn't meet the deadline of 10 years or the target of a 10 times improvement in the production of software;

    - Others misunderstood what Brooks calls "obscure writing"

e.g. "accidental" did not mean "occurring by chance"; instead, he meant that the use of technique A for benefit B unfortunately introduced problem C into the process of software development.

9. The Size of Accidental

- Some people misunderstood his point with the 90% figure.

    - Brooks doesn't actually think that accidental effort is 90% of the job;

    - its much smaller than that.

- As a result, reducing it to zero (which is effectively impossible) will not give you an order of magnitude improvement.

10. Obtaining the Increase

- Some people interpreted Brooks as saying that the essence could never be attacked.

    - That's not his point; he said that no single technique could produce an order of magnitude increase by itself.

    - He argued that several techniques in tandem could achieve it but that requires industry-wide enforcement and discipline.

- Brooks states:

- "We will surely make substantial progress over the next 40 years; an order of magnitude improvement over 40 years is hardly magical…"

Task 3. Find the answers to the questions in the text.
1. What categories of problems does Brooks describe?
2. What are subcategories of the essence?
3. What accidental difficulties does Brooks mention?
4. What does "accidental" mean (in Fred Brooks's essay)?
5. Does Brooks think that accidental effort is 90% of the job?

Task 4. Read the definitions of the verbs. Give Russian equivalents.
argue
argue for (in favor of) / against   = to give reasons for (in favor of) or against
argue about = to talk about some matter usually with different points of view
argue somebody into/out of doing something = to persuade by giving reasons
argue that = maintain a case, give reason (especially with the aim of persuading somebody)
believe
believe in = to have faith or confidence in the existence or worth of smth
believe (that) = to hold as an opinion
reflect
reflect (in/from) = to reproduce or show (an exact likeness) as a mirror would
reflect on/upon = consider; think on

Task 5. Fill in prepositions.
        a) Fill in **into, in favour, that** or **about.**
What are you arguing ….?
It does not argue much …… your favour .
He argued me …. accepting his proposal.
He argued …. it's far too early to make a decision
        b) Fill in **that** or **in.**
He believes …. God.
I believe …. you are right.
        c) Fill in **from /in** or ***on/upon***.
The sunlight was reflected …. the water.
Reflect …. what I have said.
I must reflect …. how to answer that question.

Task 6. Complete the sentences with phrases from the text (paragraphs 3, 4, 6, 8, 9, 10). Translate the sentences.
1.   Brooks argues that ….
2.   Brooks doesn't believe that ….
3.   Brooks argues that ….
4.   Brooks reflects on ….
5.   Brooks doesn't actually think that ….
6.   Some people interpreted Brooks as ….
7.   Brooks states: ….

Task 7. Find English equivalents in the text.
Para 6 **-** языки высокого уровня; разделение времени, режим разделения времени; среды программирования; объектно-ориентированное программирование
Para 7 **-** макетирование; пошаговая обработка

Task 8. Translate the sentences from F.Brooks's essay.
1.   Surely the most powerful stroke for software productivity, reliability, and simplicity has been the progressive use of high-level languages for programming.
2.   What does a high-level language accomplish? It frees a program from much of its accidental complexity.
3.   Time-sharing brought a major improvement in the productivity of programmers and in the quality of their product, although not so large as that brought by high-level languages.
4.   Unix and Interlisp, the first integrated programming environments to come into widespread use, seem to have improved productivity by integral factors.
5.   Because of these successes, environments are the subject of much of today's software-engineering research.
6.   Many students of the art hold out more hope for object-oriented programming than for any of the other technical fads of the day.
7.   Therefore, one of the most promising of the current technological efforts, and one that attacks the essence, not the accidents, of the software problem, is the development of approaches and tools for rapid prototyping of systems as prototyping is part of the iterative specification of requirements.
8.   Incremental development - grow, don't build, software.

Task 9. Agree or disagree about the problems facing software engineering.
        1. There is no magical cure for the "software crisis".
        2. Most techniques attack the accidents of software engineering.
        3. No single technique can produce an order of magnitude increase by itself.
        4. Several techniques in tandem can achieve an order of magnitude increase.

Task 10. Complete the table with appropriate words.

Noun	Verb		Noun	Adjective
1)	reduce		invisibility	7)
2)	require		change	8)
improvement	3)		9)	complex
4)	develop		10)	difficult
5)	argue		accident	11)
6)	enforce		conformity	12)

Recommended function
        Read **_Function 14 "HOW TO describe a process"_** *and try to describe a process of writing a program.*

Listening
        You are going to listen to **Fred Brooks** talk **"Design of Design"** at *WSOM Design Requirements Workshop.*

Task 1. a) Read about WSOM - Workshop on Self-Organizing Maps.

"WSOM brings together researchers and practitioners in the field of self-organizing systems, with a particular emphasis on the self-organizing maps. It highlights key advances in these and closely related fields. WSOM is a series of bi-annual international conferences started with SOM'97 Helsinki."

b) Who do you think is the audience? What is the subject of Fred Brooks's talk?

Task 2. Read the words and phrases. Make sure you know Russian equivalents.

prepare new talk, talk about requirements, relevant, the whole design process, define, the arranging conceived in the mind, execution, vernacular creation of things, implementation process, teach others to design, manage design, the design of systems, models of the design process, collaborative teams, solo/chief designers, 21st century design issues

Task 3. Part 1. 00.00 - 05.01
a) Watch and listen to the beginning of the talk and answer the questions.
    1. What is the purpose of the talk?
    2. What problems does Brooks discuss?
    3. What are the topics of the talk?
    4. Does he mention any famous people?
    5. Are there any examples or real life anecdotes?
    6. Are there any quotations?

b) Watch the video again and answer the questions to the video.

00.33-00.45	Is Fred Brooks going to talk about the design requirements?
	What is the subject of his talk?
00.46-01.11	What definition is he speaking about?
01.11-01.52	Brooks tells the story from real life. What is the sphere he is speaking? Is it cinema, science or music? What famous person does he mention?
01.53-02.17	What challenges is Brooks talking about?
02.31-03.01	Who is Fred Brooks quoting?
03.02-03.34	What are key points of the talk?
03.35-03.54	What famous designers does he mention?
03.55-04.35	What is the last question Fred wants to arise?
04.36-05.01	What is the topic Fred wants to start?

***Task 4. Part 2. 27.27-30.28-33.50***
a) Be sure you know the words and phrases.
software people, desiderata, utility function, budget constraints, critical budget, design tree of decisions, mono-rooted design tree, program crash, use functions of the Microsoft Word, function creep, design models, a waterfall model
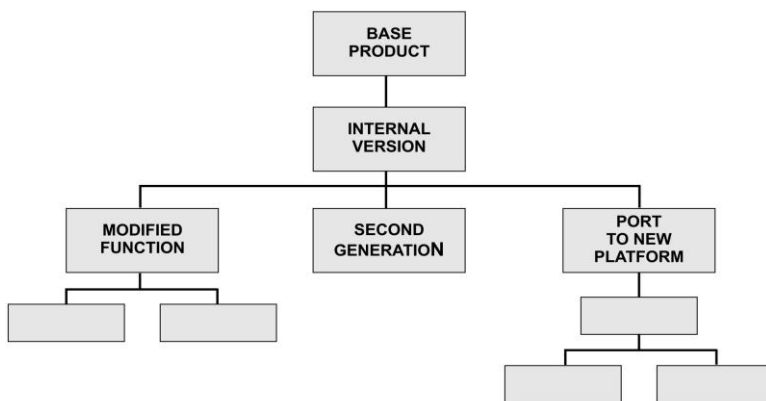
b) Look at the pictures A, B, C. Match the titles of the models with pictures.
1. Waterfall model of software construction
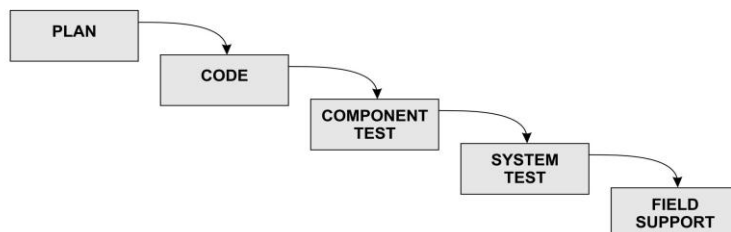2. An Incremental-Build Model
3. Parnas Families

c) Read the abstracts from Fred Brooks's book "The Mythical Man-Month". Match the abstracts with the pictures.
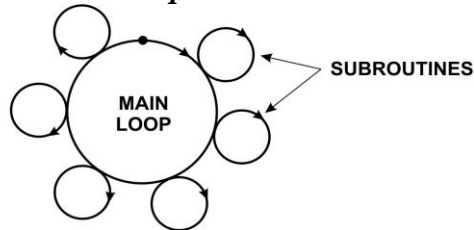
Picture A

Picture B

Picture C

1. The basic fallacy of the model is that it assumes a project goes through the process *once,* that the architecture is excellent and easy to use, the implementation design is sound, and the realization is fixable as testing proceeds. Another way of saying it is that the model assumes the mistakes will all be in the realization, and thus that their repair can be smoothly interspersed with component and system testing.

2. Harlan Mills, working in a real-time system environment, early advocated that we should build the basic polling loop of a real-time system, with subroutine calls *(stubs)* for all the functions, but only null subroutines. Compile it; test it. It goes round and round, doing literally nothing, but doing it correctly.

3. He has been a major thought leader in software engineering during this whole 20-year period. Everyone is familiar with his information-hiding concept. Rather less familiar, but very important, is his concept of designing a software product as a *family* of related products. He urges the designer to anticipate both lateral extensions and

succeeding versions of a product, and to define their function or platform differences so as to construct a family tree of related products.

d) Listen to Fred Brooks's talk. Answer the questions.
1. About what model of software construction does he speak?
2. What is his opinion about these models?
3. Fred Brooks says: "This model is dead wrong." What model does he mean?

Task 5. Decode one of the parts of the presentation:
Part 1 - 27.27 "We have a model…"– 28.27 "… it will cost you."
Part 2 - 28.27 "And you typically…" – 29.49 "…two thousand four hundred."
Part 3 - 29.49 "What's happened?..." – 30.28 "… I want to use"

Speaking
Read **Function 17 "HOW TO make a presentation".** *Also watch again the video of Brookes Talks and analyze it with the ideas in the Function. Prepare your own mini-presentation about* **an example of a successful or an unsuccessful program**. *Deliver it to your friends.*

Writing
Describe the **process of writing a program** *in a way different from the one you used when studying Function 9.*

Theme 16. MANAGEMENT

Lead-in
You are going to read the text about different types of management. Do you know anything about management levels?

Reading and Vocabulary
Task 1. a)Translate the following words and word-groups.

to implement	to oversee
an objective	entire (adj)
employ (v), an employee (n)	day-to-day
an employer	to monitor
to involve	to execute
to encourage	rigid (adj)
confidence (n), confident (adj)	to harvest
to be responsible for smth	to maintain
knowledge (n), knowledgeable (adj)	feedback (n)
major (adj), majority (n)	integral (adj)

b) Complete the table with appropriate nouns.

Verbs	Nouns
to implement	
to encourage	

to harvest	
to maintain	
to execute	
to monitor	

Task 2. This text tells general information about management, its types and its levels. Read the text and say what they are.

Management is an integral role in any business or organization, the manager's position is to get the most out of the resources at hand, these resources can include people, finance and material. The objective for the manager is to plan, organize and implement those resources in a way which will achieve the best results for the company.

Democratic management. In a democratic style, management will make decisions which are agreed upon by the majority of employees, therefore the workers feel involved and important to the organization. By involving the employees, management will be better informed to make the right decisions and harvest new ideas from the people who are involved in the day-to-day business of the company.

Autocratic management. An autocratic manager cuts an imposing and knowledgeable figure; decisions are made quickly and forcefully without involvement from anyone else. Other people's judgments and suggestions are usually neither listened to nor considered.

Paternalistic management. A paternalistic type of management encourages feedback from the workers to the leaders, essentially to maintain good morale and loyalty. It is the manager who will make the final decision, but the leader will listen to ideas and suggestions from the workers. Decisions are usually made in the best interest of the employees and business.

Different management levels.

Top-level management:
Top-level managers are the big bosses, Chief Executives and directors. They are responsible for overseeing and organizing the entire organization.

Middle-level management:
Examples of middle-level managers would be area supervisors and department managers. They are answerable to the top-level managers. The role of middle management is to execute and monitor organizational plans handed down from the top-level managers.

Low-level management:
Low-level managers are usually responsible for general supervision and motivation; examples of low-level managers are supervisors and sector leaders. Low-level managers are accountable to the middle-level managers.

Choosing the correct management style can be very tricky, but the manager ultimately has to be flexible, certain situations call for a certain styles of management. Being able to adapt to their surroundings and apply these theories can be the makings of a successful manager. Each style of management have their advantages and disadvantages, sticking to one rigid management model can lead to those disadvantages escalating, leading to low staff morale, decreasing confidence in the manager and eventually less success.

Task 3. Answer the questions to the text.
1. What is the objective of management in any organization?
2. What are the main characteristic features of democratic, autocratic and paternalistic management?
3. Give examples of top-level, middle-level and low-level managers.
4. What are top-level managers responsible for?
5. Why is it important to choose the correct management style?

Task 4. Read the following sentences and decide if they are true (T) or false (F).
1) Managers have only human resources at their disposal.
2) In a democratic style of management, the workers feel involved and important to the organization.
3) In a democratic style of management decisions are agreed upon by the minority of employees.
4) An autocratic manager usually consults with the employees when making decisions.
5) Paternalistic management implies good feedback from the workers to the leaders.
6) Big bosses and directors are responsible for overseeing and organizing the organization.
7) A department manager is an example of a low-level manager.
8) The correct management style results in success of the company.

Task 5. Match the words with their definitions.
1. an employee	a) suggestions (information, ideas) in reaction to an inquiry
2. a manager	b) to keep in proper or good condition
3. autocratic	c) a person that employs workers
4. an employer	d) a person who is hired to work for another for payment
5. to maintain	e) to carry out, to perform
6. feedback	f) a person who directs an organization, industry, shop
7. to oversee	g) routine
8. to encourage	h) to watch over and direct, to supervise
9. day-to-day	i) persuade someone to do something by giving support and advice
10. to execute	j) domineering or dictatorial

Task 6. Complete the sentences with the words from the box.

management	day-to-day	employees	to monitor
overseeing	objective	involvement	

1. The … for the manager is to plan, organize and implement the resources in a way which will achieve the best results for the company.
2. … plays an integral role in an organization.
3. An autocratic manager makes decisions quickly and forcefully without … from anyone else.

4. In a paternalistic style, decisions are usually made in the best interest of the …
   and business.
5. Top-level managers are responsible for … and organizing the entire
   organization.
6. The role of middle management is to execute and … organizational plans
   handed down from the top-level managers.
7. Employees are involved in the … business of the company.

Specialized Reading

Task 1. Translate the following words and word-groups.

manage (v), management (n)	assign (v), assignment (n)
delegate (v), delegation (n)	to exercise control
increase (v), increase (n)	value (v, n),
implement (v), implementation (n)	range (v, n)
set (v, n)	procrastination (n)
derive (v), derivative (n, adj)	schedule (v, n)
goal (n)	urgent (adj)
mode (n)	dispose (v), disposable (adj)
priority (n), prior (adj)	deadline (n)
determine (v), determination (n)	provide (v)

Task 2. Underline the stressed syllables in the following words.

process, effectiveness, to assign, prioritizing, work activities, high-priority actions, disposable time, dynamically, to eliminate, analysis, specific, strategy, to refer, immediately, to recover, software products, a schedule of activities, productivity, toward, item

Task 3. Read and translate the text.

Time management is the process of planning and exercising control over the amount of time spent on specific activities, especially to increase effectiveness or productivity. Time management may be aided by a range of skills, tools, and techniques used to manage time when accomplishing specific tasks, projects and goals. Time management also includes setting goals, monitoring, organizing, scheduling, and prioritizing. Initially, time management referred to just business or work activities, but eventually the term broadened to include personal activities as well. Time management system consists of:

1) Creating an effective environment.

This strategy has principles as "Get Organized"; "Protect Your Time"(isolate and delegate) and "Recover from Bad Time Habits" (for example from procrastination - the act of replacing high-priority actions with tasks of lower priority, or doing something from which one derives enjoyment, and thus putting off important tasks to a later time).

2) Setting priorities and goals.

Two themes are stressed here:
- "Work in Priority Order" - set goals and prioritize
- "Set gravitational goals" - that attract actions automatically

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For individual tasks or for goals, an importance rating must be established, deadlines must be set, and priorities assigned. This process results in a plan with a task list or a schedule of activities. This is done in various ways, as follows.

Pareto analysis

This is the idea that 80% of tasks can be completed in 20% of the disposable time. The remaining 20% of tasks will take up 80% of the time. This principle is used to sort tasks into two parts. According to this form of Pareto analysis it is recommended that tasks that fall into the first category should be assigned a higher priority.

The Eisenhower Method

	Urgent	Not Urgent
Important	Crying baby Kitchen fire Some calls 1	Exercise Vocation Planning 2
Not Important	3 Interruptions Distractions Other calls	4 Trivia Busy work Time wasters

All tasks are evaluated using the criteria important/unimportant and urgent/not urgent and put in according sector. Tasks in unimportant/not urgent are dropped, tasks in important/urgent are done immediately and personally, tasks in unimportant/urgent are delegated and tasks in important/not urgent get an end date and are done personally.

3) Implementing goals.

Time management centres on the creation and management of task lists. A task list (also *to-do list* or *things-to-do*) is a list of tasks to be completed, such as chores or steps toward completing a project. Task lists are used in self-management, business management. When one of the items on a task list is accomplished, the task is crossed off. The traditional method is to write these on a piece of paper with a pen. Many of the software products for time management contain a mode where the software will attempt to dynamically determine the best tasks for any given moment. It allows the manager to give tasks to the employees and use the software for communication. Time management also covers how to eliminate tasks that do not provide the individual or organization value.

Task 4. Answer the questions to the text.
1. What is time management?
2. What does time management refer to?
3. What is procrastination? Have you ever felt it?
4. What is the main idea of Pareto analysis?
5. In what order are the tasks done according to the Eisenhower Method?
6. What is a task list?
7. How can software products help authorities with time management?
8. What are the main principles of effective environment strategy?

Task 5. Read the following sentences and decide if they are true (T) or false (F).
1) Time management increases productivity.
2) Nowadays time management refers only to personal activities.
3) Deadlines must be set before priorities are assigned.
4) "Work in Priority Order" is one of the main principles of time management.
5) A task list is a list of priorities to be completed.
6) Important and urgent tasks are delegated to someone.
7) Trivia or busy work can be considered as important.
8) Tasks of no individual or organization value are eliminated.

Task 6. Match the words with their definitions.

1. deadline	a) to become greater in size, degree
2. urgent	b) the aim towards which intention is directed
3. to derive	c) requiring speedy action or attention
4. to increase	d) to exercise control or domination over
5. value	e) the act of replacing high-priority actions with tasks of lower priority
6. goal	f) a time limit for any activity
7. to manage	g) to establish
8. to set	h) the right of precedence over others
9. priority	i) to obtain
10. procrastination	j) worth

Task 7. Match the words from box A with the words from box B to make phrases from the text.

A.	**B.**
to exercise, to increase, time, high-priority, to set, disposable, software, to derive.	enjoyment, goals, productivity, control, action, products, time, management.

Task 8. Find the words from the text that match this phonemics.

1. /ɪnˈvaɪrənm(ə)nt/		7. /tekˈniːk/	
2. /əˈkʌmplɪʃ/		8. /əˈnælɪsɪs/	
3. /ˈəːdʒ(ə)nt/		9. /tʃɔː/	
4. /ˈeksəsaɪz/		10. /praɪˈɔrətaɪz/	
5. /ɪˈlɪmɪneɪt/		11. /əˈsaɪn/	
6. /ˈveːrɪəs/		12. /ˈbrɔːd(ə)n/	

Recommended function

Study **_Function 10 "HOW TO describe a thing"_** *and summarize the information about the types, levels and process of management.*

Listening

With distractions in the workplace - from emails to telephone calls - it seems hard to get any work done. **Renee Montagne** talks to *Financial Times* columnist

Lucy Kellaway about time management in her life and in the lives of workers everywhere.

Task 1.a)Check you know these words and phrases.

endless interruption, a tube, to prompt, a mad dash, upshot, to claim, to cope with, multitasking, will power, to be addicted, comforting thoughts, to get rid of, consumption, to bother, ramification

b) Listen to the text and underline the words in the box that you hear.

Task 2. Answer the questions on the recording.
1. What is the best method of time management according to the book by Atul Gawande?
2. Why does Lucy Kellaway dislike this method?
3. How is it possible to cope with different distractions in our modern life?
4. Why is multitasking a disaster for people?
5. What distractions do you usually have that prevent you from doing any work?

Task 3. Read the following sentences and decide if they are true (T) or false (F).
1) Lucy's problem is about forgetting things.
2) A checklist will probably stop your plans from collapsing.
3) Multitasking overloads long-term memory.
4) Time management is a key to getting work done.
5) It is easy to get rid of bad habits that distract.

Task 4. Write the words from the text to the following transcriptions.

1./ˈtʃeklɪst/		6./kəˈlæps/	
2./əˈtenʃn/		7./riˈspekt/	
3./ˈʌpʃɔt/		8./ˈmeməri/	
4./ˈprɔbləm/		9./diˈzaːstə/	
5./ˈɑːgjuː/		10./dæʃ/	

Task 5. Decode one of the 4 parts of the text:
Part 1 –01.13 "I had just read …" – 01.34 "…by checklists."
Part 2 – 02.12 "How else …" – 02.38 "…do anything at all."
Part 3 – 02.51 "So, I just decided …" – 03.11 "…particular hour."
Part 4 – 03.15 "Well, there were …" – 03.35 "…on the Internet."

Recommended function
Study **Function 3 "HOW TO deal with modal verbs"** *and write some advice on* ***how to manage your time*** *effectively.*

Speaking
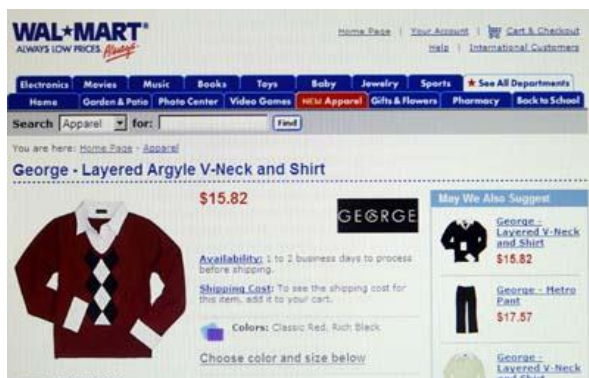*Prepare a talk about* ***a company*** *and tell about the following:*
- its name, place, size
- its specialization
- the management system in it
- advantages and disadvantages of their management system

Writing

Write 10 sentences with modal verbs about **how to manage business successfully.**

Theme 17. E-COMMERCE

Lead-in

You are going to read the text about the history of e-commerce. Do you know anything about it?

Reading and Vocabulary

Task 1. **a)***Translate the following words and word-groups.*

to conduct transactions	chat room
customer-oriented	confirm (v), confirmation (n)
an invoice	a merchant
process (v), processing (n)	to format documents
to pave the way	purchase (v, n)
an order form	interact (v), interaction (n)
to lift a ban	navigate (v), navigation (n)
shipping confirmation	a checkout system
propose (v), proposal (n)	verify (v), verification (n)
newsgroup	browse (v), browser (n)
message board	review (v, n), reviewer (n)

b) Use these words and phrases in your own sentences.

Task 2. This text tells general information about history of e-commerce. What are the most important steps in its development?

     E-commerce's history is short but fascinating. Over the course of a few decades, networking and computing technology has improved at great rates. Powerful personal computers linked to global information networks have powered a whole new world of intellectual, social and financial interactions. And this is only the beginning. As far back as the 1960s, businesses were using primitive computer networks to conduct electronic transactions. A company's computer system could share business documents - invoices, order forms, shipping confirmation - with another company's computer. In the beginning, each company had its own standards for formatting these documents. But in 1979, the American National Standards Institute came up with a universal standard for sharing business documents over electronic networks.

By the early 1980s, individual computer users were sending e-mails, participating in listservs and newsgroups, and sharing documents over networks like BITNET and USENET. CompuServe was one of the first popular networking services for home PC users, providing tools like e-mail, message boards and chat rooms. In the mid-1980s, Compuserve added a service called the Electronic Mall, where users could purchase items directly from 110 online merchants. While the Electronic Mall wasn't a huge success, it was one of the first examples of e-commerce as we know it today. In 1990, a researcher named Tim Berners-Lee proposed a hypertext-based web of information that a user could navigate using a simple interface called a browser. He called it the "WorldWideWeb". And in 1991, the National Science Foundation lifted a ban on commercial businesses operating over the Internet, paving the way for Web-based e-commerce. In 1994 and 1995, the first services for processing online credit card sales began to appear. First Virtual and CyberCash were two of the most popular. Also in 1995, a company called Verisign began developing digital IDs, or certificates, that verified the identity of online businesses.

Now let's take a closer look at the company «Amazon» that transformed e-commerce in the mid-1990s. In July 1995, Jeff Bezos boxed up the first book ever sold on Amazon.com from his Seattle garage. Within its first 30 days of business, he sold books to online shoppers in all 50 U.S. states and 45 countries. Books were cheap to ship and easy to order directly from publishers. Amazon.com set the standard for a customer-oriented e-commerce Web site. Users could search available titles by keyword, author or subject. They could browse books by category and even get personalized recommendations. They could also purchase books quickly with the patented "one-click" checkout system. The most popular Amazon.com feature has always been the reader review option. On Amazon, any registered member can write and publish a book review. And other users can rank each review, creating a hierarchy of top reviewers. Amazon now offers music, movies, electronics, toys, home and garden equipment, clothing, jewelry, video games.

Task 3. Answer the questions to the text.
1. When was a universal standard for sharing business documents over electronic networks adopted?
2. What service was the first example of e-commerce?
3. Who proposed "World Wide Web"?
4. What were two of the most popular services for processing online credit card sales in 1994-1995?
5. How can the identity of online business be verified?
6. Who was the founder of the company «Amazon»?
7. What were the advantages of buying books on Amazon.com?
8. What is the most popular Amazon.com feature?

Task 4. Read the following sentences and decide if they are true (T) or false (F).
1) At the beginning, all companies had unified standards for formatting documents.
2) Networking and computing technology have improved greatly for a few decades.
3) In 1979, the American National Standards Institute came up with a universal standard for sharing business documents over electronic networks.

4) In 1991, the National Science Foundation banned commercial businesses operating over the Internet.
5) The Electronic Mall wasn't a huge success, but it was one of the first examples of e-commerce.
6) Amazon.com did not have "one-click" checkout system.
7) On Amazon, any registered member can write and publish a book review.
8) Amazon.com set the standard for a customer-oriented e-commerce Web site.

Task 5. Match the words with their definitions.

1. transaction	a) a person who traffics in commodities for profit.
2. confirmation	b) prohibition
3. merchant	c) to perform a particular process
4. a purchase	d) a commercial document issued by a seller to a buyer indicating the products
5. a ban	e) to confirm the truth of something
6. to process	f) the act of carrying out business, negotiations, plans
7. to ship	g) to navigate through hyperlinked documents on a computer
8. to verify	h) to send (a parcel or container) to a recipient (by any means of transport).
9. to browse	i) an official indicator that things will happen as planned
10. invoice	j) that which is obtained for a price in money

Task 6. Complete the sentences with the words from the box.

browse	invoice	purchase	verify	transactions
processing	interactions	navigate	proposed	

1.   At that time businesses were using primitive computer networks to conduct electronic ...
2.   Nowadays customers can easily … different goods doing online shopping.
3.   In 1994 and 1995, the first services for … online credit card sales began to appear.
4.   On Amazon, users could … books by category and even get personalized recommendations.
5.   In 1990, Tim Berners-Lee … "WorldWideWeb" where a user could … using a browser.
6.   Digital IDs (identifiers) are certificates that … the identity of online businesses.
7.   An … is one of the most important business documents in any company.
8.   Powerful personal computers linked to global information networks have powered a whole new world of intellectual, social and financial … .

Specialized Reading

Task 1. a) Translate the following words and phrases.

commodity	facility (n), facilitate (v)
participate in (v), participation (n)	to handle
a retailer	warranty

a <u>who</u>lesaler	to in<u>vol</u>ve
con<u>su</u>me (v), con<u>su</u>mer (n)	<u>o</u>ffer (v, n)
a <u>ven</u>dor	a fee
to hire	charge (v, n)
<u>ad</u>vertise (v), <u>ad</u>vertising (n)	re<u>tur</u>n (v, n)
ac<u>cept</u> (v), ac<u>cep</u>table (adj)	de<u>li</u>ver (v), de<u>li</u>very (n)
ful<u>fill</u> (v), ful<u>fill</u>ment (n)	claim (v, n)

b) What is the difference between the terms:
a vendor, a merchant, a retailer, a wholesaler, a shop assistant?

Task 2. Underline the stressed syllables in the following words.

transportation, to recognize, by necessity, selection, environment, potential, directly, transaction, complicated, to require, ephemeral, to honor, package, at a grocery store,   to purchase, independent, a distributor, to locate,   a review

Task 3. Read and translate the text.

Commerce is buying and selling of commodities on a large scale involving transportation from place to place. So commerce is the exchange of goods and services, usually for money. We see commerce all around us in millions of different forms. When you buy something at a grocery store you are participating in commerce. If you go to work each day for a company that produces a product, that is yet another link in the chain of commerce. When you think about commerce in these different ways, you recognize several different roles:

- Buyers - these are the people with money who want to purchase a good or service.
- Sellers - these are the people who offer goods and services to buyers. Sellers are generally recognized in two different forms: retailers who sell directly to consumers and wholesalers or distributors who sell to retailers and other businesses.
- Producers - these are the people who create the products and services that sellers offer to buyers. A producer is always, by necessity, a seller as well. The producer sells the products produced to wholesalers, retailers or directly to the consumer.

Consumer advantages of e-commerce.

E-commerce has a lot of advantages for consumers as well as for retailers. When CompuServe created its Electronic Mall in the 1980s, few consumers had even dreamed of an online shopping environment. Now for many, it's become a way of life. Buying goods and services online saves time, offers greater selection, allows for independent research and often saves the consumer money. E-commerce gives consumers power that they never had before. Now buyers can read reviews, compare prices from hundreds of vendors and even watch videos about the products.

Vendor advantages of e-commerce.

E-commerce is a playing field for retail businesses. Anyone, anywhere with an Internet connection can read about their product, and buy it. They don't have to set up physical locations in different cities. They just need to invest in a good Web site design and the right online advertising to catch the attention of potential online clients. The vendor doesn't have to hire and train salespeople to pitch the product or service. The Web site does it for the company. Also the Internet never closes. Web sites are

working 24/7. People can read marketing materials and buy products outside of normal business hours.

The elements of commerce activity.

All of the elements of a typical commerce activity come into play in any traditional mail order company, whether it is selling books, consumer products, and information in the form of reports and papers, or services.

- A product. You must have a product or service to offer. You may get your products directly from a producer, or you might go through a distributor to get them, or you may produce the products yourself.
- A place. You must also have a place from which to sell your products. Web site displays the products in some way and acts as the place. Place can sometimes be very ephemeral - for example a phone number might be the place.
- A way to get people to come to your Web site. You need to figure out a way to get people to come to your place. This process is known as marketing. If no one knows that your place exists, you will never sell anything. Locating your place in a busy shopping center is one way to get traffic.
- A way to accept orders. In a mail order company the orders come in by mail or phone and are processed by employees of the company.
- A way to accept money. You can accept cash, check or credit cards. Business-to-business transactions often use purchase orders.
- A fulfillment facility to ship products to customers. You need a way to deliver the product. In mail-order businesses the item is packaged and mailed. Large items must be loaded onto trucks or trains and shipped.
- A way to accept returns. Sometimes customers do not like what they buy, so you need a way to accept returns. You may or may not charge certain fees for returns.
- A way to handle warranty claims if necessary. Sometimes a product breaks, so you need a way to honor warranty claims. For retailers this part of the transaction is often handled by the producer.
- A way to provide customer service. Many products today especially modern electronic items are so complicated that they require customer service and technical support departments to help customers to use them. Computers are a good example of this sort of product.

Task 4. Answer the questions to the text.
1. What is commerce?
2. What are the main roles in commerce?
3. What advantages does e-commerce have for a consumer and for a vendor?
4. What does a producer do?
5. What forms of sellers do you know?
6. Why should a seller or a producer invest money in advertising?
7. What are the main elements of a typical commerce activity?
8. How is money accepted in online shops?
9. Why is it important for a vendor to honor warranty claims?
10. Is it necessary to provide customer service for all products?

Task 5. Read the following sentences and decide if they are true (T) or false (F).
1) Commerce is the exchange of goods and services, usually for money.
2) Everyone is a participant of commerce in one way or another.

3) A distributor sells products directly to consumers.
4) A producer is never a seller.
5) CompuServe created its Electronic Mall in the 1980s.
6) Buying goods and services online saves time and the consumer money.
7) A phone number cannot be considered as a place.
8) People can buy products outside of normal business hours.
9) It is forbidden to return the good if you do not like it.
10) Web sites are working 24/7.

Task 6. Match the words with their definitions.

1. commodity	a) a monetary payment charged for professional services
2. warranty	b) to obtain the services in return for fixed payment
3. fee	c) to take part in something
4. advertising	d) to receive
5. to hire	e) a person or a company that sells
6. vendor	f) that which is produced, then bought or sold, then finally consumed
7. to deliver	g) the required equipment
8. to participate in	h) to transport something to its destination
9. facility	i) communication whose purpose is to influence potential customers about products and services
10. to accept	j) guarantee

Task 7. Check the meaning of the following phrases from the text and make your own sentences with them.

- yet another link in the chain of …
- have a lot of advantages for … as well as for …
- catch the attention of smb
- come into play
- charge money for smth
- honor warranty claims

Recommended function
Study **Function 12 "HOW TO define a thing and explain its use and structure".** Write some sentences describing the **elements of e-commerce.**

Listening
Over the past decade, **Online retail** has increased fivefold. There are many reasons for the surge. In some cases, better service, better price, better selection. As **Yuki Noguchi** reports, these days, you can find just about anything online.

Task 1.a) Check you know these words and phrases.

online retail, a surge, adjoining, a nursery, to embody, to respond, to charge an annual fee, an incentive, receptive, a mug, to conserve energy, a stack, recycling, decade, to increase, to claim, occasionally, to overload, comforting, a complaint

b) Listen to the recording and underline the words in the box that you hear.

Task 2. Answer the questions.
1. Why has online retail increased over the past decade?
2. What incentives will there be in the future to make people shop?
3. What are the advantages of purchasing things in online shops?
4. What are the negative moments concerning deliveries?
5. Have you ever tried online shopping? What are your impressions about it?

Task 3. Read the following sentences and decide if they are true (T) or false (F).
1) Online shops can offer customers better service, better price, better selection.
2) As Ann Houseman says she actually structures her day around when the Web boutiques open.
3) Young generation is not so interested in online shopping.
4) Nevertheless Annˈs husband goes to a real store nearly every day.
5) A huge amount of boxes after deliveries is not a problem for the Houseman at all.

Task 4. Write the words from the text to the following transcriptions.

1./pəˈsent/		6./ˈkredɪt/	
2./ˈriːteɪl/		7./ɪmˈbɔdi/	
3./ˈriːzn/		8./ˈpɜːtʃəs/	
4./ɪnˈtaɪə/		9./ɔnˈlaɪn/	
5./kənˈsɜːn/		10./sɜːdʒ/	

Task 5. Decode one of the 4 parts of the text:
Part 1 –01.54 "John Burbank is president of …" – 02.20 "… is just the beginning."
Part 2 – 02.29 "And the Housemans …" – 02.49 "… these Web boutiques open".
Part 3 – 03.15 "He also says …" – 03.30 "… on products ."
Part 4 – 04.00 "When the boxes actually arrive …" – 04.09 "…you get to see it."

Recommended function

Read **_Function 8 "HOW TO make comparison and contrast"_** *and speak about similarities and differences between traditional commerce and e-commerce.*

Speaking

Imagine that you are a seller of some product. Prepare **a short advertisement** *about it in order to make your group mates want to buy this product. Use some structures from Function 8.*

Writing

Write about **one of your favorite online shops** *and compare it with others and with traditional shops of such kind.*

Theme 18. BANKS

Lead-in

Do you often go to the bank? What for? What types of banks do you know?

Reading and Vocabulary

Task 1. a)Read and translate these words and phrase.

account (n)	emergency (n)	deduct (v, n)
account balance	extend (v), extension (n)	in cash
interest (n)	a run on the bank	goods
to pay interest	Federal Reserve	consume (v), consumer (n)
convenience (n)	reserve requirement	percentage (n)
substitute (v, n)	govern (v), government (n)	insurance corporation
loan (n)	to make loans	to rely on
derive (v)	thrift institutions	lend (v)
to derive a profit	savings bank	borrow (v)
deposit (v, n)	withdrawal (n)	mortgage (n)
purchase (v, n)	to make withdrawals	to deal in

b) Make some sentences about banks in Russia using words and phrases from the box.

c) Can you comment on this figure?
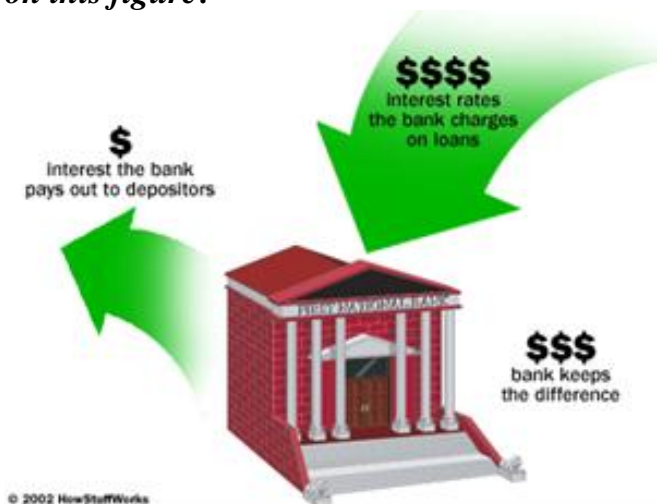
Task 2. This text has general information about American banks. Read the text and say what types of banks are mentioned in the text.

The funny thing about how a bank works is that it functions because of our trust. We give a bank our money to keep it safe for us, and then the bank turns around and gives it to someone else in order to make money for itself. Banks can legally extend considerably more credit than they have cash. Still, most of us have total trust in the bank's ability to protect our money and give it to us when we ask for it. Why do we feel better about having our money in a bank than we do having it under a mattress? Is it just the fact that they pay interest on some of our accounts? Is it because we know that if we have the cash in our pockets we'll spend it? Or, is it simply the convenience of being able to write checks and use debit cards rather than carrying

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cash? Any and all of these may be the answer, particularly with the conveniences of electronic banking today. Now, we don't even have to manually write that check - we can just swipe a debit card or click the "pay" button on the bank's Web site. In this text, we'll look into the world of banking, will see how these institutions work and why we should (or shouldn't) trust them with our hard earned cash.

What is a bank? A bank is an institution that deals in money and its substitutes and provides other financial services. Banks accept deposits and make loans and derive a profit from the difference in the interest rates paid and charged, respectively. Banks are critical to our economy. The primary function of banks is to put their account holders' money to use by lending it out to others who can then use it to buy homes, businesses, send kids to college...When you deposit your money in the bank, your money goes into a big pool of money along with everyone else's, and your account is credited with the amount of your deposit. When you write checks or make withdrawals, that amount is deducted from your account balance. Interest you earn on your balance is also added to your account. Banks create money in the economy by making loans. The amount of money that banks can lend is directly affected by the reserve requirement set by the Federal Reserve. The reserve requirement is currently 3 percent to 10 percent of a bank's total deposits. This amount can be held either in cash on hand or in the bank's reserve account with the Fed. To see how this affects the economy, think about it like this. When a bank gets a deposit of $100, assuming a reserve requirement of 10 percent, the bank can then lend out $90. That $90 goes back into the economy, purchasing goods or services, and usually ends up deposited in another bank. That bank can then lend out $81 of that $90 deposit, and that $81 goes into the economy to purchase goods or services and ultimately is deposited into another bank that proceeds to lend out a percentage of it. In this way, money grows and flows throughout the community in a much greater amount than physically exists. That $100 makes a much larger ripple in the economy than you may realize!

Why does banking work? Banking is all about trust. We trust that the bank will have our money for us when we go to get it. We trust that it will honor the checks we write to pay our bills. The thing that's hard to grasp is the fact that while people are putting money into the bank every day, the bank is lending that same money and more to other people every day. Banks consistently extend more credit than they have cash. That's a little scary; but if you go to the bank and demand your money, you'll get it. However, if everyone goes to the bank at the same time and demands their money (a run on the bank), there might be a problem. Even though the Federal Reserve Act requires that banks keep a certain percentage of their money in reserve, if everyone came to withdraw their money at the same time, there wouldn't be enough. In the event of a bank failure, your money is protected as long as the bank is insured by the Federal Deposit Insurance Corporation (FDIC). The key to the success of banking, however, still lies in the confidence that consumers have in the bank's ability to grow and protect their money. Because banks rely so heavily on consumer trust, and trust depends on the perception of integrity, the banking industry is highly regulated by the government.

There are several types of banking institutions, and initially they were quite distinct. Commercial banks were originally set up to provide services for businesses. Now, most commercial banks offer accounts to everyone. Savings banks, savings and loans, cooperative banks and credit unions are actually classified as thrift institutions. Each originally concentrated on meeting specific needs of people who were not covered by commercial banks. Savings banks were originally founded in order to provide a place for lower-income workers to save their money. Savings and loan

associations and cooperative banks were established during the 1800s to make it possible for factory workers and other lower-income workers to buy homes. Credit unions were usually started by people who shared a common bond, like working at the same company (usually a factory) or living in the same community. The credit union's main function was to provide emergency loans for people who couldn't get loans from traditional lenders. These loans might be for things like medical costs or home repairs. Now, even though there is still a differentiation between banks and thrifts, they offer many of the same services. Commercial banks can offer car loans, thrift institutions can make commercial loans, and credit unions offer mortgages!

Task 3. Answer the questions to the text.
1. What is a bank?
2. What is the most convenient way of using money?
3. How can account holders' money be used?
4. What is the primary function of banks?
5. How many types of banking institutions do you know?
6. What is the FDIC?
7. When were first cooperative banks established?
8. What financial products do the banks sell?
9. What do banks charge for their service?
10. What are sources of income for banks?

Task 4. Read the following sentences and decide if they are true (T) or false (F).
1) Banks derive a profit from the difference in the charged and paid interest rate.
2) The primary function of banks is to use their account holders' money to buy homes, businesses etc.
3) When you make withdrawals, the amount is added to your account balance.
4) The banking industry is not regulated by the government.
5) The amount of physically existing money is much greater than loaned.
6) If one wants to withdraw his money from the bank, it will be problematic.
7) Banks and thrift institutions offer many of the same services.
8) Banks rely heavily on consumer trust and their confidence in the bank's ability to grow and protect their money.
9) A run on the bank is a situation when clients go to the bank and demand their money at the same time.
10) 15 percent of a bank's total deposit is the reserve requirement.

Task 5. Complete the sentences with the words from the box.

emergency	bank	deposit	thrift institutions
profit	mortgage	confidence	

1. When your money goes into a big pool of money along with the others, it means that you … it in a bank.
2. Banks derive a … from the difference in the interest rate.
3. Consumers' … lies in the bank's ability to grow and to protect their money.
4. To buy your own house you can take a … without having to save all of the money you need.
5. ... loans are loans for things like medical costs or home repairs.
6. Savings banks, cooperative banks and credit unions are classified as …

7. A financial institution that accepts deposits and channels those deposits into lending activities is called a …

Recommended function

*Study **Function 14 "HOW TO describe a process"** and tell about how banks functions in two different ways.*

Specialized Reading

Task 1. Translate the following words and word-groups.

borrow (v), borrower (n)	to transfer the funds
fee (n)	charge (v, n)
short-term loan	savings account
source of income	fund rate
overdraft protection	transaction
deposit (v), depositor (n)	involve (n)
securities (n)	interest rate
certificate of deposit (CD)	retire (v), retirement (n)
clearinghouse (n)	negotiable order of withdrawal account
restrict (v), restriction (n)	invest (v), investment (n)

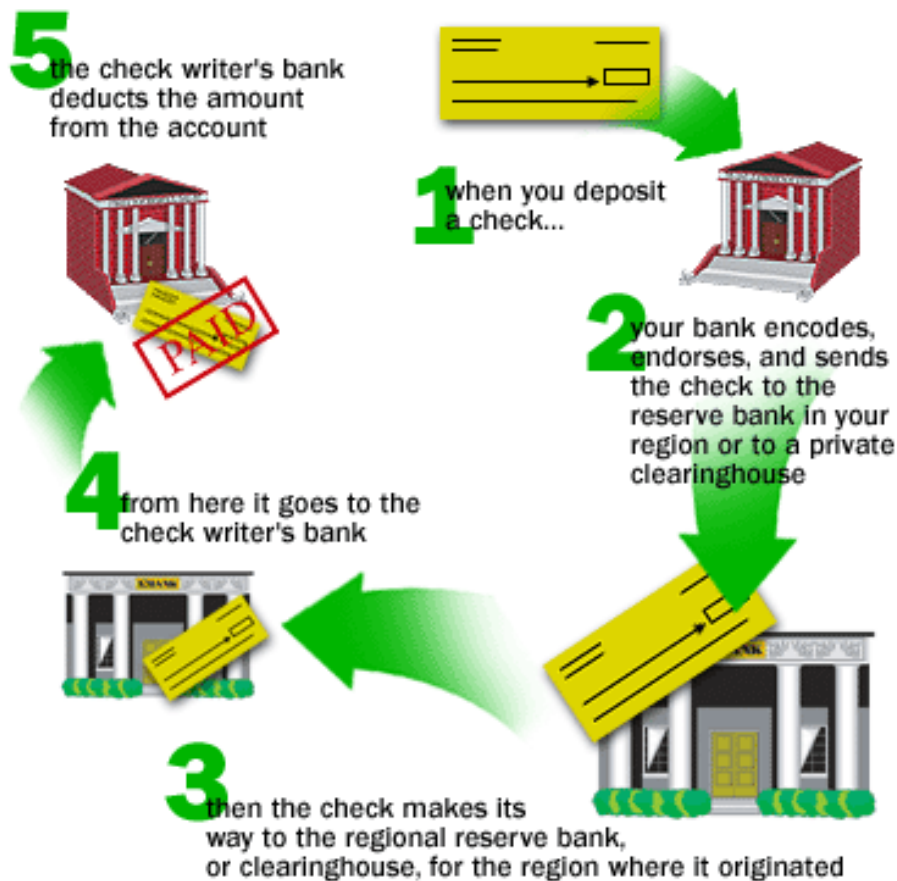### Task 2. Underline the stressed syllables in the following words.

financial products, reserve requirements, inherently, overdraft protection, income, convenient, alternative, complicated, the Federal Reserve, private, negotiable order of withdrawal, deposit, to transfer, restriction, duration, penalty, specific, limited transaction privileges, prior, minimum balance

Task 3. Read and translate the text.

Banks are just like other businesses. Their product just happens to be money. Other businesses sell widgets or services; banks sell money - in the form of loans, certificates of deposit (CDs) and other financial products. They make money on the interest they charge on loans because that interest is higher than the interest they pay on depositors' accounts. The interest rate a bank charges its borrowers depends on both the number of people who want to borrow and the amount of money the bank has available to lend. The amount available to lend also depends upon the reserve requirement the Federal Reserve Board has set. At the same time, it may also be affected by the funds rate, which is the interest rate that banks charge each other for short-term loans to meet their reserve requirements. Loaning money is also inherently risky. A bank never really knows if it'll get that money back. Therefore, the riskier the loan, the higher the interest rate the bank charges. While paying interest may not seem to be a great financial move in some respects, it really is a small price to pay for using someone else's money. Imagine having to save all of the money you needed in order to buy a house. We wouldn't be able to buy houses until we retired! Banks also charge fees for services like checking, ATM access and overdraft protection. Loans have their own set of fees that go along with them. Another source of income for banks is investments and securities.

Checking Accounts

Banks offer lots of financial products for their depositors. The checking account is one of the most common ones. It's convenient because it lets you buy things without having to worry about carrying the cash - or using a credit card and paying its interest. While most checking accounts do not pay interest, some do - these are referred to as negotiable order of withdrawal (NOW) accounts. Some say that checks have been around since about 352 B.C. in the Roman Empire. It appears that checks really started becoming popular in Holland in the 1500 to 1600s. Dutch "cashiers" provided an alternative to keeping large amounts of cash at home and agreed to hold depositors' money for safekeeping. For a fee, they would pay the depositors' debts from the account based on a note that the depositor would write - sounds a lot like a check! Today's banks do the same thing. It became a little more complicated when lots of banks became involved and money needed to be shifted from one bank to the next. To make things easier, banks now have a system of check "clearinghouses**."** Banks either send checks through the Federal Reserve or use a private clearinghouse to transfer the funds and clear the check. Here is a diagram of how that works.

5 the check writer's bank deducts the amount from the account

1 when you deposit a check...

2 your bank encodes, endorses, and sends the check to the reserve bank in your region or to a private clearinghouse

4 from here it goes to the check writer's bank

3 then the check makes its way to the regional reserve bank, or clearinghouse, for the region where it originated

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Loans, Checks and Savings

Aside from checking accounts, they offer loans, certificates of deposits and money market accounts, not to mention traditional savings accounts. Some also allow you to set up individual retirement accounts (IRAs) and other retirement or education savings accounts. There are, of course, other types of accounts being offered at banks across the country, but these are the most common ones.

- Savings accounts - The most common type of account, and probably the first account you ever had, is a savings account. These accounts usually require either a low minimum balance or have no minimum balance requirement, and allow you to keep your money in a safe place while it earns a small amount of interest each month. In standard practice, there are no restrictions on when you can withdraw your money.

- Money market accounts - A money market account (MMA) is an interest-earning savings account with limited transaction privileges. You are usually limited to six transfers or withdrawals per month, with no more than three transactions as checks written against the account. The interest rate paid on a money market account is usually higher than that of a regular passbook savings rate. Money market accounts also have a minimum balance requirement.

- Certificates of deposit - These are accounts that allow you to put in a specific amount of money for a specific period of time. In exchange for a higher interest rate, you have to agree not to withdraw the money for the duration of the fixed time period. The interest rate changes based on the length of time you decide to leave the money in the account. You can't write checks on certificates of deposit. This arrangement not only gives the bank money they can use for other purposes, but it also lets them know exactly how long they can use that money.

- Individual retirement accounts and education savings accounts - These types of accounts require that you keep your money in the bank until you reach a certain age or your child enters college. There can be penalties with these types of accounts, however, if you use the money for something other than education, or if you withdraw the money prior to retirement age.

Task 4. Answer the questions to the text.
1. What does the interest rate depend on?
2. Why is loaning money risky?
3. What financial products do banks offer?
4. Speaking about certificates of deposit, do you have to agree not to withdraw the money for the duration of the fixed time period?
5. What does education savings account require?

Task 5. Match the words from box A with the words from box B to make phrases from the text.

A	B
interest, reserve, short-term, overdraft, financial, credit, checking, fixed	card, loans, time period, rate, products protection, requirement, account

Task 6. Choose the correct variant and complete the following sentences.
1.The most common financial product is …
   a. *loan*
   b. *checking account*
   c. *clearinghouse*
2. The first checks appeared in …
   a. *the Roman Empire*
   b. *Greece*

c. *Egypt*

3. Accounts that allow you to put in a specific amount of money for a specific period of time are called …

    a. *money market accounts*

    b. *mortgage*

    c. *certificates of deposit*

4. Accounts that require you to keep your money in the bank until you reach a certain age or your child enters college are called...

    a. *individual retirement accounts and education savings accounts*

    b. *certificates of deposit*

    c. *money market accounts*

5. You can't write checks on …

    a. *savings account*

    b. *withdrawal*

    c. *certificates of deposit*

Task 7. Match the words with their definitions.

1. goods	a) a certificate of property carrying the right to receive interest or dividend
2. consumer	b) the period of being retired from work
3. securities	c) the monetary gain derived from a transaction
4. fee	d) an enterprise in which money can be invested
5. retirement	e) money lent at interest for a period of time
6. investment	f) possessions and personal property
7. loan	g) a person who places money on deposit in a bank
8. profit	h) a person who acquires goods and services for his own personal needs
9. depositor	i) the amount of money earned over a given period of time
10. income	j) a payment asked by professional people for their services

Task 8. Comment on the diagram in the text about how clearinghouse system works.

Task 9. Write the words to the following phonemics.

1. /sɔːs/		7./det/	
2. /nɪˈɡəʊʃəb(ə)l/		8. /tʃɑːdʒ/	
3. /rɪˈstrɪkʃ(ə)n /		9./dɪˈpɔzɪtə/	
4./wɪðˈdrɔːəl/		10./kəˈʃɪə/	
5./rɪˈtaɪəm(ə)nt/		11./ˈprɪvɪlɪdʒ/	
6./ˈsʌbstɪtjuːt/		12./ ˈpəːtʃəs/	

Listening

Scott Simon talks **to Gail Marks Jarvis**, personal finance blogger for the *Chicago Tribune*, about her recent post **"Is my money safe in a bank?"**

Task 1.Check you know these words.

supervision, to stir up, to develop, diversified investments, to expose, support, to handle, insecurity, a tax, a bond, government services, to diversify, to insure, to double-check, a failure

Task 2. Listen to the text and underline the words in the box that you will hear.

Task 3. Answer the questions.
1. What is a limit of money protected by the bank if you are an individual?
2. What banking services are insured?
3. Can the Federal Deposit Insurance Corporation control bank failures?
4. What are the government measures to deal with bank failures?
5. Why is it important to have the insurance that the FDIC provides?

Task 4. Read the following sentences and decide if they are true (T) or false (F).
1) Your money is safe in a bank if you have the insurance that the Federal Deposit Insurance Corporation provides.
2) Your money is protected up to 100,000 dollars per family.
3) In a bank, it's the traditional banking services that are insured, the checking account, the savings account, and the certificates of deposits.
4) Some banks are riskier than the others.
5) The list of banks with some level of insecurity is available to everyone.

Task 5. Write the words from the text to the following transcriptions.

1./fʌnd/		6./ˈfeɪljə/	
2./bɔnd/		7./həˈraɪzən/	
3./ˌsjuːpəˈvɪʒən/		8./ˌɪnsɪˈkjʊər/	
4./ˌɪndɪˈvɪdʒuəl/		9./faɪˈnænʃl/	
5./ˈmɔːgɪdʒ/		10./ˈtrʌbl/	

Task 6. Decode one of 4 parts of the text:
Part 1 – 00.41 "Are banks the safest place …" – 01.28 "…two hundred and fifty thousand."
Part 2 – 01.29 "What if someone …" – 02.06 "…the CDs."
Part 3 – 02.07 "What about if …" – 02.30 "…protected."
Part 4 – 03.00 "Can the FDIC afford …" - 03.53 "…to cover it."

Recommended function and writing
Study **Function 8 "HOW TO make comparison and contrast"** *and write a review comparing* **different banks** *or services one bank provides.*

Speaking
Prepare a talk about **one of the banks** *you know very well. Tell about the following things:*
- its name, type, location, if it's a head office or a subsidiary
- its services and offers
- your experience with this bank, your opinion of it