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ENGINEERING AND TECHNOLOGY



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ENGINEERING AND TECHNOLOGY

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Основной целью пособия является развитие иноязычной коммуникативной компетенции студентов в сфере их будущей профессиональной деятельности, а также формирование профессионально-важных качеств и навыков современного инженера. Пособие основано на модульном подходе как наиболее гибком и универсальном способе организации обучения иностранному языку. Составлено на материале аутентичных текстов интернет-сайтов (США, Великобритания, Канада)

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MODULE 1

FROM STUDENTS LIFE TO ENGINEERING CAREER

Lead in

“They know enough who know how to learn”

Henry Brooks Adams (1838 –1918), an American novelist, journalist, historian and academic.

What do you think the best ways to learn English are?

1. Work in pairs or small groups. Look at the following ways of learning.

Put them in order from the most effective to the least effective. Think of other ways to learn English.

1. Reading texts to retell them
2. Translating texts
3. Reading aloud
4. Discussing/brainstorming different topics
5. Doing grammar/ vocabulary exercises (filling the gaps, etc.)
6. Working with a partner/ in a group
7. Role-playing different situations
8. Listening to records
9. Watching videos
10. Doing projects
11. Writing letters and essays
12. Etc.

2. Compare your ideas with other pairs/ groups.

UNIT 1

WHAT COMES INTO LEARNING

“A university should be a place of light, of liberty and learning”

Benjamin Disraeli

Culture corner

Benjamin Disraeli (1804 – 1881) was a British politician and writer. He served in government for three decades, twice as Prime Minister of the United Kingdom. He was the creator of the modern Conservative Party.

For a start

You have entered the university and become a student. It means that you had good grades at school and did well enough in the university entrance exams. What helped you to reach a success in your studies? What do you think can help you when studying at university? (the words below are to help you).

to attend, to take part in, to prepare, to revise for examinations, to improve, to set goals, to achieve goals, to make progress, to learn by heart, to give a talk/presentation, to work in teams, to plan in good time, to complete tasks, to be responsible for, to cram, to rely on myself/ the others/ the Internet/ etc.

Activity 1 Academic Success Story

1. Emily is a high-achieving university student.
Before reading about her, match the English words and phrases to their Russian equivalents.

- | | |
|-------------------------------|---------------------------------------|
| 1. waste of (space / time) | a. мозговой штурм |
| 2. online databases | b. убедиться, удостовериться |
| 3. to write out the key terms | c. постараться, сделать все возможное |
| 4. to make sure | d. бесполезная, пустая трата |
| 5. schedule | e. выписать ключевые термины |
| 6. to take breaks | f. делать перерывы |
| 7. brainstorming | g. следовать чьему-либо примеру |
| 8. intelligent | h. онлайн базы данных |
| 9. to do your best | i. расписание |
| 10. to follow sb's lead | j. умный |

2. Read her Academic Success Story and find out what are the keys to her success (for the moment, ignore gaps 1-7).

Studying at university is a lot different than in school. I study by reading a lot and I listen in class to remember what's been talked about in the lectures. It is strange, but I find that I am studying less now that I am in college, but I am studying the more important things. I have understood which information is important in a text book, and which information is just a waste of space in my memory.



I..... Another difference is that I have to use a lot of outside resources. I spend many hours using online databases, library resources to complete tasks, while in school I simply relied on the sources given to me by my teacher.

II..... My mind is fresh and ready to learn. I find that I do so much better if I get up early and study a little bit every day. It is so important for me to review

everything as I go along. It is impossible to do well if I cram it all in last minute. I tried that strategy once, not good!

III..... I make notes, and write out the key terms. I look at my notes sometimes during the weeks before the test. I make sure that I have it all down the night before the test, and the next morning I get up earlier for a 2 hour cram study to get it fresh in my head for the test that day. It works for me most of the time, but I am not the best test taker in the world, I get too nervous! So I study as hard as I can.

IV..... Keeping busy! I find that if I have nothing to do on a certain day, I am less likely to get things done. If I have a set schedule and a set place, I make sure I have things done. My biggest secret is my PLANNER!! I would die without it! I write everything in it and cross it off when it's done. It makes me get things done and remember to do them.

V..... I choose time to study for each exam. I decide which subject needs more attention, and I focus more time on that one. I also take breaks in between. Nobody can study for 5 hours straight without going crazy! I have to get up and walk around, or go running, or paint my nails or something to give me a break from studying every once in a while. That way I will be totally focused when I am studying and not so tired and crazy that I don't understand what I'm reading.

VI..... These are my favourites!! I think brainstorming is the key to starting off a good task. I think you have to make a plan before you are going to write. I also think that grammar is so important, and you have to make sure that you at least sound intelligent through what you write.

VII..... Do your best and motivate other students to want to do as well as you. Show them how much it means to you and maybe they will follow your lead. Don't do it all by yourself. I've done this before and it is a lot of unnecessary stress that can be avoided when the others want to help you. Find out what motivates your team and make it fun for everyone to work together!

(Adapted from <http://www.mycollegesuccessstory.com/success-stories/EmilyB.html>)

3. Choose the best subtitle for each paragraph.

- A. My time management secret.
- B. How I succeed in team projects.
- C. My method of revising.
- D. How I find information.
- E. How I study for end of term tests.
- F. My strategies for writing tasks.
- G. My study method is usually an early morning one.

4. Discuss the following questions:

- A. Which of Emily's keys to success are the most effective?
- B. Which of these keys do you use in your studies?
- C. Do you use any other methods that help you to learn effectively?



Activity 2 Grammar review

Present Simple and Present Continuous

Complete the rules with *present simple* or *present continuous*.

We use the to:

- give factual information.

The earth goes round the sun.

- talk about routine activities.

I look at my notes sometimes during the weeks before the test.

Some verbs are almost always used in the present simple rather than present continuous, for example, *like, want, know, understand, belong, seem, believe, remember*.

We use the to:

- describe activities in progress at the moment of speaking.

I am studying less now that I am in college.

- describe temporary situations.

That machine isn't working. It broke down this morning.

- describe changing situations.

The population of the world is rising very fast.

(See page 111)

1. Find examples of the present simple and the present continuous in the text above.

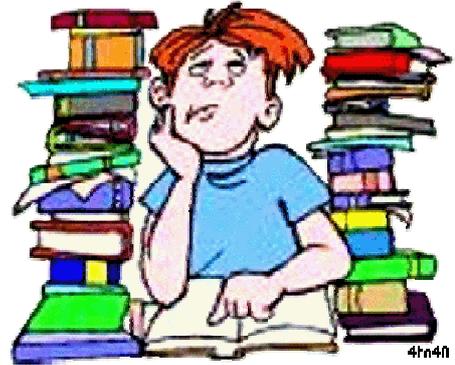
2. Complete these sentences with either the present simple or the present continuous form of the verbs in brackets:

- a. The River Volga (flow) into the Caspian Sea.
- b. your English (get) better?
- c. I called the office, but I (not remember) who I spoke to.
- d. How often you (go) to the library?
- e. She (talk) to him on the phone right now.
- f. Currently we (do) a project on history of space exploration.
- g. you (belong) to any students society?

Activity 3
Revising for Exams

1. How often do you have to take exams? How do you feel about exams? Do you enjoy them/ hate them/ get nervous about them?

Last-minute 'cramming' for exams is the worst of all – it is very stressful, is unlikely to lead to good marks and you won't be able to remember much of it after leaving the exam room. It makes much more sense to start exam revision in plenty of time - all it takes is a little planning and self-discipline to avoid those late nights and so-so grades.



2. Here are eight tips on revising for exams. Choose three most useful tips and explain your choice.

- a. Make use of your learning style when you revise.
- b. Plan in good time.
- c. Make your revision active.
- d. Look through old exam papers.
- e. Use your time well.
- f. Revise with other people.
- g. Mark your progress on your revision plan.
- h. Trust your memory.

Help Box

tip (*countable*) – a helpful piece of advice

3. Can you add some more tips?

UNIT 2

ENGINEERING IN THE 21st CENTURY

For a start

Technology is improving at an exponential rate and millennial workers switch jobs every 4.4 years, on average.

We live in a fast-changing world, and producing more of the same knowledge and skills will not suffice to address the challenges of the future. A generation ago, students could expect that what they were taught would last their lifetime. Today, because of rapid economic and social change, students have to be prepared for jobs that have not yet been created, technologies that have not yet been invented and problems that we don't yet know will arise.

In the face of rapid change, educators and activists are promoting **21st century skills** to prepare students for an unknown future and jobs that have yet to be created.



- 1. Do you think you are ready for the challenges of the future?**
- 2. What skills does a 21st-century engineer need to get to operate efficiently in the fast-changing world?**

Make a list of skills needed for an engineer.

Activity 1

Engineering in the 21st Century

You are going to read the text about 21st century skills.

- 1. Before reading decide whether you think these statements are true (T) or false (F).**

1. Engineering has changed greatly since the last century.
2. Knowing the basic information in every engineering discipline is enough to succeed professionally.
3. There are only four skills important for future engineers.
4. Problem solving and analytical thinking both involve dealing with problems.
5. Analytical thinking is only about maths and physics.
6. There is a chance to use your imagination while looking for solutions to problems.
7. Being able to work together is one of the necessary skills.

2. Read the text and check your answers.

Rapid change has become the characteristic of the 21st century. Over the past years, humanity has made a significant step in the development of all industries known to us, and even more changes are yet to come.

Engineering in the 21st century is much different from what it used to be. Today, it requires adjusting to the fast-paced world and keeping up with development. What people thought was impossible twenty years ago is now our new reality, and there is no way to hide from these changes.

At first glance, specialists must learn the basics. However, this creates a large gap between education and what is demanded on the market. That's why undergraduate degree alone is no longer enough.

How to stay relevant and competitive as an engineer? What should a specialist keep in mind to succeed?

In today's quick and constantly shifting world, 21st century skills are essential. When students are able to adapt to new requirements and overcome unexpected obstacles, they'll succeed no matter where their life takes them.

Some of the 21st century skills in education:

1. Problem solving

Students need to be able to solve complex problems as they occur. Effective problem solving involves several elements:

- Learning from previous problems
- Finding new ways to solve existing problems
- Solving problems independently or as a group
- Adapting behavior to different environments

2. Analytical thinking

Analytical thinking can involve:

- Separating facts from opinions
- Determining the key points in a text
- Seeing patterns and relationships
- Breaking down complex problems into small steps
- Identifying cause and effect
- Processing information logically

3. Creative thinking

Engineers, musicians, teachers and accountants – in every occupation, workers need to use creative thinking skills to develop innovative solutions to complex problems.

Creative solutions involve using digital and non-digital tools to come up with unique and useful ideas, or make connections between previously unrelated ideas.

4. Collaboration

Collaboration is essential when it comes to working and living in a cooperative society. Globalization and new communications technology have changed the way we think about cooperation in the workplace – and outside of it.

The best way to keep up with the rapidly changing industry is to become a lifelong learner!

3. Match the words to form expressions from the text and translate the expressions into Russian:

- | | |
|----------------|-------------|
| 1. rapid | a) world |
| 2. significant | b) step |
| 3. fast-paced | c) society |
| 4. At first | d) learner |
| 5. competitive | e) glance |
| 6. cooperative | f) engineer |
| 7. lifelong | g) change |

4. Match the English phrases to their Russian equivalents.

- | | |
|-------------------------------------|---------------------------------------|
| 1. to keep up with development | a) востребован на рынке |
| 2. to create a large gap | b) преодолеть неожиданные препятствия |
| 3. demanded on the market | c) идти в ногу с развитием |
| 4. to keep in mind | d) иметь ввиду (помнить) |
| 5. to overcome unexpected obstacles | e) обрабатывать информацию |
| 6. to solve complex problems | f) предлагать идеи |
| 7. to come up with ideas | g) решать сложные проблемы |
| 8. to process information | h) создать большой разрыв |

5. Discuss the following questions:

1. Why are the skills listed in the text called the 21st century skills?
2. Make a list of complex problems that engineers have to solve in the 21st century?
3. Choose a problem and explain which skills are necessary to solve it? Why?



Activity 2 Networking
--

It's not what you know, it's who you know.

English proverb

Networking (making professional connections) is one of the 21st century skills important for engineers. Do you agree?

- 1. How can students develop networking skills while studying at university?**
- 2. Can students' clubs/ societies help to develop them?**
- 3. Do you belong to any? If not, would you like to? Why/ why not?**
- 4. Do you have a professional society for students at your university?**

In the US for most disciplines in engineering there exists a professional society with a student chapter (студенческое отделение). With guidance from faculty, students organize the chapter's activities such as industry plant tours and inviting speakers to campus. These societies provide a valuable link to the professional world.

Read what members say about the advantages of belonging to a students' engineering society and see if you have come up with the same ideas.

1. Before you read match the words in column A with their definitions in column B:

A	B
confident individual	everyday troubles and events
daily hassles and happenings	feeling of participation
hands-on experience	have better knowledge or experience
provide valuable contacts	practical knowledge/ skills
sense of involvement (with)	supply important connections
get better acquainted (with)	sure of oneself person



"What you get from participating in student organizations is based on what you put into it. Not only can you develop invaluable friendships, but you also build your communication, leadership and team skills, which in turn makes you a more confident individual. From my experience, the things that I have learned from being involved with student organizations are just as, if not more, important than schoolwork. Student organizations represent real life - the daily hassles and happenings that you would deal with in the working world." (Kristin Shuda, a co-president of the college's Polygon Engineering Council in University of Wisconsin, USA)



"Among the many advantages of belonging to a professional society, I place hands-on experience, teambuilding skills and skills in interpersonal relations among the top. Professional societies also provide valuable contacts and job opportunities that would be hard to come by anywhere else". (Neel Vasavada, a member of the American Society of Mechanical Engineers)



"One of the greatest benefits of belonging to an engineering society is in the friendships and sense of involvement with the college that it generates. I have also been able to get better acquainted with the faculty, which I think is a big plus. If I had not gotten involved with ASCE, I surely would know less people, have less understanding of the profession and would not have gained the leadership, social and organization skills that I have developed." (Jeremy Tomesh, American Society of Civil Engineers (ASCE) student chapter leader)

2. Read the extract again and divide the advantages into the following three columns. Can you add some other advantages?

Professional skills	Social skills	Other benefits

Activity 3
Vocabulary
Word building

“Not only can you develop invaluable friendships...”

1. What do the following prefixes in bold mean? Add some more words to each category.

e.g. re- means “again”

1. **re**play/ **re**charge
2. **in**valuable/ **il**logical/ **im**possible/ **ir**regular/ **un**usual/ **dis**advantage
3. **inter**personal/ **inter**active
4. **sub**marine/ **sub**way
5. **over**crowded/ **over**estimate
6. **under**weight/ **under**estimate
7. **post**graduate

2. What parts of speech (noun or adjective) do the suffixes in bold indicate?

1. organization**ion** / leadership**ship**/ involvement**ment**
2. learner**er**/ teacher**er**/ doctor**or**
3. personal**al**/ active**ive**/ daily**ly**/ powerful**ful**

3. Make as many words as you can by combining different parts of the box:

communicate	-ive	-ion
friend	-al	-ship
profession	-ly	-ment
effect	-ful	-er/ or
invent		-ism
success		
help		
revise		
achieve		
construct		
appoint		
visible		
employ		
mechanic		
develop		

4. Make the words from exercise 3 negative using the following prefixes:

dis-

un-

in-

5. Choose at least six words you formed and write a sentence for each to illustrate the meaning.

UNIT 3

THE SCOPE OF ENGINEERING

For a start

Engineering has been called “invisible profession” or the “stealth profession” because most people have no clue what engineers do. A 1998 poll in the USA indicated 61% of adults felt “not very well” or “not at all well” informed about engineering.

1. Being a student in engineering do you know what engineers do? What areas of our society do they work in? The pictures below refer to some of the areas. Can you name them?



2. In the table there is a list of areas of society. What types of engineers work in each area?

Tick all the types of engineers who work in each area.

Types of engineers Areas of society	aerospace	agricultural	biomedical	chemical	civil	computer	electrical	environmental	mechanical	nuclear
Agriculture		✓		✓				✓	✓	
Communications										
Computers										
Construction										
Energy										
Entertainment										
Environment										
Machines										
Medicine										
Space										
Transportation										

Which areas of society are represented in the pictures on page 18?

Activity 1**What types of engineers are involved in the following activities?**

1. Develop diagnostic machines, artificial organs and prosthetic devices.
2. Design vehicles – cars, trucks, heavy equipment, buses, aircraft.
3. Work up ways to reduce energy consumption .
4. Construct the wings, landing gear, etc. Design, analyze, model, simulate, and test satellites, missiles, and rockets.
5. Create irrigation systems, tractors and buildings, experiment with food processing and farming techniques.
6. Discover and manufacture better plastics, paints, fuels, fibers, medicines, fertilizers, semiconductors, paper, and all other kinds of chemicals.
7. Make sure pollutants are removed from various streams released to the air and water.
8. Use computer technologies and advanced materials to design structures that meet the needs of a growing population.
9. Engineer structural supports for human colonies in space or on the moon.
10. Apply the laws of physics governing electricity, magnetism, and light to develop products and services for the benefit of humankind.

Activity 2**Vocabulary Focus**

Match the words to form expressions from the text and translate the expressions into Russian:

- | | |
|---------------|----------------|
| 1. artificial | a. gear |
| 2. prosthetic | b. processing |
| 3. heavy | c. the needs |
| 4. energy | d. devices |
| 5. landing | e. organs |
| 6. irrigation | f. consumption |
| 7. food | g. systems |
| 8. meet | h. equipment |

Activity 3
Pronunciation

Put the words from the boxes in the correct columns according to the pronunciation of the letters in bold:

A.

Truck, equipment, reduce, consumuption, construct, simulate, technique, manufacture, fuel, semiconductor, pollutant, computer, structure, population, support, product, humankind.

as in cl <u>u</u> b	as in <u>u</u> se	as in qu <u>u</u> ick	as in s <u>u</u> ccess	as in chequ <u>e</u>

B.

Diagnostic, machine, artificial, prosthetic, devices, design, vehicle, satellite, missile, irrigation, experiment, plastic, fiber, medicine, fertilizer, chemical, various, material, engineer, physics, electricity, magnetism, service, diagram, benefit.

as in f <u>i</u> ne	as in d <u>i</u> alogue	as in h <u>i</u> t

Activity 4

Underline the verbs used to describe engineering activities. What other verbs can be used?

Activity 5
Each One Teach One

Make up your own sentences about tasks and activities of engineers. Don't name the type of engineer, let the other students guess it.

Activity 6
Internet use



Use internet site <http://www.engineergirl.org/33.aspx> to prepare a short report about the type of engineer which appeals to you.

Present your report to the other students in the group.

Activity 7
Definitions

1. Can you define the term “engineering”?

Engineering is ...

2. Read the definitions of engineering given by professionals and choose the one which is the closest to yours.

“Engineering is the application of math and science to create something of value from our natural resources”

(<http://www.discovere.org/discover-engineering>)

“Engineering is the art of deliberately modifying the physical world for the use and conveniences of mankind”

(paraphrased from charter for ICE (Institute of Civil Engineers), 1828)

“Engineering is not merely knowing and being knowledgeable, like a walking encyclopedia; engineering is not merely analysis... Engineers operate at the interface between science and society...”

(Dean Gordon Brown; Massachusetts Institute of Technology (1962)

“Engineering is the art or science of making practical.”

(Samuel C. Florman)

“Engineering is the science of economy, of conserving the energy, kinetic and potential, provided and stored up by nature for the use of man. It is the business of engineering to utilize this energy to the best advantage, so that there may be the least possible waste.”

(Willard A. Smith)

Activity 8 Top 10

What professional benefits does an engineering career offer?

1. Read the text “10 Reasons to Love Engineering” from the site of American Engineering community The DiscoverE and match the paragraphs to the right headings.

Earn a big salary Work with great people Change the world Be creative
Solve problems, design things that matter Enjoy job flexibility Travel
Make a difference Never be bored Love your work, and live your life too!

10 Reasons to Love Engineering

1 _____

Engineering is an exciting profession, but one of its greatest advantages is that it will leave you time for all the other things in your life that you love!

2 _____

Engineering is a great outlet for the imagination – the perfect field for independent thinkers.

3 _____

Engineering takes teamwork, and you’ll collaborate with all kinds of people inside and outside the field. Whether they’re designers or architects, doctors or entrepreneurs, you’ll be surrounded by smart, inspiring people.

4 _____

Come up with solutions no one else has thought of. Make your mark on the world.

5 _____

Creative problem solving will take you into uncharted territory*, and the ideas of your colleagues will expose you to different ways of thinking. Be prepared to be fascinated and to have your talents stretched in ways you never expected.

6 _____

Engineers not only earn lots of respect, but they're highly paid. Even the starting salary for an entry-level job is impressive!

7 _____

An engineering degree offers you lots of freedom in finding your dream job. It can be a launching pad** for jobs in business, design, medicine, law, and government. To employers or graduate schools, an engineering degree reflects a well-educated individual who has been taught ways of analyzing and solving problems that can lead to success in all kinds of fields.

8 _____

Field work is a big part of engineering. You may end up designing a skyscraper in London or developing safe drinking-water systems in Asia. Or you may stay closer to home, working with a nearby high-tech company or a hospital.

9 _____

Everywhere you look you'll see examples of engineering having a positive effect on everyday life. Cars are safer, sound systems deliver better acoustics, medical tests are more accurate, and computers and cell phones are a lot more fun! You'll be giving back to your community***.

10 _____

Imagine what life would be like without pollution controls to preserve the environment, lifesaving medical equipment, or low-cost building materials for fighting global poverty. All this takes engineering. In very real and concrete ways, engineers save lives, prevent disease, reduce poverty, and protect our planet.

(from <http://www.discover.org/discover-engineering/10-reasons-to-love-engineering>)

*uncharted territory – неизведанная область

**a launching pad – стартовая площадка

***give back to your community – служить своему сообществу

2 Match the adjectives to the nouns to make up phrases and translate them:

exciting	thinker
greatest	problem solving
independent	job
smart, inspiring	company
creative	profession
starting	building materials
entry-level	individual
well-educated	advantage
high-tech	salary
low-cost	people

3. Match the English phrases to their Russian equivalents:

come up with solutions	инженерная степень
make your mark on the world	спасать жизни
earn respect	полевые работы (на местах)
engineering degree	заработать / заслужить уважение
dream job	защищать нашу планету
lead to success	предотвращать заболевания
field work	оставить свой след на земле
preserve the environment	приводить к успеху
save lives	придумать / предложить решения
prevent disease	работа мечты
protect our planet	сохранять окружающую среду

Discuss the following questions:**Activity 9**
Discussion

1. Why have you chosen engineering profession?
2. Which of the benefits listed in the text above is the most important to you?
3. What other considerations did you take into account while making your choice?

**Functional language*****Asking for and expressing opinions***

I think ...	What do you think of ... (career opportunities/ ...)?
I believe ...	How do you feel about ... (developing problem-solving skills/ the idea of benefiting society/ ...)?
In my opinion, ...	
In my view, ...	What's your opinion of ...(professional benefits/ ...)?
It seems to me that ...	
From my point of view, ...	
As far as I'm concerned, ...	
If you ask me, ... (informal)	

Activity 10
Case Study
Innovative products**Background**

IPF Investments provides the funding and support to develop and launch innovative products in Russian market. IPFI is run by a group of rich people who are willing to take risks and back projects which seem advanced and beneficial. However they also expect to make money.

A team of IPFI investors is currently considering several innovative products developed in Germany to launch in Russia. After hearing presentations IPFI will decide which projects it will invest in.

Help Box

An invention is an object, process, or technique which displays an element of novelty. While an invention is merely theoretical, an innovation is an invention that has been put into practice.

Task 1

You are researchers who need finance for your project. Work in groups. Read the description of the products and choose the one you are going to present to the team of investors.

Powerful tool

More exact, faster and more **energy-efficient** – the disk laser developed by the ISFW at Stuttgart University underlines Germany’s leading role in the field of laser technology. This new technology will be used in the **body assembly plant** at DaimlerChrysler. The laser involved in this new **welding system** does not move from one welding point to the next; instead the **beam of light** is directed at each point using mirrors and beam waveguides. As a result, assembly times should be **reduced** by 90%.



Metallic servants



Wouldn't it be nice to have a friendly machine to help with the house-work, to clear the table and fill the dishwasher? Who hasn't dreamt of that at some time? At Karlsruhe University's Institute for Technical Informatics, researchers like Professor Rudiger Dillmann are working hard at developing robotic helpers to the stage where they are ready for mass production. Initial prototypes of these humanoid robots are already walking around the labs in Karlsruhe. **Currently**, the specialists are working on a solution to one of the biggest problems: how does a machine get the skills that it will later need? The solution is for the robot's users to show the machine what it has to do. They perform the **appropriate** actions with **data** gloves on their hands while the process is also filmed by stereo cameras. The data is then directly transferred to the robot.

See-Through Display

In the past, **transparent** monitor **screens** only existed in science-fiction films like Minority Report. Now, however, they have become a reality at the Technical University of Braunschweig. For the first time, physicist Thomas Riedl has succeeded in **equipping** a transparent display with pixels that are both coloured and transparent at the same time. A possible **application**: the projection of navigation information onto a **car's windscreen**.

Intelligent models from Nature



Bionics involves the technological application of methods and procedures found in nature. German researchers are leaders in this field. Wilhelm Barthlott, the professor from Bonn, patented the self-cleaning lotus effect in the mid-1990s. In 1999 a new façade paint was put on the market that didn't allow dirt to stick – it simply ran off like raindrops on a lotus leaf. Another model from nature is being examined by researchers from the Max Planck Institute of Colloids and Interfaces in Potsdam. They discovered that the glass skeleton of an ocean glass sponge is practically **indestructible**. They want to use this knowledge to develop new, especially **stable** structures.

Revolution in the fuel tank

What the Saxon company Choren Industries produces in Freiberg is the dream of many ecologists: it is **tar-free, biodegradable and carbon-dioxide neutral**. The **fuel**, which has been named SunDiesel, is produced from



biomass, such as wood, straw or agricultural waste, using the three-stage Carbo-V process, for which the east German producers own the global patents. Together with oil giant Shell, the company is currently investing 49 million euros in the world's first

SunDiesel **refinery**. The planned **output** is 16.5 million litres of fuel a year, produced from 67,000 tonnes of biomass.

Task 2. Prepare the presentation of your products. Write a plan for your presentation and make notes under key points. Then write an introduction and conclusion.

(See page 114)

Key points for product presentation.

1. A description of the product.
2. Its innovative features.
3. Its potential consumers and main buyers.
4. Field where you can use it.

Task 3

Practice your presentation until it sounds natural and make any necessary changes. Then present your proposal to the rest of the class.

Task 4

Once each group has presented, the class should consider which innovative product has the greatest potential.

Writing

You are head of the IPFI team of investors. Write a report to the chairman of IPFI. Describe the projects you have chosen and explain why IPFI should invest in them.

(See Sample report on page 115)

Activity 11 Progress monitoring
--

In this unit you came across the following words and expressions. Tick those which you understand and can

translate into Russian.

Types of engineers

aerospace	computer
agricultural	electrical
biomedical	environmental
chemical	mechanical
civil	nuclear

Verbs

develop	model	discover
design	simulate	manufacture
work up	reduce	equip
construct	create	engineer
analyze	experiment with	apply

Nouns

truck	population	irrigation
equipment	support	fiber
technique	product	fertilizer
fuel	humankind	application
semiconductor	machine	refinery
pollutant	vehicle	output
structure	satellite	service
benefit	missile	data

Phrases

exciting profession	field work
greatest advantage	preserve the environment
independent thinker	save lives
smart, inspiring people	prevent disease
creative problem solving	protect our planet
starting salary	energy-efficient laser
entry-level job	body assembly plant
well-educated individual	welding system
high-tech company	beam of light
low-cost building materials	reduce assembly times
come up with solutions	appropriate actions
make your mark on the world	transparent monitor screens
earn respect	a car's windscreen
engineering degree	indestructible stable structures
dream job	tar-free, biodegradable and carbon-
lead to success	dioxide neutral fuel

Progress Monitoring

Return back to the beginning of Module 1. Look at the list of different ways of learning English. Would you change your list of the most effective ones?

MODULE 2**TECHNOLOGICAL WONDERS AT HOME AND IN
INDUSTRY****Lead in**

“Our civilization is largely a product of technology”.

Sir Arthur Charles Clarke (1917–2008), a British science fiction author, inventor, and futurist.



How have technologies changed our life? You can consider the changes in the following spheres:

- communication
- travelling
- housework
- working environment
- entertainment

What would you add?

UNIT 4

ACHIEVEMENTS OF MODERN ENGINEERING

The greatest achievements were at first and for a time dreams.

James Allen (American novelist, 1849-1923)

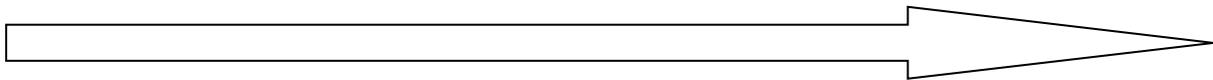
For a start

1. Automobiles, telephones, television, and computers are just a few of the innovations introduced by engineers in the twentieth century. What other innovations do you know?

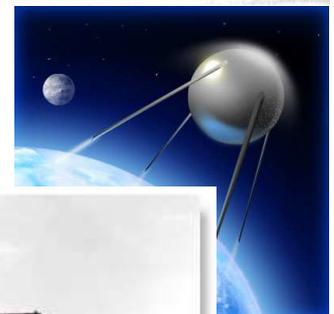
2. Look at the timeline and match the dates to the engineering achievements:

1907 1908 1925 1935 1947 1957 1968 1972 1981 1991

e



- a. Computer mouse made its public debut
- b. Home video game systems became available
- c. World Wide Web became available to the general public
- d. Ford Model T was introduced
- e. Sound barrier was broken
- f. First practical radar
- g. Televisor
- h. IBM Personal Computer was released
- i. First practical domestic vacuum cleaner was invented
- j. Sputnik I was launched



Early military radar system

Turn to page 117 and check your answers.

3. What inventions of the 21st century do you know?

Activity 1
High-tech Household
Appliances

1. What household appliances do you have at home? Have you ever thought of them as "high-tech"? How do they improve our life?

2. Read the first part of the article by Roland W. Schmitt, President Emeritus of Rensselaer Polytechnic Institute, and Retired Senior Vice President of General Electric Company. Compare your ideas with the ones in the text. Underline all the electronic appliances and their functions in the text.

Before joining General Electric, I'd never really thought of household appliances as "high-tech." The functions they perform — heating, cooling, cleaning, blowing, mixing — are as old as civilization itself.

Today, our kitchen has an electric range with plenty of electronic controls, a microwave, a toaster oven, several mixers, a dishwasher that's sometimes smarter than I am, a refrigerator-freezer, and a disposal*.



Our utility room has a brainy clothes washer, a smart dryer, a freezer, and a vacuum cleaner. Another refrigerator-freezer resides in the basement along with the equipment for central heating, dehumidifying, and air conditioning.

But all of these fancy pieces of equipment still only heat, cool, clean, blow, and mix!

We take high tech for granted in household appliances and hardly notice it while seeing it



prominently in our "electronic" appliances: televisions; audio equipment; mobile telephones; VCR, CD, and DVD recorders and players; digital cameras; pocket organizers; GPS devices; and, of course, in our Internet-connected computers. These items do things that our ancestors couldn't even dream of.

The high-tech of household appliances is a lot more than just electronics. New and improved materials enable designs of convenience and efficiency. High performance plastics, especially, allow us to build style as well as functionality into our appliances. Household appliance engineers have just as many opportunities to feed their inventive minds as any other engineers. Innovation continues: using light makes cooking food eight times faster than with conventional ovens.



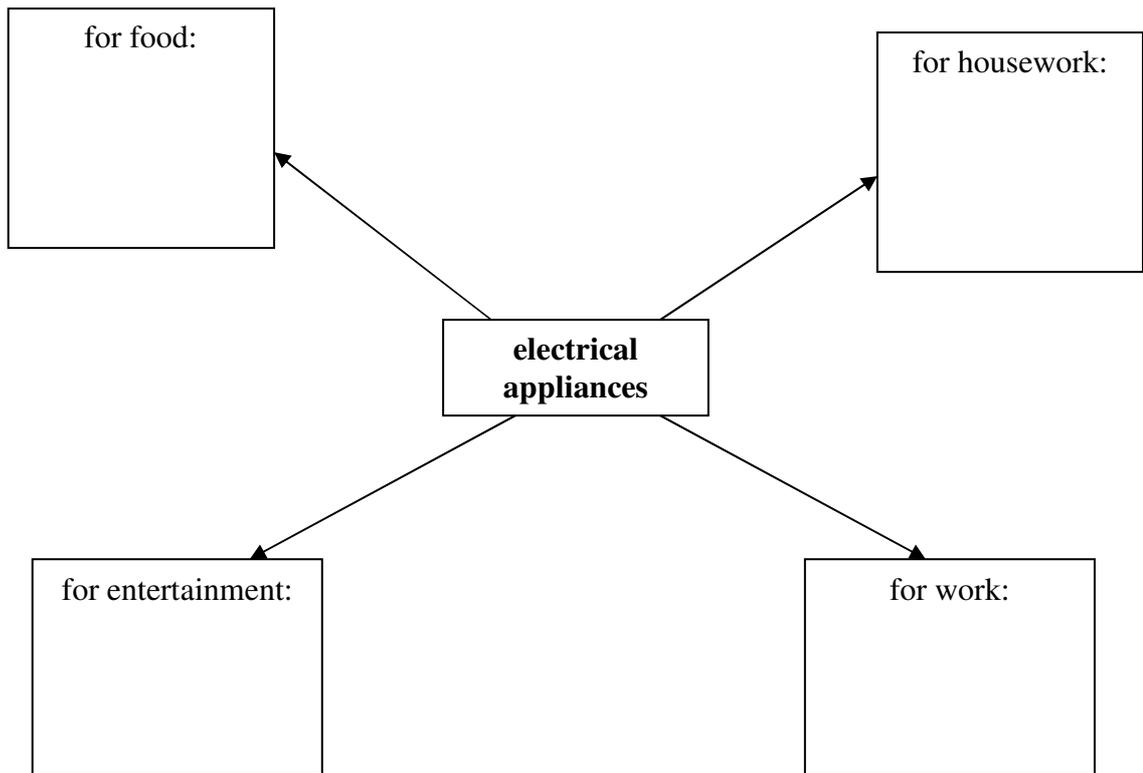
Washers and dryers that "talk" to each other improve clothes care and save time. The opportunity for innovation is as great as ever in this world of classical functions.

The incorporation of high-tech advances into the field of classic functions makes household appliances one of the great achievements of modern engineering. For the engineer there is something especially attractive about doing something that is functionally very, very old with ideas that are the newest of high-tech.

**disposal - AmE a small machine under the kitchen sink which breaks vegetable waste into small pieces*

Activity 2
Vocabulary focus

1. Fill in the diagram with the electrical appliances from the text. Some of them can go into different categories.



2. Work in groups. One person thinks of an electrical appliance. The others ask questions to guess what the appliance is. You can only ask *yes/no* questions.

For example:

- *Is it made of metal?* *Partly.*
- *Do you find it in the kitchen?* *Yes.*
- *Is it used to wash dishes?* *Yes.*
- *Is it the dishwasher?* *Yes, it is.*

Activity 3
Smart Home Technology

1. Have you ever heard about a smart home? What is it?

2. Read the text and compare with your ideas.

What Is Smart Home Technology?

What if all the devices in your life could connect to the internet? Not just computers and smartphones, but *everything*: clocks, speakers, lights, doorbells, cameras, windows, window blinds, hot water heaters, appliances, cooking utensils, you name

it. And what if those devices could all communicate, send you information, and perform your commands? It's not science fiction; it's the Internet of Things (IoT), and it's a key component of home automation and smart homes.

Home automation is exactly what it sounds like: automating the ability to control items around the house – from window shades to pet feeders – with a simple push of a button (or a voice command). Some activities, like setting up a lamp to turn on and off at your whim, are simple and relatively inexpensive. Others, like advanced surveillance cameras, may require a more serious investment of time and money.

INSIDE BILL GATES' HOME

Microsoft Chairman Bill Gates' home just outside of Seattle, Wash., might be the most famous smart home to date. Everyone in the home is pinned with an electronic tracking chip. As you move through the rooms, lights come on ahead of you and fade behind you. Your favorite songs will follow you throughout the house, as will whatever you're watching on television. The chip keeps track of all that you do and makes adjustments as it learns your preferences. When two different chips enter the same room, the system tries to compromise on something that both people will like.

With a smart home, you could connect the devices and appliances in your home so they can communicate with each other and with you.

(Adapted from <https://home.howstuffworks.com/smart-home6.htm>)

3. Can you think of examples of smart home appliances and their functions?

(see appendix on page 116 for more examples)

Activity 4 Extension



Discuss the following questions:

1. Which household appliances don't you have at home? Which would you like to have? Why?

2. Smart homes look great on paper, but are they for everyone? Do all individuals need all this technology?

Activity 5 Reading

- Have you ever visited a plant that makes electrical appliances?
- What advanced technologies are used in modern manufacturing?

1. Scan the second part of the article by Roland W. Schmitt to find out what technologies are used in manufacturing household appliances, give Russian equivalents.

There is yet another dimension of high-tech in household appliances: the way we make them. Walk through any plant that makes household appliances and you're likely to see robots, lasers, intelligent conveyors, electronically controlled machine tools, computer-driven assembly stations, and smart test equipment. And, behind the scenes will be software that keeps track of everything, from incoming orders, in-process and final inventory, custom orders, shipments, and supply chain status. And when these products leave the factory into the hands of marketing and sales, they increasingly will be tracked and supervised by more and more sophisticated systems controlled by software.

(Adapted from <http://www.greatachievements.org/>)

2. What is the role of computers in manufacturing? What processes are controlled by computers?

Activity 6 Grammar Review
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Passives

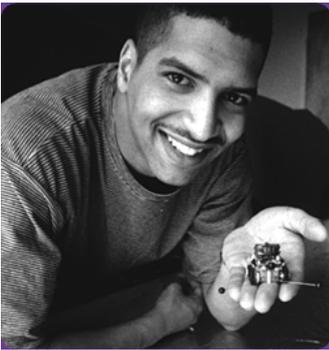
- We make passive verb forms with the verb *to be* + past participle.
*Renault cars **are made** in France.*
- We often choose a passive structure when we are not interested in or it is not necessary to know who performs an action.
*Sound barrier **was broken** in 1947.*
- If we want to mention who performed an action we can use *by*.
*First practical domestic vacuum cleaner **was invented by** James Spangler.*

(See page 112)

1. Change these active sentences into the passive so that they sound more natural.

1. Somebody produces mobile phones in Finland.
2. A mechanic is repairing my car at the moment.
3. Somebody made this video game in Japan.
4. Anybody can find lots of information by searching Google.
5. They manufacture electronic goods in China.
6. They will print the newspaper at 3 a.m.

2. Read the article “Robotic Ants Inventor” and choose the appropriate verb forms (active or passive).



At MIT’s Artificial Intelligence Lab, James McLurkin *is developing / is being developed* robotics by combining ideas from engineering with biology.

McLurkin *built / was built* his first robot, Rover, at age 15.

For his thesis project as a student, he *decided / was decided* to develop a group of smaller robots that could work together.

While working on this project, McLurkin *observed / was observed* a large container of ants which *kept / was kept* on his desk. Twelve “ant” robots *designed and built / were designed and built*. Being about an inch size, each ant *powers / is powered* by a tiny internal computer that *runs / is run* three motors. Each ant’s sensors *allow / are allowed* it to detect and go around obstacles and move toward light. These mechanisms *make / are made* the robots interact in ways that mimic the behavior of real ants.

“Biology *can use / can be used* to open the secrets of intelligence. We could then take robots and possibly change things about biology.”

Nature also *is studying / is being studied* by many other inventors to develop different types of robots. Animals serving as robot inspirations *include / are included* mice, ladybugs, bats, cockroaches, and crabs.

Activity 7
Robots

1. Have you ever seen a robot in real life? Can you give a definition of a robot? The pictures below can help you.



Compare your definitions with the ones given by www.dictionary.com.

A robot is

1. a mechanical device that sometimes resembles a human and is capable of performing a variety of often complex human tasks on command or by being programmed in advance.
2. a machine or device that operates automatically or by remote control.

2. Do you know in what sphere the first robot was used? Work in pairs. Make a list of spheres where robots are used now.

3. Read the extract and compare it with your list.

Stories of artificial helpers and companions and attempts to create them have a long history but fully autonomous machines only appeared in the 20th century. The first digitally operated and programmable robot, the Unimate, was installed in 1961 to lift hot pieces of metal and stack them. Today, commercial and industrial robots are in widespread use performing jobs more cheaply or with greater accuracy and reliability

than humans. They are also employed for jobs which are too dirty, dangerous or dull to be suitable for humans. Robots are widely used in manufacturing, assembly and packing, transport, earth and space exploration, surgery, weaponry, laboratory research, and mass production of consumer and industrial goods. Domestic robots for cleaning and maintenance are increasingly common in and around homes.

(Adapted from www.wikipedia.org)

Activity 8

Vocabulary focus

1. Match the words in the columns to make word combinations.

home	research
intelligent	assembly stations
electronically controlled	test equipment
computer-driven	exploration
smart	helpers
earth and space	automation
sophisticated	conveyors
artificial	robots
domestic	machine tools
laboratory	systems

2. Match the following words/expressions in English with their Russian equivalents:

perform your commands	робот с цифровым управлением
mass production	камеры видеонаблюдения
consumer and industrial goods	выполнять работу
perform jobs	дистанционное управление
surveillance cameras	обслуживание

remote control	точность
keep track of	механическое устройство
digitally operated robot	потребительские и промышленные товары
mechanical device	отслеживать, следить
reliability	массовое производство
accuracy	выполнять ваши команды
maintenance	надежность

Activity 9

Writing: discursive composition

1. Here is an example of a student composition on the topic: “The Reasons for Using Robots”. Read it and answer the following questions:

In what areas is it good? In what areas is it weak?

Think about:

- length of sentences
- grammar
- spelling
- vocabulary
- organisation of ideas and paragraphing
- use of linking expressions
- logical order of argument

Help Box

Discursive composition must have a definite point of view. You may want to:

- argue in favor of something,
- argue against something,
- give both sides of the argument.

The Reasons for Using Robots

What do you think of when you think about ‘robots’? If you think they are only the stuff of space movies and science fiction novels, then think again. Robots are the largest growing technological devices in the world. They perform many functions ranging from

space exploration to entertainment. The reasons for using robots are almost endless for example ; robots are ideal for jobs that require repetitive , precise movements. Human workers get bored doing the same thing over and over, which can lead to fatigue and costly mistakes. Robots are also ideal for tasks that are dangerous, or where human workers may damage the product. For example, in a factory manufacturing medicines and chemicals that may harm humans, and factories that manufacture food that humans may damage by handling. Also used in tasks that are impossible for humans eg. navigating mars or deep sea exploration. The uses for robots are almost as endless as the reasons for using them. There are some areas in which robots are used. Ninety percent of robots are used in factory work and assembly lines. They assemble cars, package food, load machines and repair machines. Busy families use robots to clean their floors so that they can get on with other more interesting things. Even kids are using robots, with the invention of robotic pets and the soon to be released robotic dolls that act just like real babies would. Another major area that robots are used in is space exploration. NASA spends hundreds of thousands of dollars a year producing robots that allow the scientific world to discover more and more about the solar system that we live in. With robots used in space exploration and factory work, their appearance is not really important, as long as they carry out their function and complete the task. Space exploration robots are usually bulky with many wheels and factory robots usually have many arms to carry out their task efficiently.

2. Work with a partner. Go through the essay and:

a. correct spelling, grammar and punctuation mistakes you can find

b. divide it into paragraphs

3. Underline all the linking expressions in the text. Which of them are used to:

- give more information
- list ideas
- explain the consequence of something

4. Fill in the gaps in the following sentences with an appropriate linking word/ phrase from the table.

Linking words and phrases

- give more information

and, for example, also, in addition (to), moreover, what is more

- explain the consequence of something (show cause and effect)

so, because, because of (this), as a result (of), consequently

- list ideas

firstly, secondly, thirdly, finally, to begin with, next, then

- contrasting idea

but, However, although, On the one hand... On the other hand...

- summarise

In conclusion... To conclude

1. he trained every day, he couldn't improve his writing skills.
2. I really like the job I'm doing at the moment. , the salary is awful.

3. Robots often star in films, , dangerous machines like Terminator or cute ones like R2D2 in Star Wars.
4. Nuclear power is relatively cheap., you could argue that it's not safe. I had to move because of my job.
5. Sea levels are rising climate change.
6. Television kills conversation in families., it has led to an increase in violent crime.

5. Write a composition giving your opinion on the following question: “Modern technology has created more problems than solutions in society. Do you agree?”

Use the following steps to write effectively:

- “brainstorm” your ideas on paper
- organise your ideas by grouping similar points together
- make a paragraph plan
- develop points by giving examples or explaining what you mean
- use linking words
- write a clear introduction and conclusion

UNIT 5

FUTURE PERFECT?

For a start

How do you feel about the future?

Which of these words best describes your feelings about it? Explain why.

excited	confident	worried	hopeful	afraid	optimistic	uncertain
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Activity 1 Predictions

Sir Arthur Charles Clarke, (1917–2008) was a British science fiction author, inventor, and futurist. In his book *Profiles of the Future* he published a timetable of predictions up to the year 2100.

Read the predictions and rank them from the most probable (1) to the least probable (9). Explain why.

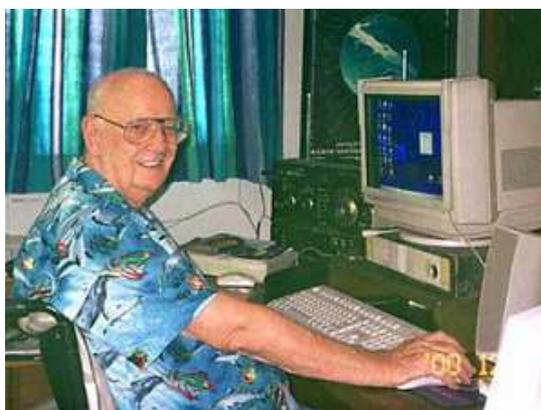
Arthur C. Clarke's predictions for the 21st century:

2010 A new form of space-based energy is adopted.

2011 Space flights become available for the public.

2016 All existing currencies are abolished. A universal currency is adopted.

2020 Artificial Intelligence reaches human levels. There are now two intelligent species on Earth, one biological, and one nonbiological.



2021 The first human landing on Mars is achieved.

2023 Dinosaurs are cloned from fragments of DNA. A dinosaur zoo opens in Florida.

2025 Brain research leads to an understanding of all human senses. Full immersion virtual reality becomes available. The user puts on a metal helmet and is then able to enter "new universes."

2040 A universal replicator based on nanotechnology is now able to create any object from meals to diamonds. The only thing that has value is information.

2095 The first humans are sent out to nearby star systems already visited by robots.

Activity 2

Nanotechnology

Many scientists all over the world say: 21st-century nanotechnology will be more important than all the greatest technologies of the 20th century put together.

Do you know:

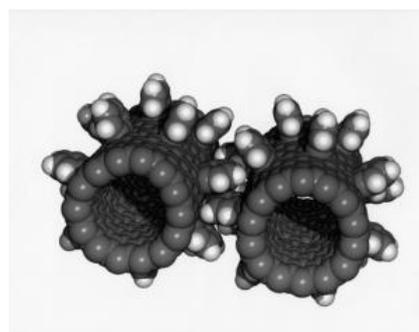
1. What is nanotechnology?
2. Where is it used nowadays?
3. Where could it be used in future?

1. Read the text and find answers to the questions above.

Nanotechnology

Tiny things

- A. The prefix "nano" means one-billionth. So, 1 nanosecond is one-billionth of a second, and 1 nanometer is one-billionth of a meter.



A human hair is about 80,000 nanometers wide.

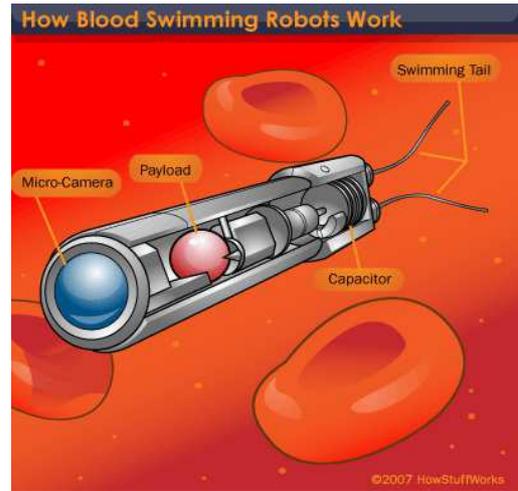
- B. Nanoscience (or nanotechnology) refers to the study of things that are smaller than about 100 or 200 nanometers. It is the study and development of the small so that it will affect the large. One of the basic goals of nanotechnology research is to control individual atoms. Carbon, hydrogen, oxygen, and other types of atoms are the building blocks of the universe. They make up galaxies, stars, planets, rocks, water, people, trees, CDs, cells — all the stuff out there.

Copying nature

- C. Most things that people build come together in a "top-down" way. If you want to make a table, for instance, you cut down a big tree, make wooden boards, and hammer them together. Nature, on the other hand, builds things from the bottom up. When atoms join together, they make molecules. Each molecule has a certain shape, and a molecule's structure determines what it can do. Molecules can then come together to make a cell — or a tree.
- D. Nanotechnologists want to do what nature does. They want to create tiny, intricate structures — atom by atom or molecule by molecule — that have specific features or applications. For example, instead of cutting and processing thin slices of silicon to make computer chips, engineers work with individual molecules to build computer processors and memories. Putting such molecules together would create a tiny chip that could hold an enormous amount of memory. You could end up with a supercomputer the size of your cell phone.
- E. Eventually, nanotech could touch every part of our lives. There might be molecular motors and nanorobots that can build other nanomachines. In medicine, nanodevices could go inside the body to deliver drugs exactly where they need to go, monitor vital signs, or perform delicate

operations. A nanoscale coating on glass could help turn the sun's energy into electricity. Nanotech could also help make light bulbs more efficient.

F. Already, a company called Nano-Tex makes fabrics with different kinds of "molecular hooks" that can repel stains, eliminate wrinkles, or shed



water. In the future, nanotech-enhanced clothes could respond to the weather to warm you up or cool you down. The U.S. Navy is using nanotech coatings on their submarines to keep sea creatures off and reduce corrosion. Other nanomaterials could lead to lightweight airplanes and other types of equipment.

2. Read the text again. Which paragraphs give information about the following things?

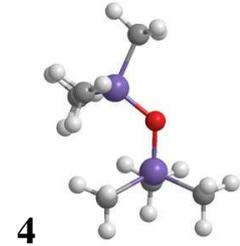
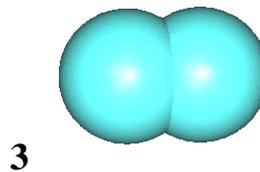
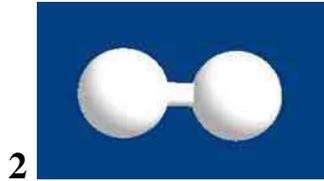
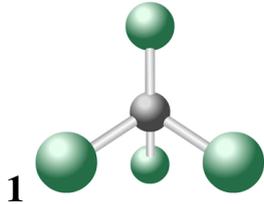
	<p>what could be done with the help of nanotechnology</p> <p>difference between nature and people in creating things</p> <p>how nanotechnology is used now</p> <p>subject and aim of nanotechnology</p> <p>the meaning of nano</p> <p>imitating nature by nanotechnologists</p>
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Activity 3
Vocabulary focus

1. Find in the text all the words with the prefix "nano".

2. Match the elements with their molecules:

hydrogen, oxygen, carbon, silicon



3. Fill in the gapped sentences with the following word combinations. Change the form of the word if necessary:

application, cell, fabric, coating, determine, universe

1. Early astronomers thought that our planet was the centre of the
2. They can manufacture a whole host of body parts, from neurons to muscles to blood
3. The amount of available water the number of houses that can be built.
4. Students learned the practical of the theory they had discussed in the classroom.
5. The tent has a waterproof on both sides.
6. Man-made such as polyester are easy to wash and iron.

4. a. Match the following words and phrases. Translate them into Russian.

tiny, intricate	water
deliver	the weather
monitor	wrinkles
repel	corrosion
eliminate	structures
shed	creatures
respond to	drugs
reduce	stains
sea	vital signs

b. Make up your own sentences using these expressions.

Activity 4
Threats



The possibilities for nanotechnology may seem limitless, but there are potential problems that already worry some people.

- Certain nanoscale particles could cause health problems, for example. Researchers have already found that molecules can harm living cells.
- And what about nanorobots that could make copies of themselves, growing in number so quickly that they take over the world, destroying the environment?
-
-

**Can you think of the other problems which could be caused by nanotechnology?
Add to the list.**

Activity 5
Smartphone

1. Nowadays a smartphone can be easily named the main gadget for most people.

- **What functions does your phone have?**
- **Do you use all of them?**
- **Would you like to have more/ less functions?**

2. Read the text about smartphone and say which features listed in the text you have in your smartphone.

What is a smartphone?

A smartphone is a mobile or cellular phone that runs off a mobile operating system (OS) and functions like a mini computer. Smartphones also function as portable media players, digital cameras, video cameras and GPS navigational devices. The operating system equips the device with advanced computing capabilities, runs applications and enables the device to perform the following basic features:

- Access Web pages and browse the Web using 4G and 3G data networks and Wi-Fi support
- View, edit and share documents
- Download files
- Create and play music playlists
- Take photos and record videos
- Play games and watch movies
- Communicate with friends and family through text messages and video chats.



A mobile operating system (OS) supports the smartphone and provides the device with advanced computing capacities. A smartphone is more than just a cell phone; it's a media player, gaming console, camera, video recorder, document editor and GPS navigational device. It's your handy tech tool for navigating your day and managing your life, especially with the millions of apps available to download. Here's just a glance at what you can do with a single tap and swipe on a smartphone's touch screen:

- Budget, pay bills and monitor finances
- Run a business

- Watch TV shows and movies
- Track health habits and log workouts
- Follow current events and sports teams
- Stay organized and productive
- Plan trips.

3. What features and applications do you use?

Activity 6 Vocabulary

Make nouns from the following words:

develop

operate

solve

complex

possible

succeed

manufacture

apply

record

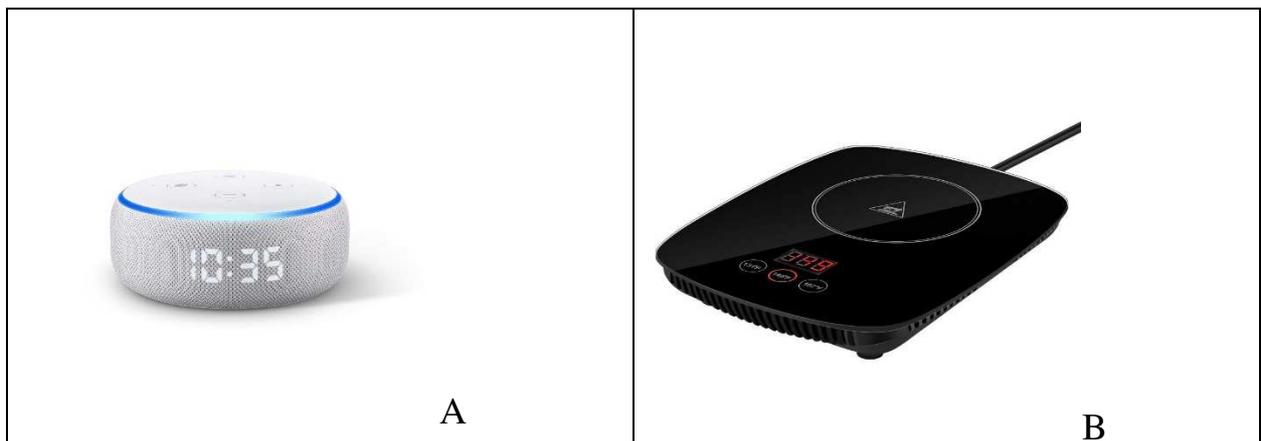
download

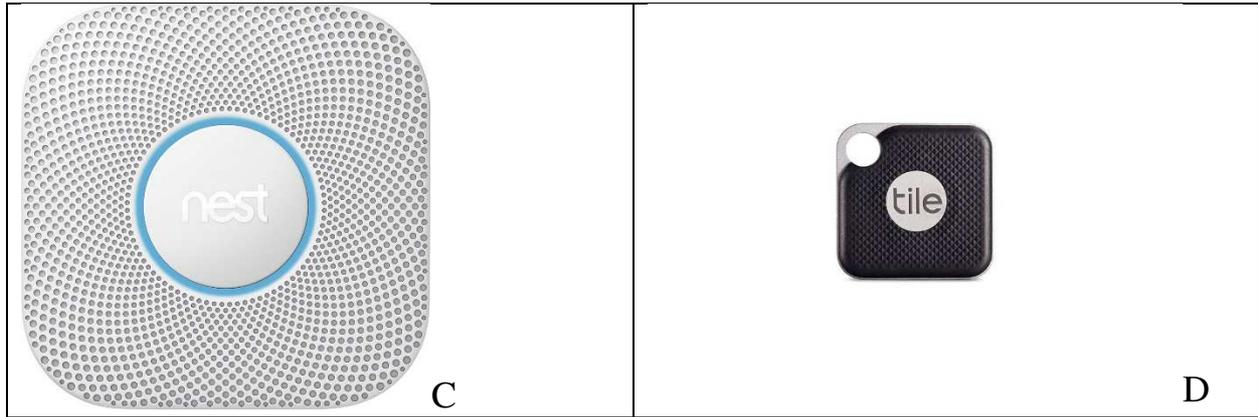
Activity 7 Reading

Gadgets

1. Look at the pictures. What do you think the things are?

Discuss your ideas in groups.





2 Read the descriptions (1-4) and match them with the pictures (A-D).

<p>1. Bluetooth Tracker and Finder for Keys, Pet Collars and Bags</p> <p>The New Tile Pro is the most powerful Bluetooth tracker for finding all your things.</p> <p>Ring your things: find lost items with your phone. If your Tile is within the 300 ft Bluetooth range, it will play a loud tune until you find it.</p> <p>Find your phone: can't find your phone? Simply <i>double press</i> the Tile button on your Tile Pro to make your phone ring, even when it's on silent.</p> <p style="text-align: center;">Product features:</p> <ul style="list-style-type: none"> • Product Dimensions: 0.3 x 1.6 x 1.6 inches • Item Weight: 0.48 ounces • <u>Water resistant</u> • Easy to attach • <u>Durable</u> • It has a 300 ft. range • Replaceable Battery - 1 Lithium Metal batteries required. (included). 	<p>2. Smart Smoke / Carbon Monoxide Alarm</p> <p>Nest Protect reliably detects and alerts you to the presence of smoke or carbon monoxide in your home. The alarm speaks to you in a calm, clear, human voice, telling you the location of the danger. It also provides smartphone alerts and battery status updates to help protect your home while you're away. If a cooking mishap leads to a small amount of smoke, Nest Protect will let you know without <i>setting off</i> the full alarm.</p> <p style="text-align: center;">Product Features:</p> <ul style="list-style-type: none"> • Product Weight: 1.7 pounds • 4 screws, 3 wire nuts • 3 AA batteries, 120V AC connector, backplate • Works with Google Assistant, Hue, Nest, Wink • Color: White.
<p>3. Smart speaker with clock and Alexa</p> <p>This version of Echo Dot has an LED display that can show the time, outdoor temperature, or timers. Play music, get the news, call almost anyone, and control</p>	<p>4. Mug Warmer for Desk</p> <p><u>Adjustable</u> temperature of the mug warmer is suitable for coffee, tea, milk and cocoa. It always remembers the right temperature you used last time,</p>

compatible smart home devices — just ask Alexa.

The LED display also has a light sensor that automatically adjusts brightness so you can see the time, day or night.

Make your life easier at home. Use your voice *to set* timers, add items to lists, and create calendar events and reminders.

You can also check the news, weather or traffic. Ask for sports scores, movie showtimes, restaurant hours, or information.

Manage compatible smart home devices using your voice. *Switch on* the lamp before getting out of bed, dim the lights from the couch to watch a movie, or *turn* the thermostat *up* as you head out.

Product Features:

- Size: 3.9" x 3.9" x 1.7" (99 mm x 99 mm x 43 mm)
- Weight: 10.6 oz. (300 grams)
- Display: LED display
- Speakers: 1.6" speaker
- Wi-Fi connectivity
- Bluetooth connectivity
- System requirements: comes ready to connect to your Wi-Fi; compatible with Fire OS, Android, and iOS devices and also accessible via your web browser.

when you are heating your beverage, the temperature will be adjusted.

Easy to use, no need to manually *turn off* the switch, auto shut off mug warmer for desk will stop working when it leaves the base. It automatically stops after 4 hours.

Easy to clean with the glass panel design. If you are occasionally clumsy, the beverage warmer will be fit for you, just clean it with a towel. The fireproof material and low power heating design ensured that the warmer is not shorted.

Product Features:

- Three Temperature Setting: 131°F, 149°F, 167°F, the right temperature for you.
- Memory Function: remembers the right temperature used last time, the temperature will be adjusted.
- Protective Function: will stop automatically after 4 hours.
- Sensitive Gravity Switch: saves troubles during busy hours.
- Item weight: 12 ounces.

3. Read the texts (1-4) again and match the sentences (1-6) below with the gadgets. Some sentences can be used to describe two gadgets.

- a) It can be a part of smart home system.
- b) It runs on batteries.
- c) It can be used to learn the news.
- d) It can save people's lives and health.

Help Box

" = inches – дюйм (единица длины; = 1/12 фута; = 2,54 см)

ft. – abbreviation for foot – фут (единица длины; = 30 см)

ounce – унция (единица веса; 1 унция – 28,35 г.)

F – abbreviation for Fahrenheit – градус Фаренгёйта (единица измерения температуры)

- e) You can set the temperature on this device.
- f) You need Bluetooth connection for this gadget.
- g) It is for people who like to drink slowly.
- h) It is a useful gadget for people who often lose things.

Activity 8 Vocabulary focus
--

1. Complete the definitions (1-9) with the underlined words in the texts. Use your dictionary to help you.

1. _____ reacting to very small changes in light, temperature, position etc.
2. _____ can be changed or moved slightly to make it suitable for different purposes.
3. _____ able to exist or be used together without causing problems.
4. _____ the ability of computers and other electronic equipment to connect with other computers or programs.
5. _____ staying in good condition for a long time, even if used a lot.
6. _____ unable to be damaged by fire.
7. _____ operated or done by hand or without the help of electricity, computers etc.
8. _____ able to keep water from being absorbed.
9. _____ suitable for a particular purpose or activity.

2. Find in the texts 1-4 words *in italics* and translate them.

3. Think of as many derivatives of the given words as you can and complete the table:

Noun	Verb	Adjective / Participle
power		
	resist	
	replace	
	connect	
	warm	
	remind	
	require	
access		
	adjust	
	protect	
sensor		

Activity 9
Extension

How useful are the gadgets? Put them in order (1= most useful, 4 = least useful). Discuss your ideas with a partner and agree on an order. Explain your list to the rest of the class.



Activity 10
Dealing with numbers

1. Say these numbers. Check with the teacher after each group (See page 113).

1. 47 362 1,841 15,000 36,503 684,321 4,537,295

2. 3.5 2.89 9.875

3. $\frac{1}{3}$ $\frac{3}{8}$ $\frac{5}{7}$ $\frac{1}{2}$ $\frac{3}{4}$

4. 15% 50% 97% 100%

2. Try and answer these questions.

1. What is the population of your a) country? b) city?
2. How many people study at your university?
3. How many members are there in a) your social network? b) most popular social network?
4. What percentage of people in your country uses the Internet?



If you want to know some more statistics go online to *Internet World*

Statistics <http://www.internetworldstats.com/stats.htm>

Activity 11
Project work

1. What information is included about each gadget? Add to this

list.

- The name of the gadget.
- Description.
- ...

2. Work in teams. Prepare a short presentation of any gadget for the other students in the group.

UNIT 6

INFORMATION AGE?

“As a general rule, the most successful man in life is the man who has the best information.”

Benjamin Disraeli

For a start

- Do you live in the age of information?
- What is information age?
- Why is this age called the information age?
- When do you think the Information Age began?
- What is it connected with?

Read the text and compare with your ideas.

Nowadays, many people tend to think of the Information Age in terms of cell phones, digital music, high definition television, digital cameras, email on the Internet, the Web, computer games, and other relatively new products and services that have come into widespread use. The pace of change brought on by such technology has been very rapid.



When did the Information Age begin? There is no single answer to this question. If you surf the internet you will find out that some people think it began in the 70s or 80s with the development of personal computers and the Internet. Others claim the Information Age actually began with the invention of telegraph when Samuel Morse held 1st successful public demonstration of the electric telegraph in 1844. However there are odd opinions that trace the Information Age back to the Bronze Age when people first started writing.

Activity 1
Computer Revolution

The idea of information age is usually linked to the concept of a Digital Age, Digital Revolution or Computer Revolution.

1. You are going to read the article by Bill Gates, the Chairman and Chief Software Architect of Microsoft Corporation, about the beginning of computer revolution. Before reading decide whether you think these statements are true (T) or false (F).

1. Bill Gates created the first desk-top computer Altair 8800.
2. BASIC programming language was rather simple, so everyone could use it.
3. At first Microsoft software was not very popular among programmers.
4. Today we completely rely on computers to run our lives and businesses.
5. We have fully exploited the PC's potential.

2. Read the article and check your answers.

For me the personal computer revolution started in the mid-1970s, when my friend Paul Allen and I saw a magazine article about the MITS Altair 8800. The Altair was the first build-it-yourself computer kit for hobbyists. For a few hundred dollars, MITS would mail you a few bags of parts and some photocopied instructions. After some careful soldering*, you had your own computer, about the size of a bread box, with rows of switches and blinking lights.



It wasn't much to look at and it wasn't terribly useful, but it felt like the start of a revolution. Until then computers were used mostly by technicians in air-conditioned rooms. Few people had the opportunity even to see a computer and even fewer got to use one. But the Altair was a computer that people could put on their desks, and what

they could do with it was limited only by their imagination — and the modest capabilities of Intel's 8080 microprocessor.

We knew that microprocessors would become cheaper and more powerful, making personal computers increasingly capable. We also knew those computers would need software to make them do useful things. So Paul and I founded a company we called Microsoft that we hoped would meet this need.



Microsoft Corporation, 1978

Our first product was a version of the BASIC programming language that could run on the Altair. Unlike many other languages available at the time, BASIC was relatively simple to use. After a few minutes of instruction, even a nontechnical person could start writing simple programs.

For its time the Altair was a huge success, and thousands of programmers used our software to make it do interesting and useful things. Since then the PC has evolved from a hobbyist's toy into a powerful tool that has transformed how we work, learn, play, and keep in touch. And it has created an industry that employs millions of people and plays a leading role in our global economy.

Computing has made many evolutionary leaps over the decades - from the command line to the graphical user interface, from stand-alone PCs to a globally connected

Help Box
decade is a period of
ten years

Internet. But we're now seeing an even more fundamental change. We're in what I call the "digital decade," a time when computers are moving beyond being merely useful to becoming an essential part of our everyday lives. Today we use computers for discrete tasks—like doing e-mail and paying bills — but in the years ahead they'll play a key role in almost everything we do. We'll rely on them to run our lives and businesses. We'll want them to keep us informed and entertained. We'll expect them to be wherever we need them. It will be an era of truly personal computing.

Many of our early dreams for the PC have already come true. They can recognize speech and handwriting, create realistic animation, and enable people to collaborate, communicate, and find information around the world. But we've barely scratched the surface** of the PC's potential, and I'm incredibly excited about the amazing innovations that are just over the horizon.

* soldering - *joining two pieces of metal together by melting a small piece of soft metal*

** scratch the surface - *to deal with only a very small part of a subject or problem*

(Adapted from <http://www.greatachievements.org/>)

Activity 2 Vocabulary Focus
--

1. Match the words to form expressions from the text and translate the expressions into Russian:

evolutionary	change
discrete	tool
global	leaps
fundamental	economy
essential	success
modest	capabilities
powerful	tasks
huge	part

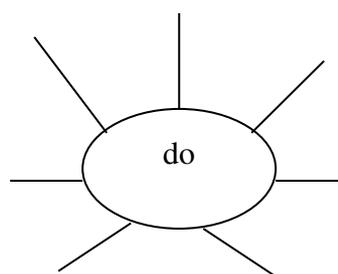
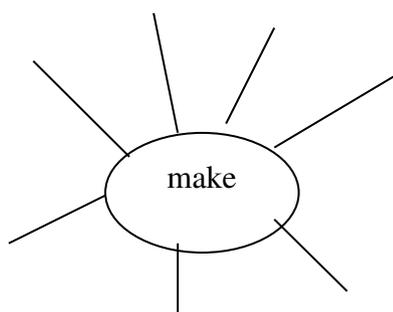
2. a. Match the following words/expressions in English with their Russian equivalents:

meet the needs	распознавать речь и почерк
run our lives and businesses	оплачивать счета
play a leading role/a key role	информировать и развлекать
pay bills	управлять нашей жизнью и делами
keep us informed and entertained	удовлетворять потребности
recognize speech and handwriting	поддерживать связь
keep in touch	играть главную роль

b. Make up your own sentences using these expressions.

3. a. Fill in the diagrams with the following words from the box:

an effort, homework, money, your best, a mistake, progress, research, a noise, someone a favour, a phone call, nothing, a decision, business



b. Find examples of the phrases with *do* and *make* in the text above.

c. Complete the questions below with *make* or *do* in the correct form:

1. Are you generally good or bad at _____ decisions? Does it depend on the kind of decision?
2. In which areas do you think you are _____ most progress in your studies?
3. When was the last time you _____ someone a favour? What was it?
4. How do you feel when you find out you _____ mistakes in your last test?
5. Have you ever _____ research? In what subject?
6. When you have holidays do you enjoy _____ nothing or do you like to be active?
7. How do you feel when your neighbours _____ noise? What do you usually do?

d. Ask and answer the questions.

Activity 3

Pronunciation

Put the words from the boxes in the correct columns according to the pronunciation of the letters in bold:

Technology, personal, **e**lectric, clearly, completely, rely, widespread, terribly, technician, **e**ven, modest, microprocessor, key, cheaper, increasing, need, version, success, evolve, learn, employ, leading, economy, leap, decade, fundamental, beyond, merely, essential, discrete, ahead, entertain, expect, era, **e**arly, dream, recognize, speech, realistic, enable, people, incredibly, excited, period, research, service, exploit.

as in pen	as in clean	as in exam	as in term	as in here

Extension**Discuss the following questions:**

1. What was your first computer like? What tasks did you use it for?
2. What role do computers play in your life now?
3. How will computers change in the future? What functions will they perform?

Activity 4**Grammar review****Present Perfect**

We use the present perfect to:

- talk about actions that continue from the past to the present.

*He **has worked** as an engineer for more than 20 years.*

(= He is still an engineer.)

- talk about past events that have a result in the present.

*The role of women **has changed** over the past 100 years.*

- talk about life experiences.

*He **has been** to many countries on business.*

The following time expressions are used with the present perfect: *since, ever, never, yet, just, already, for, so far, recently.*

Present Perfect and Past Simple

1. We use the past simple for completed actions that happen in the past.

Because the time reference is past, we use time expressions that refer to finished past time.

*John **passed** his driving test **last week**.*

***Fifty years ago** people **didn't have** personal computers.*

*Bill Gates and Paul Allen **founded** Microsoft **in 1975**.*

2. The decision to use the past simple or present perfect depends on how we see the event. If we see it as related to the present, we use the present perfect. If we see it as completed in the past, we use the past simple.

*I've **known** Mary for many years.*

(= We are still in touch.)

*I **knew** Mary when I was at college.*

(= We don't keep in touch.)

(See page 112)

1. Find examples of the past simple and present perfect in the text above.

2. Choose the right answer.

1. When _____ the company?
 - a) have you joined
 - b) did you joined
 - c) did you join
 - d) have you ever joined

2. _____ in Germany?

- a) Did you ever worked
- b) Have you ever worked
- c) Worked you
- d) Didn't you have worked

3. That's the best presentation _____

- a) I never heard
- b) I didn't hear
- c) I heard
- d) I've ever heard

4. He's the most creative person _____

- a) I never met.
- b) I never meet.
- c) I've ever met.
- d) I've never met.

5. _____ to him last week.

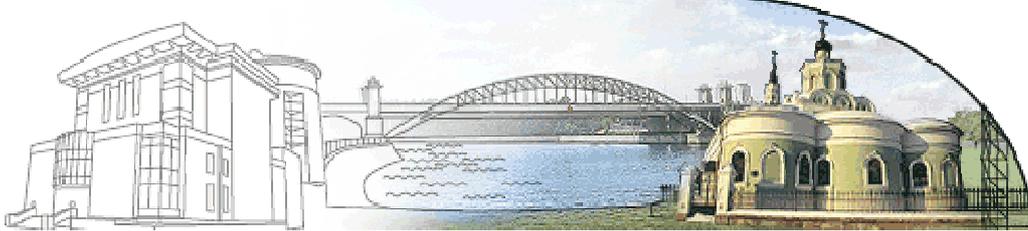
- a) I spoke
- b) I've already spoken
- c) I didn't spoke
- d) I speaked

6. The reason I look so brown is that _____ from a business trip to Spain.

- a) I come back
- b) I came back
- c) I never came back
- d) I've just come back

7. It's obvious that _____ your homework.

- a) you haven't done
- b) you didn't do
- c) you don't do
- d) you do not

MODULE 3**CIVIL ENGINEERING – A “CHALLENGING” PROFESSION?****Lead in**

“The profession of Civil Engineering is the art of directing the great sources of the power of Nature for the use and convenience of Man.” (from Wikipedia)

Your future profession is civil engineering.

- **What do you know about it?**
- **What do civil engineers do?**
- **What are they responsible for?**

UNIT 7

WHAT IS CIVIL ENGINEERING?

"When you understand civil engineering, you see the world differently."

(Institution of Civil Engineers www.ice.org.uk)

Activity 1

You are going to read an extract from the website of Institution of Civil Engineers in the UK, which promotes Civil Engineering.

1. Before reading make sure that you understand English words and expressions, matching them with their Russian equivalents.

1. rely on	А. загрязнение
2. processing and recycling waste	В. метро
3. find solutions to problems	С. полагаться на
4. pollution	Д. переходить по подземному переходу
5. network of roads	Е. железные дороги
6. underground system	Ф. проектировать и строить
7. walk through an underpass	Г. найти решение проблем
8. electricity pylons	Н. устойчивое развитие энергетики
9. design and build	І. многоэтажные автостоянки
10. railways	Ј. подача чистой воды
11. tunnels	К. переработка и утилизация отходов
12. tall structures	Л. опоры ЛЭП
13. multy-storey car parks	М. сеть дорог
14. train stations	Н. туннели
15. supply of clean water	О. высотные сооружения
16. sustainable energy	Р. железнодорожные вокзалы

• 2. Read the text “What is Civil Engineering?” and find the answers to the questions in Lead-in section.

- Do they coincide with your answers?
- Have you found any new information about your future profession?
- Would you like to add something to the text?

What is civil engineering?

Civil engineering is all about people. It’s the work that civil engineers do to develop and improve the services and facilities we, the public, all use.

We rely on civil engineering every day for a variety of things: from supplying energy and clean water to our homes, to processing and recycling our waste, to finding solutions to problems like pollution.

Culture corner

The Institution of Civil Engineers (ICE) is a registered charity that strives to promote and progress civil engineering. ICE was founded in 1818 by a small group of idealistic young men. Their aim is to "foster and promote the art and science of civil engineering". Now ICE represents around 80,000 members worldwide.

What do civil engineers do?

To understand what civil engineers do, you need to think about what you do in the first hour after you wake up on a Monday morning.

You clean your teeth using the running water in your bathroom. You have a cup of tea or coffee. You travel to work on a finely constructed network of roads or on a train or underground system. You park your car or grab another cup of coffee at the train station before heading to the office. You might even walk through an underpass or over a bridge before finally settling at your desk. None of this would have been possible without civil engineers.

Civil engineers design and build bridges, roads, railways, and tunnels. They design and build tall structures and large buildings such as multi-storey car parks, train stations, and even the Olympic stadium.

Without civil engineers we wouldn't have a constant supply of clean water, or sustainable energy to help us save our planet. Without civil engineers the world we live in would be completely unrecognisable.

(Adapted from <http://www.ice.org.uk/What-is-civil-engineering/What-do-civil-engineers-do>)

Activity 2 Grammar

Second conditional

If + past simple, would + infinitive without to

This describes an unlikely situation and its probable result.

*If we **didn't have** civil engineers we **wouldn't live** in cities.*

Instead of *would* we can use *might* or *could*, depending on the meaning.

*If he **spoke** English fluently he **could work** in a multinational company.*

1. Find examples of Second conditional in the text.

2. Fill in the gaps with Second conditionals of the verbs in brackets.

1. If civil engineers _____ (build) the Great Wall of China today, it _____ (cost) £ 300 billion.
2. If I _____ (have) a degree in Civil Engineering I _____ (have) a chance to get a well-paid job.
3. If I _____ (study) at Melbourne university I _____ (have) the opportunity to specialize in nanotechnology.
4. If I _____ (be) an office-based civil engineer I _____ (work) on computer designs.
5. If I _____ (work) in aerospace engineering I _____ (be) designing structures for use in space.

6. If I _____ (do) an outstanding civil engineering or construction project I _____ (receive) an ICE International Medal.

3. Complete the following sentences.

1. If I had a chance to study abroad ...
2. If I didn't choose to become a civil engineer ...
3. If I worked on a construction site ...
4. If I were the chief architect of Nizhny Novgorod ...
5. If

Activity 3

1. Read the text “Our World and The Civil Engineer” and fill in the gaps with the words from the box:

water supplies, facilities, meet technological challenges, coastal protection, waste (*3), dams, harbours, satisfy the demands (*2), treatment, clean water (*2).

The Profession

Civil engineers are responsible for the muscles which hold our society together – bridges, roads, railways, _____, airports, docks, _____ and tunnels. They also provide and maintain its heart and lungs – _____ and natural resources in, _____ out; transport systems to move everything safely and efficiently; and energy to make it all work.

They are very much concerned with the environment: _____, pollution reduction, protection of existing _____ and _____ disposal.

Do you know?

Brunel, Sir Marc Isambard 1769—1849, British engineer and inventor. His projects included building the old Bowery Theater (burned in 1821) and constructing a canal between Lake Champlain and the Hudson, building bridges and docks, the construction of the Thames Tunnel. He also invented many mechanical labor-saving devices. In the work on the tunnel

Sir Marc was assisted by his son, **Isambard Kingdom Brunel**, 1806—59, British civil engineer and an authority on railway traction and steam navigation. He is best known, however, for his designing and construction of ocean steamships.

Robert Stephenson (1803 - 1859) was an English civil engineer. He built railway locomotives. He constructed a number of well-known bridges including the High Level Bridge at Newcastle-upon-Tyne and the Royal Border Bridge. Despite officially being rivals Robert Stephenson shared a friendship with Isambard Kingdom Brunel and they would often help each other

Telford, Thomas, 1757—1834, Scottish civil engineer. He greatly improved road building in England and Scotland. His engineering works include harbors and docks, many notable bridges and an aqueduct across the Dee; he was engineer-in-chief of the Caledonian Canal. He is buried in Westminster Abbey.

**What famous Russian Civil Engineers do you know?
What are they well known for?
Prepare a short report about one of them.**

The civil engineer's job usually begins with the determination of a need. It may be the need to free a town centre from increasing traffic, the need to provide _____ or to build a bridge.

There may be several solutions to the problems and the civil engineer will recommend the best option to _____.

The Future

We have all heard of famous civil engineers from the past – Isambard Kingdom Brunel, Thomas Telford and Robert Stephenson for example. They were innovators in their time and achieved some remarkable feats of civil engineering.

But civil engineering today is even more about innovation as civil engineers have_____. Projects such as the Channel Tunnel, the Thames Barrier, the Humber Bridge, Canary Wharf and offshore oil platforms in the North Sea are just a few of the modern day achievements using methods and ideas never tried before.

Civil engineers will continue to _____of the civilized world – providing safe _____ and _____water _____ and developing irrigation and transport systems so communities can improve their quality of life.

And who knows what lies ahead? There are unimagined opportunities throughout the world and even beyond our own planet.

Activity 4 Pronunciation

1. Underline the stressed syllables. Then mark whether the stresses are on the same syllables (✓) or not (X).

1. chal.lenge ci.vil chan.nel ✓
2. rail.way de.mand air.port X
3. har.bour treat.ment supp.ly
4. trans.port main.tain pro.vide
5. so.lu.tion pro.tec.tion re.duc.tion
6. hous.ing py.lon net.work
7. com.mu.ni.ty in.fra.struc.ture inn.ov.at.or
8. off.shore tun.nel re.source
9. un.i.ma.gined i.rr.i.ga.tion en.gi.nee.ring

2. Put the words from the box in the correct column, according to the pronunciation of the letters in bold. Which word doesn't belong to any column?

society, air port, provide, main tain, environment, rely, recycle, disposal, satisfy, inn ovation, ach ievement, civilized, irr igation, design, quality, id ea, unimagined, pylon, electricity

as in line	as in hit	as in need	as in fire	as in pair
	inn ovation			

Activity 5

Re-arrange these “word dominoes” in the right order so that each makes a strong word partnership. Make a list of the word pairs you create. The first and last domino are half-blank.

1.		sustainable
2.	Reduction	waste
3.	oil platforms	modern day
4.	energy	natural
5.	treatment	irrigation
6.	disposal	solutions
7.	resources	pollution
8.	waste	offshore
9.	achievements	waste water
10.	to problems	to process and recycle
11.	system	electricity
12	pylon	

Activity 6

1. In the text “Our World and The Civil Engineer” it is stated that civil engineering has unimagined opportunities throughout the world and even beyond our planet. What do you think these opportunities are? Use the word partnerships from Activity 5 and the Language box below to help you express your ideas.

Language Box

Expressing your opinion	
I think...	In my view/ opinion...
I believe...	From my point of view...

2. Read the following statements about civil engineering and say if you agree or disagree with them. Prove your points of view referring to the texts you read in the unit.

- Civil Engineers are among the first to use the available high technologies.
- Civil Engineering is truly the profession that has shaped our past and is helping define and build our future.
- “Scientists explore what is; engineers create what has never been.” (Marc Isambard Brunel)
- Civil Engineering relies more than any other engineering discipline upon communication skills... and sensitivity to the needs of society.

UNIT 8

STUDYING CIVIL ENGINEERING

**For a start**

People ask “is civil engineering for me?”

The following quiz will help to find out if civil engineering career fits you.

1. Do you get good grades in math and science?
2. Do you enjoy knowing how things work?
3. Do you ever think of new or better ways to do things?
4. If you get a gift that says “Assembly Required”, do you put it together yourself?
5. Do you like to work with computers and play video games?
6. Do you like to do mazes and jigsaw puzzles?
7. Do you usually make sound decisions, and do people trust your judgment?
8. Can you express yourself easily and clearly?
9. Do you work well with others?
10. Do you like to know “why”?

Answers:

If you answered “Yes” to most of the questions, your potential for success in civil engineering is high.

Activity 1

1. What subjects are the most important to study if you want to become a civil engineer?

2. Read what subjects The Institution of Civil Engineers recommends to British students and compare with your ideas.

What subjects should I choose?**1. Maths**

If you want to become an engineer, you'll have to study maths. Engineers use maths to understand the theory of engineering and to analyse materials and structures.

For most engineering courses at university you need to have a maths A-level. You could also take further maths, if it's available as an option, but further maths is helpful, not essential. (There will also be some maths in the first year of your university course.)

Culture corner

The **A Level** is a school leaving qualification offered by educational bodies in the United Kingdom.

2. Physics

The second most important subject to study at this stage is probably physics. The laws of physics dictate how and why things behave the way they do. Studying physics will help you understand concepts such as energy, forces and motion, which are key to solving the problems that engineers face on a daily basis.

There are lots of other useful subjects.

3. Geography and geology

These subjects will build your understanding of the physical world, like the behaviour of rivers, tides and currents in the sea, and the strengths of different rocks and soils.

4. ICT

If you want to develop skills in using computer software, you must study ICT. You'll be able to apply those skills to the programmes you'll use as a civil engineer.

5. Languages

Learning a modern foreign language will be useful if you want to work abroad. Generally, it's best to choose what you enjoy and are good at. You might also want to look at some university websites to see if they have any specific requirements or preferences.

3. Which word combinations with “skills” can you find in the text? What other word combinations can you form?

4. Find in the text English equivalents to the following words and word combinations:

доступный (part 1)

существенный (part 1)

вариант (part 1)

энергия, сила и движение (part 2)

важный / ключевой для решения проблем (part 2)

характеристики рек, приливов и морских течений (part 3)

прочность горных пород и грунта (part 3)

конкретные требования (part 5)

предпочтения (part 5)

<p>Activity 2 Grammar review</p>

Modal verbs

Very often modal verbs are used to describe responsibilities and abilities of people.

1. Look through the text again and find modal verbs. (See Table 1 for reference).

Table 1. Modal verbs and their equivalents.

1. CAN	1. Умение, возможность что-то делать.
2. BE ABLE TO	2. Заменяет глагол CAN в будущем времени и в сочетании с другими глаголами.
3. MUST	3. Долженствование.
4. HAVE TO / NEED	4. Необходимость что-то сделать.
5. MAY / MIGHT / COULD	5. Возможность и вероятность совершения действия в настоящем и будущем времени.

2. Check if you remember how to use modal verbs. Complete the sentences with the necessary modal verbs.

1. How _____ you become a civil engineer?
2. Modern civil engineers _____ be good specialists in information technology, computer-aided design as computers are becoming increasingly important.
3. During the course of studies graduate and undergraduate students _____ complete a number of research projects.
4. Every morning we turn on the tap, boil a kettle, use the bathroom, walk along the road, cross a bridge or take a train. Without civil engineering we wouldn't _____ do any of these.
5. In future civil engineers _____ find new ways to minimize problems and to maintain the quality of the world in which we live.
6. If you study Civil Engineering you _____ learn how to use maths and science to design big construction projects.

3. Make up some sentences, describing your abilities and responsibilities as a civil engineering student. Use different modal verbs.

Activity 3

To prepare yourself for a career in civil engineering you should know the tasks you will have to perform in your future job. AMERICA'S CAREER INFONET provides a list of the most important tasks in the field of civil engineering.

Before reading match the following key words/expressions in English with their Russian equivalents:

1. survey report	a. почва, почвогрунт, грунт;
2. blueprint	строительный грунт
3. aerial photography	b. оборудование, оснащение, арматура,
4. traffic pattern	оснастка
5. environmental condition	c. гидродвигатели и гидротехнические сооружения
6. impact	d. условия окружающей среды,
7. construction activities	окружающие условия; внешние условия
8. quantity	e. схема движения
9. project feasibility	f. чертеж
10. project site	g. прочность; предел прочности
11. equipment	фундамента/ основания
12. labor (Am) = labour (Br)	h. асфальт
13. safety and sanitation standards	i. труд; рабочая сила, рабочие
14. hydraulic systems and structures	j. сильное воздействие; влияние
15. modifications	k. производственный персонал
	l. количество
	m. акт осмотра и экспертизы
	n. бетон

Activity 5

Read the table with the tasks and complete the gaps using the words in the box:

<p>safety or sanitation standards, construction, hydraulic systems, program modifications, soil, aerial photography, labour, environmental conditions, equipment, blueprints</p>
--

Occupation Specific Tasks:

- Analyze survey reports, maps, drawings, _____, _____, and other topographical or geologic data to plan projects.
- Conduct studies of traffic patterns or _____ to identify engineering problems and assess the potential impact of projects.
- Estimate quantities and cost of materials, _____, and _____ to determine project feasibility.
- Inspect project sites to monitor progress and design _____.
- Plan and design transportation or _____ and structures, following construction and government standards.
- Provide technical advice regarding design, construction, or _____ to industrial and managerial personnel.
- Direct _____ activities at project site.

<i>Do you know?</i>

<p>A blueprint is a plan or design documenting an architecture. The name comes from the photographic print composed of white lines on a blue background commonly used in the past for copying architectural plans and engineering drawings. The blueprint process was developed by the British astronomer Sir John Herschel in 1840.</p>

<p>Aerial photography is the taking of photographs from above with a camera placed on an aircraft, balloon, rocket, kite or similar vehicle. It was first practised by the French airman Nadar in 1858. Aerial photography is used in cartography, land-use planning, movie production, environmental studies, espionage, commercial advertising, and other fields. Aerial photos are often processed by a GIS (geographic information system).</p>
--

- Test _____ and materials to determine the strength of foundations, concrete, asphalt, or steel.

2. The following verbs all relate to civil engineering tasks and activities. Cross out the word/ phrase which cannot go with the verb:

to determine - project feasibility/ a position/soils

to estimate – quantity / cost / size / asphalt

to conduct studies - industrial personnel / of environmental conditions / of traffic patterns

to identify – labour / problems / quantity / impact

to direct – a research project / construction activities / feasibility / design

to provide – technical advice / building materials / impact

to inspect – project site / work / quantity

to monitor – concrete / progress / sanitation standards / labor costs

to plan – a hydraulic structure / topographical data / the work on ...

to design – a building /a transportation system / progress /a project

to test – strength of foundation /a design /soil / equipment

3. Use the phrases above to describe stages of a construction project:

1. Paperwork (requirements)

To design a building, ...

2. Budget

3. Materials

4. Staff and Human Resources

5. Construction

To monitor sanitation standards, ...

Activity 6

To perform all the tasks efficiently a civil engineer must have certain knowledge, skills and abilities.

American Society of Civil Engineers (ASCE) presents a list of most important **Knowledge, Skills and Abilities** (KSAs) in different fields, necessary for Civil Engineers.

Knowledge**1. Match the following definitions to the corresponding type of knowledge:**

Knowledge: engineering and technology, mechanics, design, public safety and security, mathematics, economics and accounting (бухгалтерский учет), administration and management, law and government, building and construction, computers and electronics, physics.

_____ – Knowledge of materials, methods, and the tools involved in the construction or repair of houses or other structures such as highways and roads.

_____ – Knowledge of physical principles, laws, and their applications to understand fluid, material, and atmospheric dynamics; mechanical and electrical processes.

_____ – Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, and equipment to the design and production of various goods and services.

_____ – Knowledge of processors, chips, electronic equipment and computer hardware and software.

_____ – Knowledge of design techniques, tools, and principles involved in production of technical plans, blueprints, and models.

_____ – Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.

_____ – Knowledge of laws, legal codes, court procedures, and government regulations.

_____ – Knowledge of machines and tools, including their designs, uses, repair, and maintenance.

_____ – Knowledge of business and management principles involved in strategic planning, leadership technique, and coordination of people and resources.

_____ – Knowledge of relevant equipment, policies, and strategies for effective security operations for the protection of people, data, and property.

_____ – Knowledge of economic and accounting principles and practices, the financial markets and banking.

Skills and Abilities

2. Complete the definitions of skills and abilities using the following verbs:

to come up with

to identify

to do

to solve

to arrange

to try

to remember

to use

to communicate

to recognize

Critical Thinking – using logic _____ the strengths and weaknesses of alternative solutions.

Negotiation – bringing others together _____ to reconcile differences (устранять разногласия).

Science – using scientific rules and methods _____ problems.

Active Learning – understanding how _____ new information for current and future problem-solving and decision-making.

Instructing – teaching others how _____ something.

Problem Sensitivity – the ability _____ when something is wrong or there is a problem.

Speaking – the ability _____ information and ideas in speaking so others will understand.

Information Ordering – the ability _____ things or actions in a certain order according to a specific rule (e.g., patterns of numbers, letters, words, pictures, mathematical operations).

Originality – the ability _____ unusual or clever ideas, or to develop creative ways to solve a problem.

Memorization – the ability _____ information such as words, numbers, pictures, and procedures.

Activity 7

Discuss the questions:

- What knowledge, skills and abilities are the most important for civil engineers?
- What knowledge, skills and abilities have you already got?
- What knowledge do you have to get?
- What skills and abilities do you have to develop?

Activity 8

Grace and Austyn are studying Civil Engineering at Aberdeen University.

1. Read what they say about their choice of profession and their career plans.

Which of the students

1. has been abroad?
2. has been interested in engineering since very young age?
3. wants to work on a project site?
4. took part in a construction project?
5. wants to satisfy the demands of society?
6. cares about the future impact of engineering projects?

Grace Wilkinson



Why civil engineering?

I think it was a combination of being a creative and mathematical person. After visiting cities like London and New York, I initially wanted to design buildings. But I decided on civil engineering because it will give me the chance to apply maths to both design and construction.

I did summer work experience at Galliford Try (a construction company) and learned a lot. It was a really great experience to see the project when it was nearly finished, especially after hearing about the problems the company had to solve.

The future

I think I'd like to work on long-lasting and sustainable projects. The biggest thing that inspires me to become a civil engineer is the scope and importance of civil engineering. Not just how projects benefit everyday lives, but also how the engineering of today will affect the future.

Austyn Lloyd

Why civil engineering?

When I was a child, I got interested in how structures and infrastructure work and their importance to society. I love the thought of being a civil engineer and creating things that improve people's lives, like building a dam to provide water or a bridge to link communities.



The future

I want to manage structural civil engineering projects, but I'd also like to do field work so I can get involved in lots of different activities.

2. Discuss with your partner:

- How would you explain your choice of profession?
- What are your career plans?

MODULE 4

EMPLOYMENT

“Civil engineering is an umbrella field comprised of many related specialities.”(from Wikipedia)

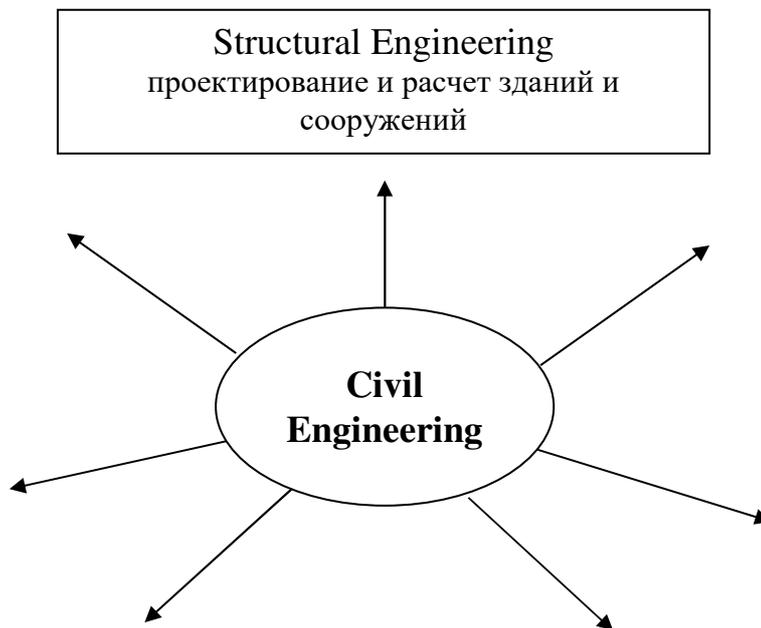
Lead-in

Civil engineering is the broadest of the engineering fields. In fact, engineering was

once divided into only two fields - military and civil.

What specialities of civil engineering do you know?

Brainstorm your ideas and complete the diagram using either English or Russian language.



Do you know?

Early English verb *engine* meant "to contrive" (придумывать, изобретать; разрабатывать) or "to devise" (выдумывать, изобретать). Thus the engines of war were devices such as catapults, floating bridges, and assault towers, and the designer was called the "*engineer*" or military engineer.

His counterpart was the civil engineer who applied the same knowledge and skill to design structures, streets, water-supply and sewage systems, and other projects of benefit to the civilian population.

UNIT 9

SPECIALITIES



Activity 1
Civil
Engineering
Specialities

1. Read quickly the descriptions of the specialities given by American Society of Civil Engineers

(<http://www.asce.org/kids/tech.cfm>) and match them with

the names of the specialities (the missing words correspond

to the names of the specialities).

Environmental Engineering	Geotechnical Engineering
Transportation Engineering	Construction Engineering
Water Resources	Urban Planning
	Structural Engineering

Civil Engineering: Technical Specialties

I. _____



As a _____ engineer, you will be a builder of our future. The construction phase of a project is the first visible result of a design.

Using your technical and management skills, you will turn designs into reality - on time and within budget. You will use your knowledge of construction methods, equipment, and principles of financing, planning, and managing, to turn the designs of other engineers into successful facilities.

II. _____



The skills of _____ engineers are very important as we try to protect the limited resources of our planet. _____ engineers should understand physical, chemical, and biological processes to destroy toxic substances, remove pollutants from water, reduce non-hazardous solid waste volumes, eliminate contaminants from the air, and develop groundwater supplies. In this field, you may have to resolve problems of providing safe drinking water, cleaning up sites contaminated with hazardous materials, cleaning up and preventing air pollution, treating wastewater, and managing solid wastes.

III. _____



Almost all of the facilities that make up our infrastructure are in, on, or with earth materials, and _____ engineering is the discipline that deals with applications of technology to solve these problems. Examples of facilities in the earth are tunnels, deep foundations, and pipelines. Highway pavements and many buildings are supported on the earth. And earth dams, embankments, and slopes are constructed with the earth. In addition, many soil-like waste materials are located in containment areas. To design these facilities, _____ engineers must understand the principles of mechanics and mathematics and conduct analyses, which require input data to quantify the properties of the earth materials, and they can receive this information from laboratory or field tests.

IV. _____



As a _____ engineer, you will have to analyze and design structures to ensure that they are safe. They must support their own weight and resist dynamic environmental loads such as hurricanes, earthquakes, blizzards, and floods. Stadiums, arenas, skyscrapers, offshore oil structures, space platforms, amusement park rides, bridges,

office buildings, and homes are a few of the many types of projects that _____ engineers work on. You will develop and use knowledge of the properties and behaviors of steel, concrete, aluminum, timber, and plastic as well as new and exotic materials. To control the project you will have to be on the construction site inspecting and verifying the work.

V. _____



Because the quality of a community is directly related to the quality of its _____ system, your function as a _____ engineer will be to move people, goods, and materials safely and efficiently. Your challenge will be to find ways to meet the increasing travel needs on land, air and sea. You will design, construct, and maintain all types of facilities, including highways, railroads, airfields, and ports. An important part of _____ engineering is to upgrade our transportation capability by improving traffic control and mass transit systems, and by introducing high-speed trains and other new transportation methods.

VI. _____



As a professional in this area, you will deal with the full development of a community. Analyzing a variety of information will help you coordinate projects, such as projecting street patterns, identifying park and recreation areas, and determining areas for industrial and residential growth. To ensure ready access to your community, coordination with other authorities may be necessary to integrate freeways, airports, and other related facilities. To coordinate the project successfully you will have to be people-oriented as well as technically knowledgeable.

VII. _____



As a _____ engineer, you will deal with issues such as the quality and quantity of water, which is essential to our lives. You will work to prevent floods, to supply water for cities, industry and irrigation, to treat wastewater, to protect beaches, or to manage and redirect rivers. You might work on the design, construction, or maintenance of hydroelectric power facilities, canals, dams, pipelines, pumping stations, locks, or seaport facilities.

2. What key words helped you identify the specialities? Write out two or three words from each paragraph that you need to translate to get better understanding of the text. You may consult a dictionary or ask your teacher.

Activity 2 Pronunciation

1. Match the words in the left and right columns which contain the same sound:

1. structure	a. turn
2. concrete	b. verify
3. analyze	c. pavement
4. containment	d. dam
5. project* (verb)	e. solid
6. determine	f. develop
7. analysis	g. industrial

* 'project - noun pro'ject - verb

2. Put the words below in the correct column of the table according to their word stress:

require, non-hazardous, analysis, properties, access, pipelines,
coordinate, maintenance, substances, supplies, project, eliminate,
technology, off-shore, identify, conduct, contaminants, quantify, canal

● ● ●	● ●	● ● ● ●	● ●
		analysis	

**Activity 3
Vocabulary**

1. Look through the descriptions of the specialities again and find English equivalents of the following Russian words and expressions:

I.	Воплотить проект в жизнь
	Этап строительства
	Технические навыки и навыки управления
II.	Разрушать токсичные вещества
	Разрабатывать грунтовое водоснабжение

	Сократить количество невредных твердых отходов
	Удалить загрязнители из воздуха
	Очищать сточные воды
	Перерабатывать твердые отходы
III.	Определить свойства
	Полевые испытания на месте
	Нуждаться в исходных данных
	Дорожное покрытие автострад
	Земельные материалы
	Место скопления (расположения) отходов
IV.	Выдерживать нагрузки окружающей среды
	Осматривать и проверять работу
	Морское нефтяное сооружение
V.	Улучшать провозную способность
	Быть непосредственно связанным с чем-либо
	Сложная задача, проблема, вызов
	Удобства, услуги, оборудование, сооружения
VI.	Гарантировать быстрый доступ к жилым районам
	Проектировать схемы улиц
	Определять участки для промышленной и жилой застройки
VII.	Эксплуатация

2. Find synonyms to the following words in extract II:

pollutant (3) –

to destroy –

to clean (water) (2) –

to supply –

3. What weather words can you find in extract IV? What other words

describing weather do you know?

4. Write down all the types of building materials from extract IV. What other building materials do you know?

5. Think of as many derivatives of the given words as you can and complete the table:

Noun	Verb	Adjective/ Participle II
hazards		
	contaminate	
technology,	--/--	
	construct	
		structural
	apply	
pollutant,		
		transportable
		analyzed
	maintain	

Activity 4 Grammar

Very often infinitives are used to express purpose. In this case they answer the question *Why*.

Example: *Construction engineers use their knowledge to turn the designs into successful facilities.*

1. In the texts describing civil engineering specialities there are several examples of the infinitives used to express purpose. Find at least 10 of them.

2. Match parts of the sentences from the left and the right columns.

1. A water resources engineer deals with such issues as the quality and quantity of water...	a. ... to solve problems.
2. Transportation engineers design, construct and maintain all types of facilities, including highways, railroads, airfields and ports...	b. ... to identify the strengths and weaknesses of alternative solutions and conclusions.
3. Civil engineers need to study mathematics...	c. ... to identify engineering problems and assess the potential impact of projects.
4. Civil engineers use logic and reasoning...	d. ... to move people, goods and materials safely and efficiently.
5. One of civil engineers' specific tasks is to conduct studies of traffic patterns or environmental conditions....	e. ... to prevent floods and supply water for cities, industry and irrigation.

3 Transform the sentences using the infinitive of purpose.

Example:

Civil engineers have to make technical plans, blueprints, drawings and models. For this purpose they should possess good knowledge of design techniques and tools.

*Civil engineers should possess good knowledge of design techniques and tools **to make** technical plans, blueprints, drawings and models.*

1. Engineers have to use computers because they need to program and process information.
2. One of the tasks of civil engineers is to choose the best solutions to the problems. That's why they need to analyze information.
3. Civil engineers create economical and aesthetically pleasing facilities. That's why they must be well informed about the sciences and must apply their theoretical knowledge.
4. Geotechnical engineers work closely with environmental specialists because they investigate water contamination and design domestic and mine waste storage facilities.
5. Structural engineers have to be on the construction site inspecting and verifying the work. It is necessary for them as they need to control the project according to the plan.
6. Civil engineers need to use design software and drawing tools. It's important when they plan and design transportation or hydraulic systems and structures.
7. Civil engineers should test soil and materials. It is essential as they need to determine the strength of foundations, concrete, asphalt, or steel.

<p>Activity 5 Summarizing</p>

1. Read the texts on the specialities once again and complete the following table:

Speciality	Tasks and activities	Knowledge and skills	Projects (facilities)
I. Environmental Engineering	To destroy toxic substances, to remove pollutants from water, to reduce non-hazardous solid waste volumes, to eliminate contaminants from the air, to develop groundwater supplies...	Physical, chemical, and biological processes	
II. Construction Engineering			
III. Geotechnical Engineering			
IV. Structural Engineering			
V. Transportation Engineering			
VI. Urban Planning			
VII. Water Resources			

2. Compare your table with the other students' ones in the group.

Activity 6 Writing

Within the framework of specialist program at your university you can further select a subject field (technical speciality) leading to certain specialist qualifications. For example, Nizhny Novgorod State University of Architecture and Civil Engineering (www.nngasu.ru) provides the following specialist qualifications:

- Construction of Roads and Airfields
- Industrial and Civil Construction
- Hydraulic Engineering
- Production of Building Materials, Products and Structures
- Water Supply and Sanitation
- Heat and Gas Supply
- Expertise and Management of Real Estate



Write a description of your speciality like in Activity 1.

Activity 7 Speaking

In the past few years the scope of civil engineering has grown to include several new areas of study. What do you think these areas are?

1. Search the Internet for the keywords *emerging areas in civil engineering* to see the new civil engineering specialities.

Choose one of the new areas to study and prepare a short presentation for your group. Speak about:

Tasks

Challenges

Job responsibilities

Etc.

2. What new areas in Civil Engineering will be more perspective in Russia in future? Why? What area would you like to work in?

UNIT 10

STATISTICS



For a start

What kind of companies do civil engineers work for?

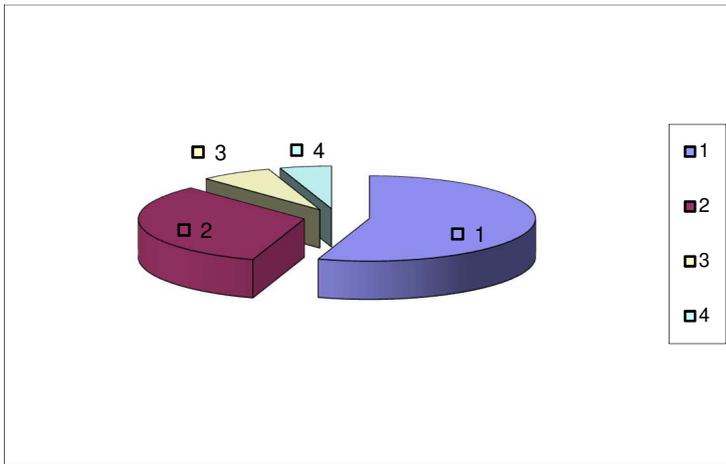
What kind of jobs do civil engineers have?

Activity 1

Read the statistical data of the U.S.A. and complete the diagram.

Civil engineers held about 272,900 jobs in 2012. They generally work indoors in offices. However, they sometimes spend time outdoors at construction sites so they can monitor operations or solve problems at the site. Occasionally, civil engineers travel abroad to work on large engineering projects in other countries.

Almost one third of the job were in Federal, State, and local government agencies. *A little more than half* were employed by firms providing engineering consulting services, primarily developing designs for new construction projects. *Most of the others* worked in the construction and manufacturing industries. *About 12,000* civil engineers were self-employed, many as consultants.



- 1.
- 2.
- 3.
4. *Self-employed*

Activity 2 Fractions and percentages

Fractions and percentages are used to express the relative values of one amount compared to another.

- Most fractions expressed using ordinal numbers:

a third (1/3) *a fifth (1/5)* *two sixths (2/6)*

- There are some exceptions:

a half (1/2) *a quarter (1/4)* *three quarters (3/4)* *three and a half (3 1/2)*

Complete the table:

$\frac{1}{2}$	a half	50%
$\frac{1}{3}$		66%
$\frac{1}{4}$		25%
$\frac{3}{4}$		75%
$\frac{2}{5}$		40%
$\frac{5}{6}$	five sixths	83%
$\frac{9}{10}$		90%

The following words are used to give approximations while talking about amounts.

about	approximately	nearly	roughly	around
	little less	little more		

Example: *Approximately a third of civil engineers work in Federal, State, and local government agencies.*

**Activity 3
Statistics**

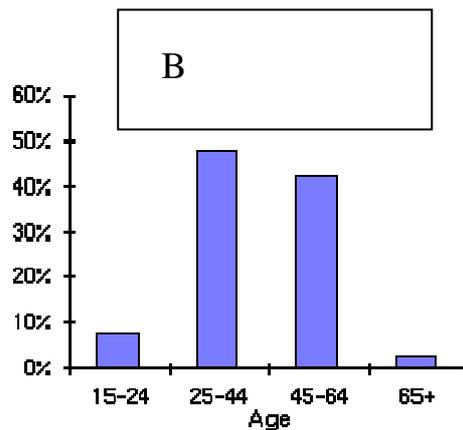
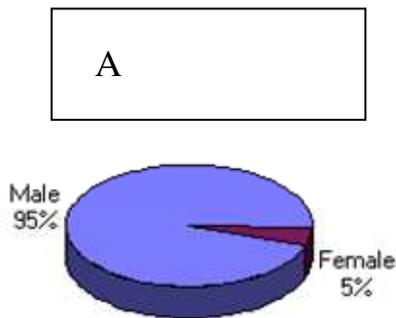
1. Look at the statistics on civil engineer occupations available from Statistics Canada.

Which one is:

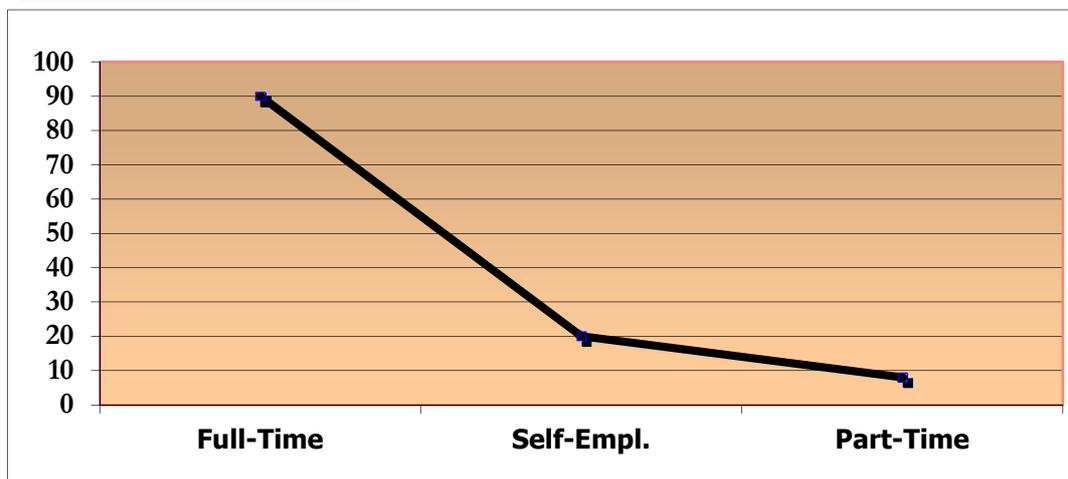
- a bar graph
- a line-graph
- a pie chart

2. Match these headings to the correct graph, table or chart.

- Type of employment of Civil Engineers, 2012
- Gender of Civil Engineers, 2012
- Age of Civil Engineers, 2012



C



3. Look at the information in the bar graph Age of Civil Engineers, 2012 and complete its description. Use the appropriate fractions or percentages and approximation words.

The age chart gives the percentage of people in each of the four age groups: 15-24, 25-44, 45-64, and 65+. **Little less than 10 %** of civil engineers in 2012 were 15-24 years old. The age of _____ of employees varied from 25 to 44 years old. The group of 45-64 year olds amounted to _____. People of 65 years old and older represented _____.

4. Write down all the verbs used in the text to describe the diagram.

5. Write similar description of the following diagrams: Type of employment of Civil Engineers, Gender of Civil Engineers, 2012. Use words of approximation, fractions and percentages and the necessary verbs to describe the diagram.

Activity 4

1. Do you know how much Civil Engineers earn?

Read the information given by the U.S. Department of Labor.

Median annual earnings of civil engineers were \$87,130 in 2014. The middle 50 percent earned between \$75,150 and \$99,470. The lowest 10% earned less than 57,430 and the highest 10 percent earned more than \$128,110.

According to a 2014 salary survey by the National Association of Colleges and employers, bachelor's degree candidates in civil engineering received starting offers \$50,616 per year, master's degree candidates received an average offer of \$54,080 and Ph.D. candidates were offered \$72,280 as an initial salary.

2. Work in pairs. Present the information given in the text in a diagrammatic form.

3. Do you know the average salary of a civil engineer in Russia? How much do you hope to earn?

**Activity 5
Pronunciation**

Put the words from the box in the correct column according to the pronunciation of the letters in bold.

Occupation, satisfaction, **large**, **repair**, transportation, capacity, approximately, interact, expanding, replace, manufacturing, **global**, quality, **earnings**, **major**, **varied**, training, career, postgraduate, **area**, demand, software, department, salary

as in place	as in traffic	as in part	as in aerial	as in ability	as in earthquake	as in quantity
	interact					

**Activity 6
Reading**

Do you think employment of civil engineers will increase in the nearest future? Why? Why not?

1. Look through the text about the future of civil engineering, based on the information given by U.S. Bureau of Labor Statistics and answer the questions (Don't worry about the gaps).

- Why will the demand in civil engineers increase?
- How will job requirements for civil engineers change in the future?



2. Before reading the text match English words to their Russian equivalents.

waste treatment plant	дорожное полотно
renewable energy	водоочистная станция
permit documents	крупномасштабный проект
large-scale project	возобновляемый источник энергии
solar panel	грузовик
road bed	разрешительная документация
truck	солнечная батарея

Employment of civil engineers is projected to grow 20 percent from 2012 to 2022, faster than the average for all occupations. As infrastructure continues to age, civil engineers will be needed to manage projects to rebuild bridges, _____, and upgrade dams.

Moreover, a growing population means that new water systems will be required while the aging, existing water systems must be maintained to reduce or eliminate _____. In addition, more waste treatment plants will be needed to help clean the nation's waterways. Civil engineers play a key part in all of this work.

The work of civil engineers will be needed for renewable energy projects. Civil engineers prepare the permit documents for these types of projects, verifying that the project will comply with federal, state, and _____. With regard to solar energy, these engineers conduct _____ for large-scale projects. They also evaluate the ability of

solar panel support structures and buildings to tolerate stresses from wind, seismic activity, and other sources. For large-scale wind projects, civil engineers often prepare road beds to handle large trucks that carry the turbines.

Technology has had a major influence on _____ and training requirements for civil engineers in the last five to ten years, particularly in the areas of computer design programs and software. Many tasks are computer based now and computerization of civil engineering is expected to continue growing.

A higher standard and level of education will be required due to the competitive nature of the job. Civil engineering firms will employ people who have done well in their studies and have completed _____ at a postgraduate level.

Whatever area you choose, design, construction, research, teaching, or management, civil engineering will offer you_____.

3. Which words do you think are missing? Read the text carefully and complete it with the words from the box. Use a dictionary to help you.

a. a wide range of career choices	e. repair roads
b. the skills	f. extra studies
c. leaks of drinking water	g. structural analyses
d. local requirements	

4. Complete this table with the words from the text.

Noun	Verb	Adjective / participle
	to grow	
computerization		
		constructive
reduction		
competition		
	to require	
		employed

Activity 7

We often prefer Passive voice when it is not so important who or what did the action.

Language review

This house was built in 1800.

This is a passive sentence.



Compare: Somebody built this house in 1800. (active)

This house was built in 1800. (passive)

In this example, it is not important who built the house.

1. Find passive forms in the text about the future of civil engineering.
2. Transform the sentences, using Passive Voice. Example:

Steel provides the strength of structure.

The strength is provided by steel.

Do you know?

- 1) John Smeaton designed and built the famous Eddystone Lighthouse, off the coast of Cornwall, England.
 - 2) Civil engineers differentiate the word “construction” from the word “building”.
 - 3) Sebastien le Prestre de Vauban laid the foundations of civil engineering profession.
 - 4) Builders widely use the chief materials of civil engineering: steel, reinforced concrete and timber.
 - 5) A professional civil engineer usually adds several years of practical training and experience to the theoretical basis.
 - 6) We can divide the profession of civil engineering into 3 broad categories, such as consulting, contracting and municipal engineering.
 - 7) Nowadays the new technologies inevitably influence architectural form.
 - 8) If you apply to a firm of contractors, professional civil engineers will organize and control both labour and machines.
 - 9) The architect must always keep in mind the function of the proposed building.
3. **Find all the uses of Passive Voice in the section “Do you know”.**



The **Eddystone Lighthouse** is a lighthouse situated on the [Eddystone Rocks](#), 14 miles south-west of Plymouth. There were 4 versions of this structure. The first was an octagonal wooden structure created in 1698. It was destroyed by the [Great Storm of 1703](#). The second lighthouse was designed as a conical wooden structure and destroyed by fire in [1755](#). The third lighthouse (1756-1759), known as *Smeaton's Tower*, was perhaps the best known as for its structure John Smeaton developed 'hydraulic lime' (a form of concrete) and thus advanced cement technology. It was dismantled because of the rock erosion and later rebuilt at Plymouth in [1877](#) as a memorial. The current, fourth lighthouse was built in 1882. The techniques used in its construction were pioneered by [Robert Stevenson](#). The tower is 51m high.

Which version of the light house do you think is shown in the picture above?

4. **Passive Voice is widely used to describe landmarks and other constructions. Have you ever heard about *The Grand Canyon Skywalk*? Where is it located? How high is it? Read the introduction to the text about *The Grand Canyon Skywalk* and check yourself.**
5. **Read the rest of the text and put the verbs in brackets into the correct form (Active or Passive).**

The Grand Canyon Skywalk (in Arizona, USA) is a horseshoe-shaped, glass-bottom structure that allows visitors to walk 70 feet past the edge of the Grand Canyon wall and stand 4,000 feet above the Colorado River.

The Grand Canyon Skywalk is active and open to the public year-round, hosting approximately 2 million visitors.



The Grand Canyon Skywalk (to open) to the general public on March 28, 2007. It (to access) via the Grand Canyon West Airport terminal or a 120-mile (190 km) drive from Las Vegas.

David Jin, an entrepreneur who (to involve) with tourism and the Hualapai Nation for some time, (to have) the idea of extending a platform out over the edge of the Grand Canyon. With the help of architect Mark Ross Johnson, that idea (to evolve) into a "U"-shaped walkway that (to construct).

The overall Skywalk width is 65 feet (20 m), the length is 70 feet (21 m). The outer and inner bridge box beams (to support) by eight box posts.

The deck of the Skywalk (to make) with four layers of iron glass. The Skywalk glass sidings (to make) with the same glass as the deck. Engineers (to conduct) extensive testing during the planning and design phase to ensure the Grand Canyon Skywalk could easily withstand the high winds that (to blow) through the Grand Canyon.

The walkway could carry 822 people that weigh 200 pounds (91 kg) each without overstress, but maximum occupancy at one time is 120 people.

The Skywalk (to assemble) on top of the canyon wall and moved into final position in two days.

Astronauts Buzz Aldrin and John Herrington (to attend) the opening ceremony on March 20, 2007.

According to Hualapai officials, the cost of the Skywalk (to be) \$30 million. Future plans for the Grand Canyon Skywalk complex (to include) a museum, movie theater, VIP lounge, gift shop, and several restaurants.



6. What other outstanding landmarks do you know?

Write a description of your favorite landmark, using the passive. Then tell your classmates about it.

Activity 8

Discuss these questions about future of civil engineering. Use the information from activities 1, 3, 4, 5.

- What reasons for the increasing demand in civil engineers do experts give?
- What will civil engineers have to do in future?
- What skills will be necessary for future civil engineers? Why?
- “A higher standard and level of education is now required due to the competitive nature of the job”. What does “competitive nature of the job” mean?

GRAMMAR REFERENCE**Present Simple and Present Continuous****Present Simple**

+ I/ You/ We/ They **work**.

He/ She/ It **works**.

- I/ You/ We/ They **don't work**.

He/ She/ It **doesn't work**.

? **Do** I/ you/ we/ they **work**?

Does he/ she/ it/ **work**?

Present Continuous

+ I **am going**.

He/ She/ It **is going**.

You/ We/ They **are going**.

- I **am not going**.

He/ She/ It **is not going**.

You/ We/ They **are not going**.

? **Am** I **going**?

Is he/ she/ it **going**?

Are you/ we/ they **going**?

Passives

+ It's **done**. It's **being done**. It **was done**. It **has been done**.

It **will be done**.

- It's **not done**. It's **not being done**. It **wasn't done**. It **hasn't been done**.

It **won't be done**.

? **Is it done?** **Is it being done?** **Was it done?** **Has it been done?**

Will it be done?

Passives can also be formed with modal verbs.

Can it be done? It **can't be done**. It **should be done**. It **must be done**. It **might be done**.

Present Perfect

+ I/ You/ We/ They **have worked**.

He/ She/ It **has worked**.

- I/ You/ We/ They **haven't worked**.

He/ She/ It **hasn't worked**.

? **Have I/ you/ we/ they worked?**

Has he/ she/ it/ worked?

Past Simple

+ I/ You/ We/ They **worked**.

He/ She/ It **worked**.

- I/ You/ He/ She/ It/ We/ They **didn't work**.

? **Did I/ you/ he/ she/ it/ we/ they work?**

Dealing with numbers

Saying large numbers

For example, 912,757,250 = nine hundred and twelve million, seven hundred and fifty-seven thousand, two hundred and fifty.

British and American English differences

0 = nought / oh (BrE) 0 = zero (AmE)

Fractions	Decimals
$\frac{5}{7}$ = five-sevenths	1.25 = one point two five
$\frac{2}{5}$ = two-fifths	0.754 = nought point seven five four (BrE)
$\frac{1}{2}$ = a half	zero point seven five four (AmE)
$\frac{1}{4}$ = a quarter	point seven five four (BrE/AmE)

Percentages

65% = sixty-five percent

WRITING FILE**Guide to presentation**

1. Make a plan of your talk. This should include at least three sections:
 - introduction
 - development
 - conclusion
2. Write detailed notes of what you will say:
 - key points and key words
 - the action points you will stress
3. Prepare visual aids
4. Practice your presentation :
 - use simple and clear language
 - don't read from your notes

Look at these expressions. In which part of a presentation would you expect them to be used?

1. On this next slide you can see ...
2. To conclude, I want to tell you about ...
3. I'll be happy to answer questions at the end of the presentation.
4. Let's have a look at some statistics/ figures.
5. My name is ... and I'm a ...
6. Finally, a few words about ...
7. This brings me to the next point ...
8. Thanks very much for listening to my talk.
9. My main aim today is to tell you .../ I'm here today to tell you ...

Sample report

Date: 12 April 2008

Report on: location of new assembly plant

Introduction

The purpose of this report is to assess the suitability of locating the new assembly plant in Hamburg, north Germany, and recommend a suitable site.

Findings

Hamburg has excellent transport links by sea, road and air. It is one of Europe's busiest ports, Germany's two main motorways pass through the city and it has a fast-growing international airport. It is also a gateway to Scandinavia and central Europe with a fast rail link to Berlin.

The region has an educated and skilled workforce with a strong engineering tradition. It will be possible to source many components locally.

Recommendation

It is suggested that the fast-developing business park north west of the city would be an ideal site because it is next to the motorway and 10 minutes from both the harbour and rail terminal. We recommend that the site should be studied in more detail immediately.

Amanda Jones

Research and Development Manager

APPENDIX TO UNIT 4

Here are some examples of smart home products and their functions.

- **Cameras** will track your home's exterior even if it's pitch-black outside.
- **LED lights** let you program color and brightness right from your smartphone.
- **Motion sensors** will send an alert when there's motion around your house, and they can even tell the difference between pets and burglars.
- **Door locks and garage doors** can open automatically as your smartphone approaches.
- **Auto alerts** from your security system will immediately go to your smartphone, so you instantly know if there's a problem at home.
- **Refrigerators** that create dinner recipes based on the ingredients stored inside.
- **Washers and dryers** that send text message alerts when their cycle has ended.
- **Television** that can be programmed so that your children can watch it only at certain times.
- **Coffee maker** that can be turned on the from bed.
- **Trash cans** that monitor what you throw away and generate online orders for replacements.

Keys

1907 **First practical domestic vacuum cleaner was invented.** James Spangler invented the first practical domestic vacuum cleaner.

1908 **Ford Model T was introduced.** Henry Ford began making the Model T. First-year production was 10,660 cars.

1925 **Televisor.** Scottish inventor John Logie Baird successfully transmitted the first recognizable image – the head of a ventriloquist’s dummy – at a London department store, using a device he called a Televisor. A mechanical system based on the spinning disk scanner developed in the 1880s by German scientist Paul Nipkow, it required synchronization of the transmitter and receiver disks. The Televisor images, composed of 30 lines flashing 10 times per second, were so hard to watch they give viewers a headache.

1935 **First practical radar.** British scientist Sir Robert Watson-Watt patented the first practical radar (for radio detection and ranging) system for meteorological applications. During World War II radar was successfully used in Great Britain to detect incoming aircraft and provide information to intercept bombers.

1947 **Sound barrier was broken.** U.S. Air Force pilot Captain Charles Yeager became the fastest man alive when he piloted the Bell X-1 faster than sound for the first time on October 14 over the town of Victorville, California.

1957 **Sputnik I was launched.** On October 4 the Soviet Union launched *Sputnik I* using a liquid-fueled rocket built by Sergei Korolev. About the size of a basketball, the first artificial Earth satellite weighed 184 pounds and took about 98 minutes to complete one orbit.

1968 **Computer mouse made its public debut.** The computer mouse made its public debut during a demonstration at a computer conference in San Francisco. Its inventor, Douglas Engelbart of the Stanford Research Institute received a patent for the mouse 2 years later.

1972 **Home video game systems became available.** In September, Magnavox shipped Odyssey 100 home game systems to distributors. The system was test marketed in 25 cities, and 9,000 units were sold in Southern California Alone during the first month at a price of \$99.95.

In November, Nolan Bushnell formed Atari and shipped Pong, a coin-operated video arcade game, designed and built by Al Alcorn. The following year Atari introduced its home version of the game, which soon outstripped Odyssey 100.

1981 **IBM Personal Computer was released.** IBM introduced the IBM Personal Computer with an Intel 8088 microprocessor and an operating system – MS-DOS – designed by Microsoft. Fully equipped with 64 kilobytes of memory and a floppy disk drive, it cost under \$3,000.

1991 **World Wide Web became available to the general public.** The World Wide Web became available to the general public.

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ENGINEERING AND TECHNOLOGY

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