

# **Английский язык для специальных целей**

# Учебное пособие



# Владивосток

2024

Министерство науки и высшего образования Российской Федерации  
Дальневосточный федеральный университет

# Английский язык для специальных целей

Учебное пособие

*Рекомендовано*

*Дальневосточным региональным учебно-методическим центром  
(ДВ РУМЦ) в качестве учебного пособия для студентов бакалавриата,  
специалитета и магистратуры естественнонаучных  
и инженерно-технических направлений подготовки  
вузов региона*

Владивосток



2024

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ISBN 978-5-7444-5769-3

УДК 811.111(075.8)

ББК 81.432.1я73

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**Английский язык для специальных целей** : учебное пособие / О.К. Титова,  
В.Б. Колычева, Ю.О. Каморная, И.Ф. Веремеева, Г.Л. Ардеева, А.В. Штрамило,  
Е.В. Кравченко, И.Н. Лазарева, П.С. Минакова. – Владивосток : Издательство  
Дальневосточного федерального университета, 2024. – [178 с.]. – ISBN 978-5-  
7444-5769-3. – URL: <https://www.dvfu.ru/science/publishing-activities/catalogue-of-books-fefu/>. – Дата публикации: 30.08.2024. – Текст. Изображение : электронные.

Пособие по английскому языку разработано в соответствии с федеральными  
государственными стандартами и предназначено для формирования и  
совершенствования лексических навыков, а также развития умений аудирования,  
чтения, говорения и письма в профессиональной сфере.

*Текстовое электронное издание*

Минимальные системные требования:

Веб-браузер Internet Explorer версии 6.0 или выше,  
Опера версии 7.0 или выше, Google Chrome версии 3.0 или выше.

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определяются требованиями перечисленных выше программных продуктов.

Размещено на сайте 30.08.2024 г.

Объем 5,30 Мб

Дальневосточный федеральный университет  
690922, Приморский край, г. Владивосток, о. Русский, п. Аякс, 10.

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## **ПРЕДИСЛОВИЕ**

Учебное пособие предназначено для студентов бакалавриата, специалитета и магистратуры неязыковых направлений подготовки, изучающих английский язык в профессиональной сфере по укрупненным направлениям подготовки математических, естественных наук, инженерного дела, техники и технических наук, и способствует развитию базовых компетенций, таких как коммуникация, межкультурное взаимодействие, критическое мышление, а также профессиональных компетенций.

Пособие состоит из восьми разделов, включающих аутентичный аудио-, видео- и печатный материал, относящийся к будущей профессиональной деятельности студентов. В пособии широко представлена разнообразная лексика для развития словарного запаса студентов как для профессиональной, так и академической сферы, для усвоения лексики созданы специальные задания коммуникативной направленности.

Разработанные языковые и речевые упражнения позволяют развивать у студентов востребованные в академическом и профессиональном общении речевые умения (чтение, аудирование, говорение, письмо), а также лексические и грамматические навыки.

Учебное пособие содержит грамматический справочный материал, позволяющий снимать трудности при составлении письменных и устных высказываний. Кроме того, для учебного пособия разработаны методические рекомендации и ключи к разделам пособия, предназначенные для преподавателя.

В данном пособии собран и структурирован материал с учетом методики преподавания английского языка и опыта преподавания английского языка для специальных целей.

## UNIT 1

### NATURAL AND FORMAL SCIENCE

#### I. Warming-up.

##### 1. Practice a 60-second listening on science. Then answer the questions.

- 1) What is the most important subject at school? Why?
- 2) Why was the speaker fond of science at school?
- 3) What sciences did he enjoy?
- 4) Does he want to continue studying science? What major is he interested in?
- 5) What should governments do to have more and better scientists in future?
- 6) What is interesting for the speaker to think about?
- 7) How about you? What sciences were you into at school? Why?
- 8) What do you think it is necessary to do to develop science?
- 9) What future science will be like in your opinion?
- 10) What skills does scientific work demand from a scientist?
- 11) What features of character do you find most useful for a good scientist?

##### 2. Agree or disagree with the statements. Explain your point of view.

- 1) Science has a great influence on our lives.
- 2) Scientific ideas are absolute and unchanging.
- 3) Science is complete.
- 4) Science is a community endeavor.
- 5) Experiments are a necessary part of the scientific process. Without an experiment, the study is not rigorous or scientific.

##### 3. Comment on the quotations about science and scientists below. Which of them do you like most? Why?

- “The saddest aspect of life right now is that science gathers knowledge faster than society gathers wisdom.” – **Isaac Asimov**
- “It is strange that only extraordinary men make the discoveries, which later appear so easy and simple.” – **Georg C. Lichtenberg**
- “The scientist is not a person who gives the right answers, he’s one who asks the right questions.” – **Claude Levi-Strauss**
- “Equipped with his five senses, man explores the universe around him and calls the adventure Science.” – **Edwin Powell Hubble**
- “What we know is a drop, what we don’t know is an ocean.” – **Isaac Newton**

## **II. Words to learn.**

### **1. Read and guess what the words in bold type mean. Then look the words up to make sure that you have guessed right.**

1. Before I became a singer, I taught **natural sciences**. 2. The fourth **experiment** was with transmission of JPEG images to a Web browser. 3. I believe this is the usual **procedure**. 4. Today's **technology** is beyond me. 5. Rocks and **minerals** are useful for us in many ways. 6. There is a **paleontology** conference in Los Angeles. 7. There's not a lot of breaking news in **geology**. 8. It's the largest **galaxy** known to exist. 9. Language is a social and cultural **phenomenon**. Language and cultural **phenomena** are very interesting to study. 10. **Cross-discipline** development processes demand open and integrated engineering systems. 11. Viral evolution is a **subfield** of evolutionary biology and virology that is specifically concerned with the evolution of viruses. 12. In the discussion of activities in the field of **social sciences**, the close interdependence of intolerance and violence was stressed. 13. A **formal science** is a branch of knowledge concerned with formal systems.

### **2. Read the words of the Active Vocabulary, look them up and then study the word-combinations and sentences to know how to use them.**

**major** (adj) – important, serious, large, or great: *a major factor, a major division, a major change*. Global warming is one of the major problems facing our planet. These regulations and requirements have a major impact on the research and development of new drugs. Smoking is one of the major causes of cancer.

**to integrate** (v) – to combine two or more things into one to make something more effective: *to integrate competitive services, to integrate data, to integrate learning with play*. The journal particularly encourages studies which integrate philosophical, historical, and sociological considerations.

**multiple** (adj) – consisting of or involving many things or types of things: *method of multiple comparison, multiple prediction, multiple collision, multiple achievements*. She made multiple copies of the report.

**to lack** (v) – to not have or not have enough of something that is needed or wanted: *to lack courage, to lack knowledge, to lack data, to lack observation*. His book lacks any coherent structure.

**to define** (v) – to describe the meaning of something, esp. a word, or to explain something more clearly so that it can be understood; to explain, state, or determine the meaning and exact limits of something: *to define a term, to define a problem, the properties that define this species are, to define the boundary between two countries*. It is very difficult to define the concept of beauty.

**to cause (v)** – to make something happen, especially something bad: *to cause the infection, to cause the landslide, to cause the operation to go wrong.* Most heart attacks are caused by blood clots. The difficult driving conditions caused several accidents.

**investigation (n)** – the act or process of researching, or a research; a careful search or examination in order to discover facts, etc.: *scientific investigation, further investigation, to do/conduct/undertake/carry out an investigation.* This study was a part of a larger qualitative *investigation* of older women, physical activity, and health. Further *investigation* is required, because the issues are too important for simply assuming that persistence and intractability necessarily imply an organic genesis.



**to develop (v)** – to invent something or bring something into existence; to make something become more advanced or modern; to design; to evolve: *to develop an idea, to develop a theory, to develop a product, to develop one's mind.* They developed a new technique. The company is spending \$650 million on developing new products/technology.

**advance (n)** – the forward movement of something, or progress in understanding it or in doing it well; an achievement: *technological advances, educational advance, advance(s) in biology.* Nothing could stop the advance of the floodwaters. Recent advances in medical science mean that this illness can now be cured.

**scourge (n)** – something that causes a lot of trouble or suffering to a group of people (because of war, hunger or diseases): *the scourge of war, the white scourge, scourge of drug abuse, the scourge of famine.* There have been great advances in treatments for global scourges such as cancer and AIDS. The disease continues to be a scourge in the developing world. Terrorism is a widespread scourge that threatens world peace and stability.

**mankind (n)** – the whole of the human race, including both men and women (humanity/humankind): *one of the most important events in the history of mankind, challenge to mankind, preserve mankind from the danger.* We are considering perspectives that are new in the history of both mankind and our planet. Language is the greatest educator of mankind. Mankind is destroying the planet, all in the name of progress.

**to rely on (upon) (v)** – to depend on or trust someone or something: *to rely on a system, to rely on a weather forecast.* You can't rely on good weather for the whole

trip. The system relies too heavily on/upon one person. These computer games rely on/upon 3D graphics. The success of this project relies on everyone making an effort. Every investigation must be relied on qualitative and quantitative data.

**to provide (v)** – to give something to a person, company, or organization, or to make it available for them to use: *provide somebody with goods, provide funds for expansion into television, to provide a service for customers*. The company provides medical benefits to all employees. I can provide you with directions to their house. I am provided with everything I need. Our digital imaging centre provides a 3D scanning service to wide range of customers in Europe, the Middle East, and Africa.

**to exist (v)** – to be present in a particular time, place, or situation/to manage to live under difficult conditions: *to exist in a wide range of areas, to exist from one visit to the next, to exist in the purest and most troubled conditions*. Opportunities exist in our company for experienced engineers. There is no evidence that life exists on the other planets. She walked past me as if I didn't exist. The unit exists to promote your interests. You can't exist on only 500 calories a day.

**to predict (v)** – to say that an event or action will happen in the future, or is going to happen, especially as a result of knowledge or experience (to foretell something): *to predict the future, to predict the weather, to predict the consequences*.

We can predict changes in climate with a surprising degree of accuracy. They are predicting heavy rain for tomorrow. Industry leaders predict that another 8000 jobs could be lost by the end of the year.



**discovery (n)** – the process of learning something that was not known before, or of finding someone or something that was missing, or hidden/scientific finding, breakthrough or revelation: *discovery of radium, recent discovery, unexpected discovery, the discovery of pollution in the river, discovery procedure, to make a great discovery*. Scientists have made an important discovery. The scientists announced their discovery to the world. With the discovery of oil in the region, the situation changed. Many scientific discoveries have been made by accident.

**to underlie (v – underlay, underline)** – to be the basis of something, to lie under something (also in a figurative meaning): *to underlie all human success, to underlie the experiment*. What really underlies most heart diseases? The safety of children underlies all our decisions. Try to figure out what feeling underlies your anger. Careful planning underlies all our decisions.

**universe (n)** – the space and everything that exists in it including the Earth and all other planets: *far reaches of the universe, the immense and boundless universe, geocentric model of the universe*. The origins of the universe are still a mystery. Do you think we are the only form of intelligent life in the universe?

**entire (adj)** – used for emphasizing that you mean all or every part of something: *the entire adult population, an entire town devastated by an earthquake, the entire corpus of Shakespeare's works, the entire universe*. He was giving his entire attention to the task. It was the worst day in my entire life. Her entire attention centered on her children. An entire civilization vanished. I spent an entire month writing that report.

**observation (n)** – the process of watching someone or something carefully to find something out: *empirical observation, scientific observation, to make an observation on / about something, close observation of nature / human nature / animal behavior, a detailed observation of the birds that visited the garden, under observation*. He recorded his observations in a notebook. He spent two nights under close observation in hospital. That observation of hers was very perspective. The book is full of interesting observations on / about the nature of musical composition.

**to reveal (v)** – to let something become known, for example, a secret or information that was previously not known: *to reveal a secret to somebody, to reveal a biography, to reveal her source, to reveal more information*. She refused to reveal the content of the letter. Plans for rerouting traffic have been revealed to residents. The survey revealed that many consumers are aware of the risks.

**to create (v)** – to make something new or original that didn't exist before: *to create a theory, to create an army, to create a character, to create a file*. He created a wonderful meal from very few ingredients. Picasso created Cubism. He created a wonderful meal from very few ingredients.

**data (n – singular / plural)** – information, e.g., measurements or statistics, used as a basis for reasoning, discussion, or calculation; in computing: *to be based on data, improved data*. The study was based on data from 2,100 women. To cope with these data, hospitals bought large mainframe computers. No important data is stored on the devices.

**quantitative (adj)** – relating to numbers or amounts, or quantity: *quantitative data, quantitative model, quantitative change*. We need to do a proper quantitative analysis of this problem. Scientists are gathering quantitative data about human intelligence. Quantitative analysis determines the amounts and proportions of the chemical constituents of a substance or mixture.

**qualitative (adj)** – relating to quality of something (how good or bad something is): *qualitative analysis, qualitative test, qualitative adjective, a*

*qualitative study of educational services, qualitative difference.* Qualitative analysis determines the chemical constituents of a substance or mixture. Is there any qualitative difference between these two DVD players? There has been a qualitative change in the relationship between the public and the government.

**establishment** (**n**) – the process of starting or creating something, for example an organization: *the establishment of a scientific fact, the establishment of diplomatic relations.* The establishment of the regional government did not end terrorism. Since its establishment in 1945, the United Nations has played a dominant role in the development of international law. The establishment of new areas of employment is a priority.

**evaluation** (**n**) – assessment, or the process of judging or calculating the quality, importance, amount, or value of something: *the evaluation of the data, critical evaluation of the student's paper, an impartial evaluation of the job applicant's qualifications, project evaluation, evaluation database.* They took some samples of products for evaluation. His superior gave him an excellent evaluation. We need to carry out a proper evaluation of the new system.



**3. Complete the sentences with the words in the box. Some of them can be used twice.**

integrated, defined, provided, developed, advanced, revealed, created, relied on, predicted

- 1) \_\_\_\_\_ medicine is used in all the hospitals of the city.
- 2) Transport planning should be \_\_\_\_\_ with energy policy.
- 3) Modern civilization is mostly \_\_\_\_\_ by new and \_\_\_\_\_ technologies.
- 4) These waters are full of nutrients \_\_\_\_\_ by water currents.
- 5) Here are a lot of tools \_\_\_\_\_ by our engineers.
- 6) The secret \_\_\_\_\_ by her colleagues surprised everyone.
- 7) How many of ring designs \_\_\_\_\_ by you have been sold?
- 8) \_\_\_\_\_ catastrophes will save a lot of lives.
- 9) What data is your investigation \_\_\_\_\_?
- 10) \_\_\_\_\_ learning with play help remember new words.

**4. Work with a partner. Student A: Make up your own sentences with any of the definitions above. Student B: Guess what word is meant, paraphrase the sentence using the necessary word.**

Example: Yesterday at the meeting she let the details of her plan become known. – Yesterday at the meeting she revealed the details of her plan.

### **III. Reading I.**

**1. Read and translate the text about natural and formal sciences and answer the question:** What does this text focus on?

**Natural sciences** are one of the three major divisions of science, the other two being the social sciences and the formal sciences. Chemistry, biology, earth science, astronomy, and physics are all part of natural sciences. There are also cross-disciplines, such as biophysics, which integrate different aspects of multiple subjects. Prior to the 17th century, these disciplines were often referred to as "natural philosophy" and lacked the types of experiments and procedures used today.

#### **Chemistry**

Much of what defines modern civilization comes from advances in knowledge and technology caused by investigations in the natural sciences and chemistry. For instance, the modern production of food can be traced back to the Haber-Bosch process which was developed during World War I. This chemical process allows the creation of fertilizer nitrates from atmospheric nitrogen, rather than relying on biologically fixed sources of nitrogen such as cow dung, significantly increasing the amount of food various countries produce.



#### **Biology and Medicine**

Thanks to developments in biology, especially those in the 20th Century, doctors can use advanced medicines to cure or treat a lot of diseases that were previously fatal. Through research in biology and medicine, scourges of the 19th century and before, such as plague and smallpox, have come largely under control. Perhaps more importantly, mortality rates for infants and mothers in industrialized nations have drastically decreased. The biological subfield of genetics has even allowed scientists to understand the very code of life itself and recognize the way it expresses itself within each person.

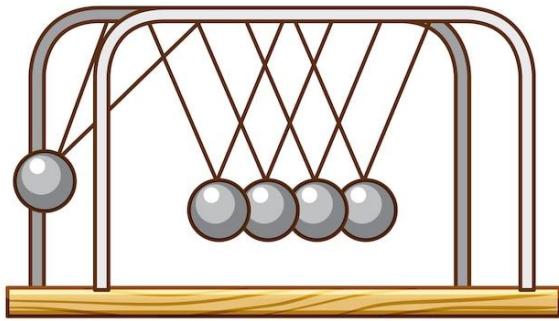
#### **Earth Sciences**

Advances in earth science have allowed mankind to extract huge amounts of minerals and petroleum from the Earth's crust, powering the engines of modern civilization and industry. Paleontology, a subfield of earth science, provides a

window into the Earth's distant past, long before humans even existed. Through discoveries in geology and similar fields within the natural sciences, scientists are better able to understand the history of the planet and predict changes it may go through in the future.

### Astronomy and Physics

Physics is, in many respects, the science that underlies all other natural sciences, and offered some of the most unexpected revelations of the 20th century. Among the most notable of these was the discovery that matter and energy are constant, and merely transfer from one state to the other. Through astronomy, scientists have discovered an enormous amount of information about the universe. In previous centuries, it was thought that the entire universe was just the Milky Way galaxy, until a series of debates and observations in the 20th century revealed that the universe is literally millions of times bigger than previously imagined.



### Different Types of Science

The establishment of the scientific method in the 1600s and the ensuing scientific revolution helped create modern science. Natural sciences are often referred to as "hard science" because of the heavy use of objective data and quantitative methods that rely on numbers and mathematics. In contrast, the social sciences, such as psychology, sociology, and anthropology, rely more on qualitative, or non-numeric, evaluations and tend to have less-certain conclusions. The formal sciences, including mathematics and statistics, are heavily quantitative in nature, but do not typically involve the study of natural phenomenon or experimentation.

Differences from other forms of science as opposed to empirical sciences (natural and social), the formal sciences do not involve empirical procedures. They also do not presuppose knowledge of contingent facts or describe the real world. In this sense, formal sciences are both logically and methodologically *a priori*, for their content and validity are independent of any empirical procedures. Therefore, strictly speaking, formal science is not a science. It is a formal logical system with its content targeted at the real things, information, and thoughts that we experienced. As Francis Bacon pointed out in the 17<sup>th</sup> century, experimental verification of the propositions must be carried out rigorously and cannot take logic itself as the way to draw conclusions in nature. Formal science is a method that is helpful to science but cannot replace science. Because of their non-empirical nature, formal sciences are construed by outlining a set of axioms and definitions

from which other statements (theorems) are deduced. In other words, theories in formal sciences contain no synthetic statements; all their statements are analytic.

## 2. Answer the following questions:

- 1) What are major divisions of science?
- 2) What sciences are part of natural sciences?
- 3) What do you understand by cross-disciplines? What is their function?
- 4) How were natural sciences viewed prior to the 17<sup>th</sup> century? What did they lack at that time?
- 5) Do you agree that much of what defines modern civilization comes from advances and investigations in natural sciences and chemistry? Prove it.
- 6) How do biology and medicine help mankind?
- 7) What can people understand through advances in earth sciences and geology?
- 8) Which science underlies all other natural sciences? Why?
- 9) What discoveries have scientists made through astronomy?
- 10) What helped to create modern science?
- 11) Why are natural sciences often referred to as “hard science”?
- 12) How do social sciences and formal sciences differ from natural sciences?

## 3. Find in the text English equivalents to the lexical units in the box. Then render the content from the text using these units and use them in the sentences of your own.

например, особенно, ранее, посредством, в значительной степени (3), ранее (до того, как), просто, во многих отношениях, в отличие от (2), менее точно, кардинально

## 4. Translate the sentences with the Vocabulary of the Unit.

1. Легко быть здоровым в наши дни. Ученые разработали много новых эффективных лекарств.
2. Есть ли какие-нибудь количественные данные, которые могут подтвердить его выводы? – Да. Во многих отношениях он прав.
3. Сколько основных разделов существует в науке? – Три раздела: естественные науки, формальные науки и социальные науки.
4. Необходимо кардинально изменить твое отношение к учебе. Иначе в твоих знаниях не будет прогресса.
5. В прошлом году проводилось (было) три разных исследования в этой области, не так ли? – Ну, проводилось (было) что-то вроде наблюдения.
6. Необходимо научиться предсказывать явления, которые в значительной степени могут помочь раскрыть причину всех бед человечества.
7. Сегодня в лаборатории университета проводилось (было)

много экспериментов, но *открытий не было*. 8. Терроризм – бедствие, угрожающее всему миру. 9. Вам следует включить количественные данные в свою диссертацию. 10. Сейчас они проводят качественный анализ образцов из озера. 11. Я уверен, что установление научных истин возможно только при помощи эксперимента. 12. Студенты представляют свои проекты для экспертной оценки на следующей неделе. 13. Твоя статья очень интересная, но в ней *не хватает количественных данных* по описываемому исследованию. 14. Ты когда-нибудь использовал метод *многократного сравнения*? 15. *Объедини эти данные*, чтобы увидеть полную картину от начала до конца. 16. На прошлом собрании мы *обозначили (определенели)* проблему, и теперь я хотел бы послушать ваши предложения по ее решению. 17. Сильные дожди в этом месяце *вызвали оползень*. 18. На своих лекциях он *раскрывает тайны всей вселенной*, отвечая на некоторые из наиболее *важных* вопросов аудитории. 19. В 1864 г. Дж. Максвелл *создал теорию* электромагнитного поля, согласно которой электрическое и магнитное поля *существуют* как взаимосвязанные составляющие *единого* целого – электромагнитного поля. 20. Университет *обеспечивает* студентов необходимыми учебными пособиями. 21. Сегодня мы поговорим о 10 наиболее значимых для *человечества открытиях*. 22. Эти виды не могут *существовать* вместе. 23. В нашем университете студенты получают не только теоретические знания, но и *проводят* научные эксперименты. Это в значительной степени улучшает качество их образования. 24. До 17 века науке *не хватало* экспериментов. 25. *Палеонтология и геология* – науки о земле, которые *дают* ответы на вопросы об историческом облике земли и его организмах. 26. Млечный путь – не единственная *галактика* в *целой вселенной*. 27. Наша страна богата *минералами*. 28. Какие *подотрасли* математики вы знаете? 29. Природные *явления* иногда кардинально меняют жизнь людей. 30. Какие *технологии* необходимы для проведения этого эксперимента? 31. Эта *процедура* очень простая, она не потребует много времени. 32. *Междисциплинарные процессы* требуют применения открытых и интегрированных систем. 33. Ранее мы уже говорили о необходимости применения *междисциплинарных исследований*. 34. Он *просто* не знал, что сказать. 35. Я не люблю долгие прогулки, *особенно* зимой. 36. Я хочу кардинально поменять свою жизнь. 37. *Оценки* в области социологии *менее точны*. 38. Нужно *полагаться на* более точные данные. 39. В нашей стране много уникальных мест, *например*, озеро Байкал. 40. Я надеюсь получить высокую *оценку* моего проекта.

## **IV. Reading II.**

### **1. Discuss the questions.**

- 1) What list of all significant branches of the formal sciences can you make?
- 2) How can formal sciences begin to expand their research to the public?

### **2. Read and translate the text “What are the Formal Sciences? FAQ”.**

#### **What are the Formal Sciences? FAQ (frequently asked questions)**



Curious and eager to explore the list of uses and applications of formal science? Read these essential topics across all branches of the field.

The formal sciences help us work with and understand complex information, especially in systems that involve mathematics and logic. Thus, formal sciences are most important in areas that apply math and reasoning, including computers, statistics, and even linguistics.

The main areas are computer science, mathematics, statistics, and systems science.

A base in math and logic is essential for a degree in the field of formal sciences. Core classes will center on math and logic, while other courses will narrow in on specific subtopics within these or related fields. These topics will then extend into higher levels and start relating to other areas of application, such as business, finance, and technology.

Pure science is a method of studying and understanding the world around us. It builds knowledge through testing phenomena. Formal science, on the other hand, is a way of organizing and understanding systems of knowledge and information. It uses patterns and languages to characterize data in fields like mathematics, statistics, and computer science.

Because managing large amounts of information is a big part of the modern world, formal scientists are in high demand. Popular jobs include accountant, mathematician, professor, programmer, and computer scientist. Many of these jobs are particularly important for the current and future information economy that focuses less on physical human labor.

It is now clear that the formal sciences form a cornerstone of quantitative science. They are a unique way of applying math and logic to a wide variety of critical modern fields like computer science, business, and more.

The critical element of growth for any field of study is to expand who can learn about your subject. In many ways, technology increases our ability to reach new sources of information. There exist more opportunities now than ever before

in history. That fact is due to online resources becoming more accessible and affordable. Not only do costs seem to trend down, but many independent learners want to explore subjects in their own time. Many who have jobs cannot attend college. Even those in college regularly search for new ways to supplement their academic work.

**3. Make up a plan, headline every passage of the text above.**

**4. Find in the text English equivalents to the following Russian words and word-combinations. Then make up your own sentences with these words and word-combinations.**

Изучить список способов применения и использования, существенно важные темы, сложная (комплексная) информация, задействуют математику и логику, таким образом, применять математические вычисления и рассуждения, наука о системах, основные занятия, сосредоточиться на, сузиться на подтемы, смежные области, распространиться на более высокие уровни, чистая наука, через тестирование явлений, чтобы охарактеризовать данные, быть высоко востребованным, современная и будущая информационная экономика, сосредоточиться на физическом труде человека, краеугольный камень, уникальный способ, широкий спектр важнейших современных областей, крайне важный элемент роста, во многом, увеличивать нашу способность, больше возможностей, благодаря онлайн ресурсам, (более) доступный, доступный (по средствам), иметь тенденцию к снижению (снижаться), обучающиеся самостоятельно, посещать колледж, регулярно искать новые способы дополнить академическую занятость.

**5. Answer the following questions.**

- 1) What subjects do the formal sciences include?
- 2) What does a degree in the formal sciences involve?
- 3) What difference is there between formal science and pure science?
- 4) What jobs can you get using a degree in formal sciences?
- 5) Why do the formal sciences form a cornerstone?
- 6) How can you expand your knowledge in the field of your interests?

**6. Speak on Natural and Formal Sciences. Mind using the Active Vocabulary.**

**7. Work with a partner. Role-play the conversation. You are making up your mind what major to choose as your future profession, so you discuss with your partner the importance and perspective of different natural or formal**

sciences, and then finally make a choice. Use the information of the texts (Reading I, II) and the Active Vocabulary.



## V. Listening.

### 1. Discuss the questions.

- 1) Why did you choose to study natural or formal sciences at the University?
- 2) What does the natural and formal sciences course involve at your university?
- 3) What do you know about the course at other educational establishments all over the world?

### 2. Complete the table with the Supplementary Vocabulary. Then make up your own sentences with the words and word-combinations in the table and practice translating them with your groupmates.

word / word combination	definition	translation
to explore		
broad (knowledge, course)		
to involve		
to offer		
roughly		
opportunity		
department		
breadth (of knowledge)		
depth (of knowledge)		
to appeal to smb		

<b>word / word combination</b>	<b>definition</b>	<b>translation</b>
practical(s)		
supervision / supervision work / under supervision		
small group teaching / two-on-one (three-on-one group)		
to be at the top of the field (world leading experts, world class thinkers, highly acclaimed professors, senior academics)		
to be responsible for		
to help smb out		
to engage with smb		
to keep oneself busy		
to apply		
think out loud		
unrelated		
to gain		
to catch out		
to get to know		

**3. Watch the video or listen to the interview.** While watching, complete the sentences with the Supplementary Vocabulary.

- 1) It allowed me \_\_\_\_\_ subjects like Earth Sciences and Pharmacology.
- 2) The Natural Sciences course at Cambridge is a very \_\_\_\_\_ course.
- 3) It \_\_\_\_\_ studying several different subjects.
- 4) Some subjects will be \_\_\_\_\_ on a fourth year, as well.
- 5) In your second year you'll choose from \_\_\_\_\_ 20 different topics.
- 6) You'll have the \_\_\_\_\_ then to specialize and join a single \_\_\_\_\_.
- 7) The combination of \_\_\_\_\_ and \_\_\_\_\_ was something that really \_\_\_\_\_ to me.
- 8) The standard mode of teaching are the lectures and the \_\_\_\_\_.
- 9) Cambridge has \_\_\_\_\_, or what we call \_\_\_\_\_.

10) \_\_\_\_\_, or \_\_\_\_\_ groups, where we can \_\_\_\_\_ with people who are \_\_\_\_\_ of their field.

11) We also have a Director of Studies who is \_\_\_\_\_ for our academic life.

12) I always had people who would be able to \_\_\_\_\_ me \_\_\_\_\_ with anything.

13) Students are taught by \_\_\_\_\_ research experts. These are \_\_\_\_\_, \_\_\_\_\_ thinkers, \_\_\_\_\_ professors.

14) The opportunity to really \_\_\_\_\_ these people has been amazing.

15) I think it's really interesting to learn things in lectures, to learn them on paper, but seeing them in real life, \_\_\_\_\_ them in real life situations is really important.

16) I'll also find some time to work on my \_\_\_\_\_.

17) Because I like to \_\_\_\_\_, I tend to do a lot of societies in my spare time.

18) The Natural Sciences prepares students for \_\_\_\_\_.

19) ... some go into things like science, like banking but some will do something completely \_\_\_\_\_.

20) Although I will be leaving science, I will still be using the skills that I have \_\_\_\_\_ throughout my time here.

21) ... we are looking to \_\_\_\_\_ the students...We are not trying to \_\_\_\_\_ students \_\_\_\_\_.

22) Just show them what you can do, \_\_\_\_\_, and you'll be OK.

23) Remember, you miss every \_\_\_\_\_ which you don't take, your degree and your experiences what you \_\_\_\_\_ and what you make of it.

#### 4. Watch the video again and answer the questions. Use the Supplementary Vocabulary.

1) Why do students choose to study Natural Sciences at Cambridge? What appeals to them?

2) What is the Natural Sciences course at Cambridge like? How is it organized?

3) What mode of teaching is there at Cambridge?

4) What is the advantage of small group teaching?

5) What are a Director of Studies and a tutor responsible for? What are their duties? What is their role in students' life?

6) What is one of the special aspects of the Natural Sciences at Cambridge?

7) What is the favorite part of the course for some students? Why?

8) How is a typical day of Cambridge students organized? What do they do in their free time?

9) What career opportunities can students have after graduating from Cambridge? / What careers does Cambridge prepare students for?

10) What do professors want to get to know when students come for the interview?

11) What students should remember if they want to be successful?

**5. How about you? Answer the questions about your course of Natural and Formal sciences at the University. Use the Supplementary Vocabulary.**

1) Why did you choose to study Natural Sciences/Formal Sciences at Far Eastern Federal University? What appealed to you?

2) How is the Natural/Formal Sciences course organized at FEFU?

3) What mode of teaching is at FEFU in comparison with Cambridge?

4) Do students have the opportunity to have a small group teaching, or supervision?

5) Who can help students out with academic and non-academic problems?

6) What's your favorite part of the course: lectures, practicals, or supervision work?

7) Do you like to keep yourself busy? How does your typical day go on?

8) What career opportunities are in front of you after graduating from the Far Eastern Federal University?

9) What are you planning to do: stay in research (science) or ...?

10) What do professors at the University want to see in their students, and what they are trying to teach them?

11) What's necessary for students to do to become successful in studying science and in their future profession as well?

**6. Speak on the Natural and Formal Sciences Course at your University. Mind using Active and Supplementary Vocabulary. Patterns from the video may be useful as well.**

**VI. Supplementary reading.**

**1. Read and translate the text paying attention to the reference words below the text.**

## **What Brings about Changes in Science?**

(1) Einstein published three major scientific papers. One of these put forward a new way of calculating the size of molecules. Another explained Brownian motion — the random dance performed by specks of dust trapped in a fluid. Einstein suggested that the tiny particles making up the fluid — its atoms or molecules — were bouncing against the specks of dust and causing the motion. These papers helped to establish the reality of atoms and molecules. Another of Einstein's 1905 papers explained the photoelectric effect — the way that metals could emit electrons (tiny, charged particles) from their surface when light was shone on them. Most scientists believed that light travelled in waves — like sound or water waves. But Einstein suggested that the photoelectric effect could be explained if light could also behave as a stream of tiny packets of energy.

(2) Einstein's paper on the photoelectric effect helped give birth to quantum theory, and it was for this paper that Einstein received the Nobel Prize in 1922. Quantum theory led, in the 1920s and 1930s, to another revolution in physics. Physicists showed that, as well as light waves behaving like particles, particles could sometimes act as waves. This theory established "objective probability" in physics. This was the idea that completely unpredictable chance events can take place at the subatomic level. Einstein never fully accepted the prevalent interpretation of quantum theory. But, while many of these interpretations involve wild metaphysical flights of fancy, the physical results are, like those of relativity, very well established.

(3) Marrying together the two pillars of 20th century physics — relativity and quantum theory — is a central problem for physics even today. Successfully doing this may require a revolution in science similar to those begun by Newton and Einstein. There are three main interconnected driving forces for such changes in science. The first is the development of technology. Changes in technology can make new experiments possible and they also influence the problems that scientists develop an interest in. Newton was fascinated by the new machines of the 17th century. Similarly, Einstein was fascinated by electricity and magnetism. This influence also works in a negative way. The governments and multinationals that control technology are often able to dictate what is researched.

(4) The second factor driving scientific progress is the way that the dominant ideas in society change. Ideas from the broader culture can impinge upon science. Newton's ideas were part of a revolutionary new attempt at a rational explanation of both nature and society. On the other hand, the dominant ideas in society can also limit the development of science. This is most obvious in the social sciences, where delving too deeply into how society is organized might raise difficult questions for our rulers. Less is at stake in the natural sciences. Indeed,

improvements in natural sciences are vital to our rulers if they want to compete effectively with each other. But the distorted worldview of capitalism still impacts on science. Extremely narrow and specialized bodies of knowledge develop—creating problems for scientists trying to bring about the kind of sweeping revolution heralded by Einstein.

(5) Finally, science moves forward because scientists seek to develop logically consistent theories. This can push them beyond the dominant, or commonsense ideas of their time. Einstein's breakthrough cannot be reduced simply to changes in technology or wider cultural and ideological shifts. Science is not simply the gathering and ordering of data about the outside world. It also requires abstraction—developing theories about the underlying laws of nature that are usually not immediately apparent. This crucial role of theory is not just a feature of the natural sciences.

(6) Einstein argued that “common sense is the prejudices acquired by age 18”. Marxist theory, which is a social science topic, challenges “common sense” political ideas. If we, according to this theory, want to change the world, we need to combine our actions with theory that digs below the surface appearance of society to understand how the system works.

**Note: Reference words**

**to bring about** – to cause something to happen – вызывать, быть причиной;

**to put forward** – to state an idea or opinion, or to suggest a plan or person, for other people to consider – выдвинуть идею, предложить;

**speck** – a very small mark, piece, or amount – частичка, частица;

**to bounce** – to move up or away after hitting a surface – подпрыгивать, отскакивать;

**a pillar** (a pillar of 20<sup>th</sup> century physics) – something that is an important part of a place, or activity – основополагающее направление, основа;

**to impinge on/upon** – to have an effect on something, often by limiting it in some way – посягать, влиять на;

**delve into** – to examine something carefully in order to discover more information about someone or something – вникнуть в суть дела, углубиться, доискиваться; копаться в чем-л с целью глубже понять;

**to be at stake** – is often used to describe situations where something of value is at risk, such as reputation, relationships, jobs, or even lives. The idiom emphasizes the significance or potential consequences of a particular situation or decision – быть поставленным на карту; быть на кону; находиться под угрозой, в опасности;

**vital** – essential, necessary, crucial for survival or well-being – жизненно важный;

**distorted** – changed so that it looks strange or unusual – искривленный, искаженный;

**sweeping** revolution – affecting many things or people / having great effect or range – широкий (с большим охватом) / бурный, стремительный;

**to herald** – to announce so that it is publicly known and expected – предвещать, предсказывать;

**(to be) consistent** – always acting, behaving or happening in the same way, achieving the same level or success; if the ideas are consistent, they don't contradict one another – последовательный, согласованный;

**crucial** – extremely important or necessary – решающий, ключевой;

**prejudice** – an unreasonable opinion or feeling especially when formed without enough thought or knowledge – предубеждение, предрассудок.

## 2. What do these words refer to in the text.

Passage 2: “those” \_\_\_\_\_

Passage 3: “doing this” \_\_\_\_\_

Passage 5: “this” \_\_\_\_\_

## 3. Answer the following comprehension questions.

- 1) What's Einstein's contribution to science?
- 2) How did Einstein's scientific work influence the further scientific development?
- 3) What were the two pillars of the 20<sup>th</sup> century? Are they still urgent today?
- 4) What are the three main interconnected driving forces that bring about changes in science?
- 5) According to the writer, how do the attitudes of the authority figures differ towards the development in social sciences and natural sciences?
- 6) In the writer's view, how does capitalism affect science negatively?
- 7) What do we need to do if we want to change the world?
- 8) Why do you think Einstein argued that “common sense is the prejudices acquired by age 18”? What is your point of view on this point?

## 4. Render the text. Use the phrases below and useful linking words to order your rendering logically.

The text under discussion is headlined “....” ...

The article dwells on / touches on / focuses on...

The first paragraph writes about (describes / stresses / considers) ...

Next, the text claims that...

First, next, then... / the *second* paragraph states, claims, emphasizes, stresses that...

Actually, the fact is, the point is, moreover, furthermore, besides, in addition...

To sum it up (summing it up)...; in conclusion.

## VII. Written translation.

### 1. Translate from Russian into English using your Active Vocabulary and a dictionary if necessary.

Если в ваших планах потрясать мир удивительными *открытиями* и научными *исследованиями*, раскрыть тайны *вселенной*, покончить с разнообразными *бедствиями человечества* и достичь *прогресса* в научно-технической и медицинской сфере, то смело поступайте в университет, и вы получите *широкие возможности для создания* и реализации вашей мечты. В университете есть *факультеты* по разным направлениям научного знания. Вуз *предложит* необходимую теоретическую базу, участие в грантовых конкурсах, *возможность* консультироваться и получать помощь от *ведущих преподавателей мирового уровня*, обмениваться идеями с одногруппниками и сокурсниками, начать делать первые шаги в науке *под руководством старших научных сотрудников* и просто находиться в атмосфере научного творчества. Кроме того, в университете много лабораторий и компьютерных классов для студентов, что также *привлекает* будущих ученых. Там студенты могут *применить* теоретические знания на практике.

Что думают потенциальные работодатели о дипломах своих сотрудников? В компании при выборе кандидата, например на стажировку (*internship*), обязательно обращают внимание на полученное образование, так как если человек обладает необходимой теоретической базой, это *во многих отношениях* позволяет считать, что человек может мыслить структурно. *В отличие от* стажировки, при приеме на работу опыт будет важнее, чем диплом вуза, оконченного 10 лет назад. Представители компаний советуют также не игнорировать *возможности*, которые предлагает онлайн-образование. Конечно, для трудоустройства на серьезную позицию одних онлайн-курсов будет недостаточно, но сертификаты о дополнительной квалификации *в значительной степени увеличат* шансы кандидата получить желаемую должность.

Идите вперед, не тратьте время, помните, вы упускаете каждую *возможность*, которой не пользуетесь.

## VIII. Writing an email “How to email a professor”.

### 1. Study a step-by-step guide “How to write an email to a professor” with a sample.

There are many situations when you need to email your professor: Asking a question, inquiring about your grades, informing them about a missed class, etc. Here are a few useful tips:

#### 1. *Make sure you really need to send that email.*

If you want to email a professor asking a question, check your syllabus first. Chances are pretty solid; you'll find the answer. The syllabus can tell you about your workload, assignments, deadlines, and more. If that's something you were looking for, there's no need to send an email and waste your professor's time. Your classmates are another valuable source of information, so make sure to talk to them first.

If the syllabus, or your peers, can't answer your question, it's fine to send an email with additional inquiries.

#### 2. *Use your school email.*

This is the best course of actions because such an email looks professional and shows a recipient that your message is about classes. If you don't have an educational email address, make sure to use an appropriate email address like *firstname.lastname@example.com*. Your *bro\$\$77@example.com* address isn't suitable for academic correspondence.

#### 3. *Write a clear subject line.*

The subject line defines if a recipient opens your email, so make sure it's clear, concise and to the point. A good subject line tells a professor what your email is about and how they should act on it.

#### 4. *Include a proper email greeting.*

Start your email to a professor with an appropriate and respectful salutation. Double-check their name before sending an email and make sure your greeting is followed by a comma.

Here's how to start an email to a professor:

#### 5. *Remind who you are.*

Professors have lots of students, so it's important to tell them your name and the class you're attending. This helps you save the recipient's time and ensures you get a reply faster.

#### 6. *Get straight to the point.*

After greeting a professor and introducing yourself, it's time to state your question or request. Keep it concise and clear, so the recipient can quickly comprehend what it's about and what action is expected from them.



*7. End an email politely and include a professional signature.*

Thank them for their time and sign off your email with “Sincerely”, “Best regards”, “Kind regards” followed by your name.

*8. Proofread your email.*

Pay attention to grammar, spelling, and punctuation. Make sure to stick to a formal tone and avoid emojis or informal abbreviations like FYI or ASAP. Check the spelling of your professor’s name one more time.

*9. Put yourself in your professor’s shoes.*

Reread the email as if you are a professor who receives it. Is it clear who’s writing to you and what they want? Is the tone of the email polite and respectful? Does it comply with a formal email format? If all your answers are “Yes,” then feel free to send your email.

### **A Sample**

Subject: Question about the History 1B assignment

Dear Professor Smith,

I am Lexie Brown, from History 1B, Section 1. In the syllabus, the deadline for our latest assignment is listed as April 9<sup>th</sup>, However, in class on Monday you mentioned April 12<sup>th</sup> as the deadline.

Could you please verify the correct deadline?

Thank you so much for your time.

Sincerely,

Lexie Brown

**2. Write an email to one of your professors on any of the suggested topics, or choose your own one: *Class attendance, Inquiring about my grade, Question about my assignment, Appointment request, Verifying the date of the exam.***

## **IX. Free Writing Essay.**

Read the samples of free writing essays on the topic “My experience in science”. Discuss the described experiences, what science means to these people, how much science influences them. Then write your own free writing essay on your experience in science. Use Active and Supplementary Vocabulary.

### **1. Lilian – My experience in science.**

I graduated with a degree in Biology and had already worked in the specific field of Botany and in Science Education, researching and teaching in high school.

My idea of science is much more closed to the everyday world, that is, I see science as something developed because of and for the real everyday world.

Science is not just what a few people do in their laboratories, but, instead, it is a study and/or work related to our lives, something that everyone can understand and participate.

There is science everywhere. We should be interested in it and try to keep a close relationship with science, so we are able to understand what is happening around us and, the most important, to become part of it, to participate. The most important issues discussed today are in some way related to science. We can think about genetics, food, cosmetics, climate, biological war, energy, and many other things, and we will find science in these things. We should pay attention to how we interact with it, with this information.

We don't need to become scientists to understand, talk about and participate in science. We need to get closer and closer to science, living science in our everyday lives. We just need to change our points of view and stop thinking about science as something difficult and distant and start thinking about it as our own lives.

When I think about science I also immediately think about school. I'm always concerned about how to bring science and scientific world to the classes, to the student's reality, because I believe they could be more interested in science if they could see science in this way.

Thinking about it, after reading Dr. Michael's book and some articles, I now believe that maybe it's possible to do this, that is, make science easier, closer, and more interesting to students, doing science in classes. So, the students will learn doing science.

I believe everybody can do it; we can learn science doing science and living science, associating what is happening in our world with the existing scientific knowledge.

## **2. Janet – My experience in science.**

My experience in "science" begins in Grade school science classes, health, math to Grade 9 and biology, chemistry, physics, and algebra in grades 10-12. My favorite was Chemistry, then algebra, biology, and physics. I took Chemistry twice to improve my grades and enjoyed it both times in a large class though, in retrospect "good teacher, too many students, too late in curriculum." The same with physics "good teacher, too many students, too late." I say this because of the experience I have with science from a learning/teaching perspective. Perhaps "social studies" would have more meaning and understanding for me in high school if it had been called "social sciences".

So in the social sciences at university, I am re-learning what I experience when learning, i.e., discovery, process, experience, (praxis) and now look at the bigger pictures, I think, time is running out, - no time to re-learn the sciences such

as biology, chemistry and physics, but it is necessary for my peace of mind to understand the learning process from which I hope to find the voice and be able to communicate in a meaningful way for myself and for anyone who may care to listen.

In retrospect, this is interesting...looking back and seeing how much this (my experience with science) has impacted on my thoughts about the topic and what I am doing today. My experience with science has had a strong impact on me. This is a bit of a surprise.

### Test yourself

**1. Read the statements and say if they are true or false. Make corrections and additions.**

1. Natural and formal sciences are two of the three major divisions of science.
2. Cross-disciplines are disciplines that differentiate different aspects of natural sciences.
3. Prior to the 17<sup>th</sup> century science started to use different types of experiments and procedures.
4. Modern civilization heavily depends on the advances in the natural sciences and chemistry.
5. Biological and medical research is not too advanced to cure or treat diseases especially fatal ones.
6. Earth sciences allow mankind to understand the history of the planet, predict changes and extract mineral and natural resources.
7. Astronomy underlies all natural sciences.
8. Through astronomy, scientists discover the information about the universe.
9. Natural sciences are often referred to as “hard science” because of qualitative methods.
10. The social sciences tend to have less-certain conclusions.
11. The formal sciences do not typically involve the study of natural phenomenon or experimentation.
12. The formal sciences rely on mathematics and logic.
13. The main areas of formal sciences are mathematics and statistics.
14. Pure science is one of the formal sciences.
15. Formal scientists are not so popular nowadays.
16. The formal sciences are just a supplementary area.
17. There exist more opportunities due to online resources becoming more accessible and affordable.
18. The Natural Sciences course at Cambridge is a very narrow course.

19. The standard mode of teaching at Cambridge are lectures and practicals, and small group teaching as well.

20. A Director of Studies at Cambridge is responsible for academic life at the university as well as non-academic such as finances, or welfare.

21. The Natural sciences course at Cambridge prepares students for any career opportunities.

\_\_\_\_\_ (*on the text “What brings about changes in science”*)

22. The first driving force for changes in science is the development of technology.

23. The dominant ideas do not bring about changes in science.

24. Science moves forward because scientists try to develop logically consistent theories.

25. We just need to develop theories if we want to change the world.

## **2. Rearrange the letters in the anagrams to get the active words from the Unit Vocabulary.**

rsienuev, orbiveoastn, vnsgeaiintoit, ulpetiml, nmiadnk, yroisvced, seocrug, enlaauitov, eerint, eqvatntatiiu, opoitrnytup, liesthsnmbeat, aiterengt, ndecvaa, qitavaeintl, erlediun, ealvre, lepoixer, elovvn, orfbfaalde, ntenosrreco, vspiunoires, hurlgyo, rnempetdta, gina

## **3. Match the words with the definitions.**

<b>Definition</b>	<b>Word</b>
1. important, serious or great	data
2. the process of learning something that was not known before, or finding(s)	evaluation
3. relating to numbers or quantity	establishment
4. relating to quality of something	to integrate
5. consisting or involving many things or types of things	to lack
6. to describe or explain the meaning of something, especially the word, or to explain something very clearly so it can be understood	to cause
7. research	to develop
8. the space and everything that exists in it including the Earth and all other planets	entire
9. the process of watching someone or something carefully to find something out	to reveal
10. to make something new or original that didn't exist before	advance

11. something that causes a lot of trouble or suffering to a group of people	mankind
12. to depend on or trust someone or something	to provide
13. to be present in a particular time, place, or situation	to predict
14. to let something become known, for instance a secret or information that was previously not known	to create
15. used for emphasizing that you mean all or every part of something; whole	observation
16. to invent, design something or bring something into existence, to advance something	universe
17. to make something happen, especially something bad	investigation
18. to not have or not have enough of something that is needed or wanted	to define
19. to combine two or more things into one to make something more effective	multiple
20. the whole of the human race, including both men and women	to rely on (upon)
21. the forward movement of something, or an improvement or developing in something progress in understanding it or in doing it well	scourge
22. to say that an event or action is going to happen (will happen) in the future	discovery
23. to be the basis of something	qualitative
24. to give something to a person, company, or organization	to exist
25. the process of starting or creating something	quantitative
26. information	major
27. the process of judging or assessing the quality, importance, amount, or value of something	to underlie

#### 4. Paraphrase the sentences using the words in the box instead of definitions.

To bring about, to put forward, to be at stake, speck, to bounce, pillar, to impinge on/upon, distorted, sweeping, to delve into, prejudice, to herald, crucial.

1. She played an extremely important role in the investigation.
2. The technology announced a new age of space exploration.
3. Einstein's ideas caused the kind of revolution that had a great effect on many people.
4. I realized how many words had been strangely changed.
5. Dominant ideas in society can have an effect upon science.
6. Relativity and quantum theory are two important parts of the 20<sup>th</sup> century physics.
7. The rubber ball after hitting a surface moves up.
8. The whole solar system is but a small piece in the universe.
9. They have stated a number of ideas and even suggested a good, detailed plan of their experiment.
10. The new data will certainly cause a change in the project.
11. We need to act in the same way in our approach.
12. Science lacks unreasonable ideas and opinions.
13. I like to examine old books looking for forgotten history.
14. What is at risk now (if talking about our society)?

**5. Complete the sentences with the Unit Vocabulary in the correct form.**

1. Oxygen is the \_\_\_\_\_ component of the Earth's air shell, the atmosphere.
2. Could you \_\_\_\_\_ the term "atmosphere"?
3. In their laboratory they \_\_\_\_\_ products that can replace milk.
4. Well, to get the entire picture of the study, I strongly recommend you to \_\_\_\_\_ your data with the previous results.
5. You \_\_\_\_\_ knowledge of the subject. I am afraid you'll fail the exam.
6. Every scientific research needs \_\_\_\_\_ as well as \_\_\_\_\_ data.
7. The study was based on \_\_\_\_\_ from 200 respondents.
8. He got an excellent \_\_\_\_\_ from his supervisor.
9. Science is a method of learning and a way of fact \_\_\_\_\_ through investigations.
10. Your report on recreational facilities of the territory is very interesting. Will you conduct further \_\_\_\_\_?
11. Heavy rains \_\_\_\_\_ the landslide last month.
12. What \_\_\_\_\_ all success of yours?
13. In the 20<sup>th</sup> century scientists made a lot of great \_\_\_\_\_, for instance, relativity and quantum theory.
14. During this course student will learn how to \_\_\_\_\_ the weather.
15. Does life \_\_\_\_\_ on Mars?
16. Science is rapidly moving forward. It is impossible to stop technological \_\_\_\_\_.

17. Doctors all over the world are making great efforts in treating global \_\_\_\_\_ like COVID-19.
18. That's one small step for a man and one giant leap for \_\_\_\_\_ .
19. You're very reliable. I can always \_\_\_\_\_ you.
20. Don't worry! I will \_\_\_\_\_ you \_\_\_\_ all practical material for your experiment.
21. It would be great if life existed not only in our \_\_\_\_\_ .
22. There were periods when the \_\_\_\_\_ civilizations vanished.
23. \_\_\_\_\_ is a descriptive psychological research method consisting in purposeful and organized perception and registration of the behavior of the object under study.
24. A survey of the British diet has \_\_\_\_\_ that a growing number of people are overweight.
25. If you were able to \_\_\_\_\_ your own theory, what would it be?

**6. Complete the text with the words in the box, then make a written translation of the text without a dictionary.**

In many respects<sup>1</sup>, less-certain<sup>2</sup>, prior to<sup>3</sup>, previously<sup>4</sup>, significantly/heavily/largely<sup>5</sup>, for instance<sup>6</sup>, drastically<sup>7</sup>, merely<sup>8</sup>

We can define “science” as both a body of knowledge and a process. \_\_\_\_\_, science is a major advance of the mankind. \_\_\_\_\_ the 17<sup>th</sup> century it was \_\_\_\_\_ as it lacked experiments and procedures used today. And only in 19<sup>th</sup> century there appeared such method as observation. Science explores unexplained parts of the natural world, creates new theories, and develops new tools, methods, and medicine to improve a human life. Most typically in science, answering one question brings about deeper and more detailed questions for further investigation. Similarly, putting forward a fruitful idea to reveal a \_\_\_\_\_ anomalous observation frequently leads to creating multiple new expectations and areas of research. So, in a sense, the more we know, the more we know what we don’t yet know. The establishment of a scientific fact is crucial. \_\_\_\_\_, James Watson and Francis Crick’s proposal that DNA takes the form of a double helix helped answer a burning question in biology about the chemical structure of DNA. This discovery is \_\_\_\_\_ important. And while it helped answer one question, it provided scientists with new expectations and heralded new fields of research. (e.g. genetic engineering). Most evaluations of scientific advances are rather high. So, if you are keen on science, if you love science, \_\_\_\_\_ go for it because once it can \_\_\_\_\_ change your life and the life of the mankind.

## UNIT 2

### THINKING LIKE A SCIENTIST

#### I. Warming-up.

##### 1. Answer the questions.

1. What is a scientist? What skills are needed to be a scientist?
2. What would you tell your fellow students about thinking like a scientist?
3. Have you heard about scientific method?



##### 2. Complete the following chart with your ideas:

		scientist		
	observing			
		Scientific method		
				classifying

##### 3. Discuss the information about science with your fellow students.

#### II. Reading I.

##### 1. Read the following text and find the facts you've *not* mentioned in the discussion.

When you were very young, you used to explore the things around you by touching and tasting. As you were growing, you asked questions about the world you live in. What is lightning? Where does a rainbow come from? Why is the ocean blue? As an adult, you may have wondered how antibiotics work or why vitamins are important to your health. Every day, you ask questions and seek answers to organize and make sense of the world around you.

When the Nobel Laureate Linus Pauling described his student life in Oregon, he recalled that he read many books on chemistry, mineralogy, and physics. He said, “I was building up this tremendous background of empirical knowledge and at the same time asking a great number of questions.” Linus Pauling won two Nobel Prizes: the first, in 1954, was in chemistry for his work on the nature of chemical bonds and the determination of the structures of complex substances; the second, in 1962, was the Peace Prize.

The process of trying to understand nature is unique to each scientist. However, the scientific method is a process that scientists use to make observations in nature, gather data, and explain natural phenomena.

**Observations.** The first step in the scientific method is to make observations about nature and ask questions about what you observe. When an observation always seems to be true, it may be stated as a law that predicts that behavior and is often measurable. However, a law does not explain that observation. For example, we can use the Law of Gravity to predict that if we drop our chemistry book it would fall on the table or the floor but this law does not explain why our book falls.

**Hypothesis.** A scientist forms a hypothesis, which gives a possible explanation of an observation or a law. The hypothesis must be stated in such a way that it can be tested by experiments.

**Experiments.** To determine if a hypothesis is true or false, experiments are done to find a relationship between the hypothesis and the observations. The results of the experiments may confirm the hypothesis. However, if the experiments do not confirm the hypothesis, it is modified or discarded. Then new experiments will be designed to test the hypothesis.

**Conclusion/theory.** When the results of the experiments are analyzed, a conclusion is made as to whether the hypothesis is true or false. When experiments give consistent results, the hypothesis may be stated to be true. Even then, the hypothesis continues to be tested and, based on new experimental results, may need to be modified or replaced. If many additional experiments by a group of scientists continue to support the hypothesis, it may become a scientific theory, which gives an explanation for the initial observations.

You may be surprised to realize that you use the scientific method in your everyday life. Suppose you visit a friend in her home. Soon after you arrive, your eyes start to itch and you begin to sneeze. Then you observe that your friend has a new cat. Perhaps you ask yourself why you are sneezing and you form the hypothesis that you are allergic to cats. To test your hypothesis, you leave your friend’s home. If the sneezing stops, perhaps your hypothesis is correct. You test your hypothesis further by visiting another friend who also has a cat. If you start to

sneeze again, your experimental results support your hypothesis and you come to the conclusion that you are allergic to cats. However, if you continue sneezing after you leave your friend's home, your hypothesis is not supported. Now you need to form a new hypothesis, which could be that you have a cold. (*Basic chemistry by Karen Timberlake and William Timberlake / Fifth Edition PEARSON, ALWAYS LEARNING, and Mastering Chemistry; Pearson Education Limited 2017*)

**2. Look through the text and deduce which of the following ideas are expressed in the passage.**

1. A scientist is a person who has expertise or performs research in a specific field of science, through observations and experiments.
2. Designing an experiment allows you to test and potentially disprove your hypothesis.
3. You use the scientific method in your everyday life to explain the outcome of a situation.
4. Thinking like a scientist will help you solve problems more efficiently and it can also help you land better jobs and increase your chances for promotions at work.
5. The core characteristics or skills needed to be a scientist are: Observation, Curiosity, Logic, Creativity, Skepticism, Objectivity, Peer review.
6. Observation is the very beginning of the scientific method because scientists are constantly observing things about the natural world, and then asking questions such as how or why?
7. When a hypothesis is supported by experiments, other scientists analyze the data, make their own observations, replicate the experiments, and test the hypothesis themselves in a process called peer review.
8. The qualities of a scientist include having analytical skills, being detail-oriented, and being organized. Scientists are open-minded, unbiased, and adaptable.
9. A scientist thinks methodically using a set of principles called the scientific method to solve problems.
10. The scientific method is a step-by-step process that scientists follow to understand how or why something works; ask a question, form a hypothesis, test the hypothesis, analyze data, and draw conclusions.
11. A theory is a hypothesis that has been validated many times by many scientists.

**III. Words to learn.**

**1. Give Russian equivalents to the following words, word combinations and terms. Where exactly are they used in the text?**

*Nouns:* 1. lightning 2. properties 3. background 4. data 5. behavior 6. relationship  
7. determination.

*Adjectives:* 1. unique 2. measurable 3. tremendous 4. additional 5. possible 6. initial 7. hard.

*Verbs:* 1. recall 2. explore 3. gather 4. confirm 5. support 6. itch 7. sneeze.

*Word combinations:* 1. make sense of 2. mulled over 3. natural phenomena 4. consistent results 5. you are allergic to 6. you have a cold 7. seek answers to.

*Terms:* 1. inorganic compound 2. chemical bonds 3. chemistry 4. the Law of Gravity 5. substances 6. empirical knowledge.

**2. Use a dictionary and give the plural form of the following words and translate them into Russian.**

Singular	Plural
hypothesis	
theory	
datum	
phenomenon	
knowledge	
synthesis	
analysis	
basis	
criterion	
focus	

**3. Match the synonyms.**

a. test, trial	1. determination
b. assumption	2. experiment
c. system of ideas	3. hypothesis
d. monitoring, examination	4. relationship
e. thing, fact	5. properties
f. quality, characteristic	6. observation
g. bond, connection	7. phenomenon
h. definition, specification	8. theory

**4. Look through the text again and define each of the following terms: a. *observation* b. *hypothesis* c. *experiment* d. *theory* e. *conclusion*. Omit all unnecessary details and explain the terms in your own words. You may use a dictionary to define each of the terms of the Scientific method.**

**5. Identify each of the following statements as an observation (O), a hypothesis (H), or an experiment (E).**

**1.**

- a. A silver tray turns a dull gray color when left uncovered.
- b. When a silver tray is covered with plastic wrap, it does not tarnish.
- c. Oxygen reacts with silver when the tray is exposed to air.

**2.**

- a. "Today I placed two tomato seedlings in the garden, and two more in a closet. I will give all the plants the same amount of water and fertilizer."
- b. "After 50 days, the tomato plants in the garden are 3 ft. high with green leaves. The plants in the closet are 8 in. tall and yellow."
- c. "Tomato plants need sunlight to grow."

*Note: 3 ft. high - футов в высоту; 8 in. tall - дюймов в высоту*

**3.**

- a. The bicycle tire is flat.
- b. If I add air to the bicycle tire, it will expand to the proper size.
- c. When I added air to the bicycle tire, it was still flat.

**6. Describe the activities that are parts of the scientific method. Identify each activity, *a* to *f*, as an observation (O), a hypothesis (H), an experiment (E), or a conclusion (C).**

**1.**

*At a popular restaurant, where Chang is the head chef, the following occurred:*

- a. Chang determined that sales of the house salad had dropped.
- b. Chang decided that the house salad needed a new dressing.
- c. In a taste test, Chang prepared four bowls of lettuce, each with a new dressing: sesame seed, olive oil and balsamic vinegar, creamy Italian, and blue cheese.
- d. The tasters rated the sesame seed salad dressing as the favorite.
- e. After two weeks, Chang noted that the orders for the house salad with the new sesame seed dressing had doubled.
- f. Chang decided that the sesame seed dressing improved the sales of the house salad because the sesame seed dressing enhanced the taste. Customers rated the sesame seed dressing as the best.

**2.**

- a. One hour after drinking a glass of regular milk, Jim experienced stomach cramps.
- b. Jim thinks he may be lactose intolerant.
- c. Jim drinks a glass of lactose-free milk and does not have any stomach cramps.

d. Jim drinks a glass of regular milk to which he has added lactase, an enzyme that breaks down lactose, and has no stomach cramps.

**3.**

- a. During an assessment in the emergency room, a nurse writes that the patient has a resting pulse of 30 beats/min.
- b. A nurse thinks that an incision from a recent surgery that is red and swollen is infected.
- c. Repeated studies show that lowering sodium in the diet leads to a decrease in blood pressure.

*Note: в отделении неотложной помощи - in the emergency room*

*разрез после операции - an incision from a surgery*

**7. Write a one-sentence definition for each of the following key terms: *chemical, chemistry, conclusion, experiment, hypothesis, observation, scientific method, theory.***

**IV. Watch and listen.**

**1. Watch the video. Answer the question - *How can you apply the scientific method to areas of your life in order to increase your odds of being successful?***

**2. Learning grammar.**

The scientific method starts when you ask a question about something that you observe: How, What, When, Who, Which, Why, or Where? Ask all possible questions to the video and let your partner to answer them. (APPENDIX. Table 4 All Kinds of Questions).

**3. A hypothesis is an educated guess about how things work. It is an attempt to answer your question with an explanation that can be tested. Revise grammar *Subjunctive Mood* (Table 10), *Conditional Clauses* (Table 11) and construct a hypothesis. A good hypothesis allows you to make a prediction: "If \_\_\_\_\_ [I do this] \_\_\_\_\_, then \_\_\_\_\_ [this] \_\_\_\_\_ will happen." Write both your hypothesis and the resulting prediction.**

**4. Render the following text in English using the active vocabulary. Study carefully the words of the Active Vocabulary.**

В науке, каждое новое открытие начинается с постановки гипотезы. Гипотеза – это предварительное предположение, основанное на знаниях и

наблюдениях исследователя. Однако, чтобы проверить правильность гипотезы, необходимо провести эксперимент.

Эксперимент – это контролируемое наблюдение, которое позволяет проверить или опровергнуть гипотезы. В научном эксперименте участвуют все необходимые компоненты: группы контроля, экспериментальные переменные, систематическое наблюдение и точный замер результатов.

Наблюдение – важный этап научного метода. Наблюдение позволяет собрать информацию и данные, которые могут подтвердить или опровергнуть гипотезу. Именно на основе наблюдений формируется научная теория.

Научный метод – систематический подход к исследованию и получению знаний. Он включает в себя такие этапы, как постановка вопроса, формулировка гипотезы, проведение эксперимента, наблюдение и обработка данных.

В результате проведенных экспериментов и наблюдений, научная теория может быть сформулирована. Теория – это объяснение явлений, фактов и закономерностей исходя из имеющихся данных. Она является фундаментом для развития научного знания и может быть проверена и подтверждена или опровергнута в последующих экспериментах.

Таким образом, научный метод, основанный на постановке гипотезы, эксперименте и наблюдении, позволяет исследователям изучать мир вокруг нас и расширять наше понимание научных явлений. Важно помнить, что процесс науки непрерывен и всегда открыт для дальнейшего исследования и разработки новых теорий.

## V. Reading II.

### 1. Read another text and choose the most suitable title out of given ones:

- 1. Scientific Method**
- 2. Sharing Your Results**
- 3. Constructing a Hypothesis**
- 4. How to Think Like a Scientist**
- 5. Testing the Hypothesis**

A scientist thinks methodically using a set of principles called the scientific method to solve problems. Thinking like a scientist will help you solve problems more efficiently. It can also help you land better jobs and increase your chances for promotions at work. Everyday decision making, such as where to shop, may benefit from using the scientific method of thinking.

The first step in the scientific method is formulating a question. Make some observation of the world around you, and pose it as a question. You will then use the scientific method to investigate the question and attempt to answer it. The scientific method can be applied to all sorts of questions, for example, you could ask “Will I save money if I stop shopping at Store A and buy my groceries at Store B instead?”

Do some background research. It is likely that someone has asked a similar question in the past and gotten some answers. Research your question using the internet, the library, or other records. Even if you do not find an exact answer, you will gain an understanding of the variables that you need to consider in your experiment. For example, you might find that someone did a study of the prices of groceries at Store A depending on the time of year. While this doesn’t answer your entire question, it does bring to your attention that you should consider the time of year in your experiment.

Once you have a thorough understanding of your question, you will need to develop a hypothesis. A hypothesis is a statement that reflects your educated guess as to what the answer to your question might be. A hypothesis absolutely must be falsifiable, or able to be disproven. Start your hypothesis with an educated guess. For example, if you have shopped at Store A and Store B before and you have an instinct that Store B might be cheaper, you could build your hypothesis around that thought. A good hypothesis would be “Store B has lower prices than Store A.” A bad hypothesis would be “The prices of Store B are set by invisible magicians that can never be discovered by people.”

Use the hypothesis to make some prediction. Hypotheses are useful because they allow you to predict the outcome of one thing based on your knowledge about it. Then, you can adjust your hypothesis based on whether or not it was disproven. Keep in mind that a hypothesis can never be “proven.” For example, your prediction might be “If I shop at Store B, I’ll save money.”

Design an experiment. An experiment is a test, or series of tests, to disprove your hypothesis. If the experiment fails to disprove your hypothesis, that means that it may be suitable for making predictions about the question you have posed. If the experiment disproves your hypothesis, it means that the hypothesis does not accurately predict the outcome of the situation. You might decide that your experiment will be to shop at Store A and Store B and compare the money you spent at each store.

Carry out the experiment. Once the experiment is laid out, you will need to carry out the steps. It is important not to carry out the experiment with bias. The scientific method does not allow for tweaking the experiment to make the results fit what you want. For example, you must commit to buying the same foods at

each store for a fair comparison. You should not buy the name brand at Store A, and the off brand at Store B to draw the conclusion that Store B is cheaper. In this scenario, the foods serve as your control and the stores are your variables.

Sometimes, experiments do a poor job of testing the hypothesis. When this happens, you have to troubleshoot your experiment. Ask yourself what went wrong, and how can the next experiment address these issues. For example, you could compare receipts from each store and think that you are saving \$15 per week, but you only notice an extra \$5 per week leftover. Upon a closer investigation, you realize that you have to buy extra gas each week to get to Store B, and that detracts from your savings. At this point, you would need to redesign your experiment to include gas receipts as well.



Once you have completed your experiment, you will be able to analyze the data. You will either find trends that are consistent with your hypothesis, inconsistent with your hypothesis, or no trend at all. Inconsistent trends, or no trends, will disprove your hypothesis. Looking at the receipts from each store would allow you to analyze how money was spent during the experiment. If your hypothesis constantly makes accurate predictions, it may become a theory.

The data and trends will allow you to draw conclusions about your hypothesis. Sometimes, this will be easiest to express in words, and other times it is more suitable to use graphs or charts to summarize your conclusions. Either way, it is important to keep in mind that even if your hypothesis gave predictions consistent with this experiment, it is still a falsifiable hypothesis. You could summarize the conclusions of your shopping experiment by entering the totals you spent at each store into a spreadsheet and generating a graph from the data. This would make it easy to see if Store A or Store B saved you money.

For an experiment or a result to be scientific in nature, it must be replicable. You, or someone else, must be able to reproduce the same results each time you do the experiment. If your results cannot be replicated, then your hypothesis is not supported. If you go to the Store B and save money one time, but do not save money consistently when going to Store B, your results are not replicable.

Additional versions of the experiment can be carried out by yourself or by someone else. The scientific method is designed so that anyone can get the same

results when doing any experiment, given that they are knowledgeable about the procedures. The more times your hypothesis is supported, the stronger it becomes. You can replicate the store experiment by going to both stores multiple times and comparing your results. You could also have a friend go to both stores and analyze their data.

**2. Read the text again and say if the following statements are True or False.**

1. The scientific method can be applied to all types of questions.
2. A hypothesis must be a statement that cannot be disproven.
3. The first step in the scientific method is conducting background research.
4. The purpose of an experiment is to prove your hypothesis correct.
5. The scientific method allows for tweaking the experiment to fit desired results.
6. Troubleshooting an experiment involves analyzing the data and looking for consistent trends.
7. Analyzing data is an optional step in the scientific method.
8. Drawing conclusions is not necessary if the hypothesis consistently makes accurate predictions.
9. For an experiment to be scientific in nature, its results must be replicable.
10. The scientific method does not require multiple versions of an experiment to be carried out.

**3. Read the text once again and entitle its paragraphs.**

**4. Write out key words out of each paragraph and the sentence(s) expressing the main idea(s) of each paragraph.**

**5. Write an abstract/summary to the text.**

**6. Translate one of logical parts into Russian. Use the words of the Active Vocabulary.**

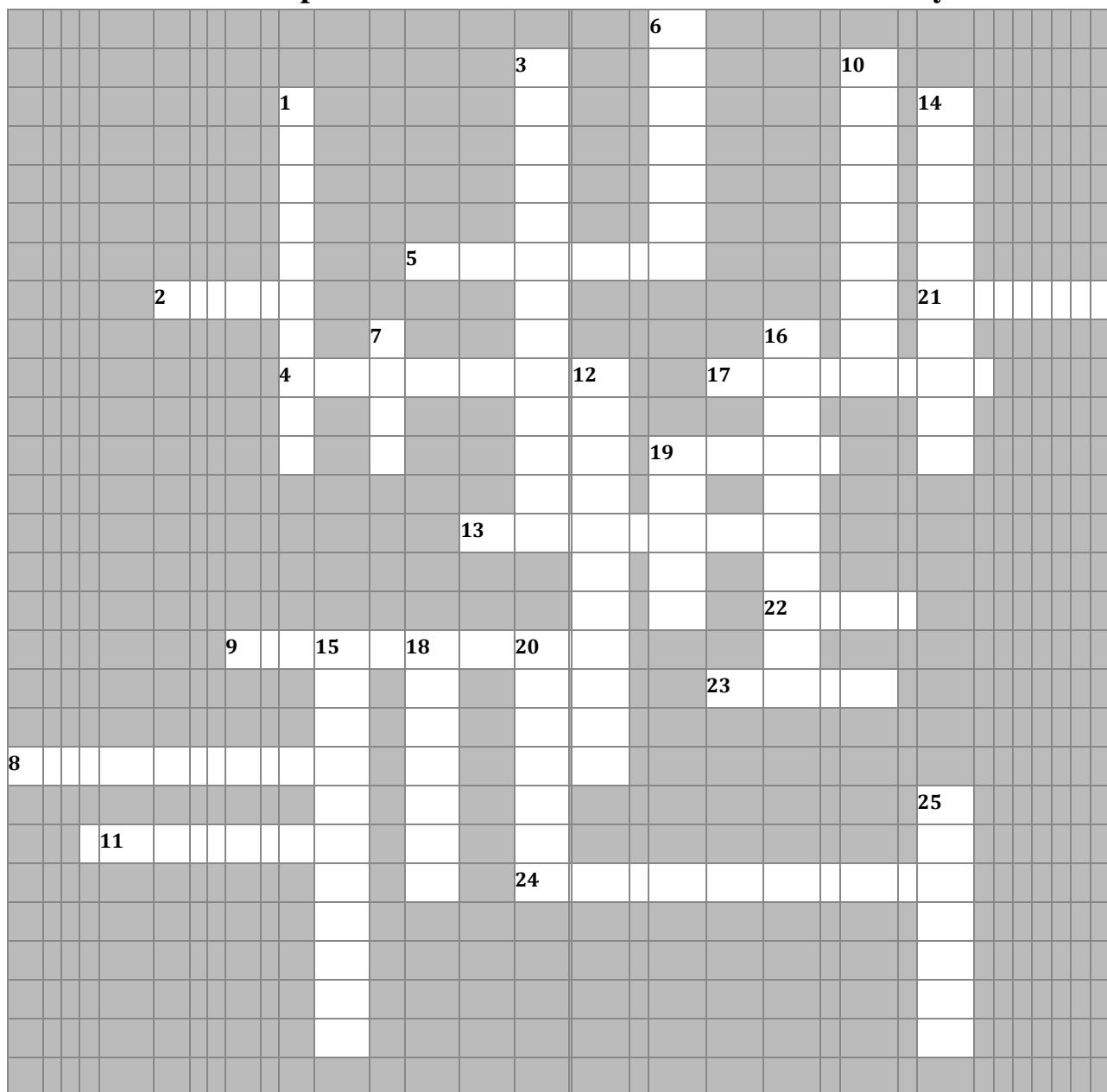
**VI. Active Vocabulary**

**1. Match the Russian words and word combinations in *A* with their equivalents in *B*:**

<i>A</i>	<i>B</i>
1. bond	a. соединение
2. mull over	b. огромный
3. compound	c. взаимосвязь

4. relationship	d. связь
5. tremendous	e. свойство
6. measurable	f. долго и тщательно обдумывать
7. property	g. согласующийся, постоянный, последовательный
8. bias	h. казаться менее ценным (умалить)
9. consistent	i. испытание
10. carry out	j. электронная таблица
11. trial	k. выполнять, проводить
12. support	l. измеримый
13. spreadsheet	m. чек, квитанция
14. receipt	n. необъективность, предвзятость
15. detract from	o. доказательство, поддержка
16. troubleshoot	p. устранение неполадок

## 2. Do the crossword puzzle. Use the words of the Active Vocabulary.



ACROSS:	DOWN:
2. to collect several things, often from different places or people (COLLECT)/ to understand or believe something as a result of something that has been said or done (UNDERSTAND);	1. information about something that helps people understand it;
4. being the only existing one of its type or, more generally, unusual, or special in some way;	3. knowing a lot (intelligent, clever);
5. to say that an event or action will happen in the future, especially as a result of knowledge or experience;	6. something such as a piece of paper or message proving that money, goods, or information have been received;
8. able to be proved to be false;	7. the fact that information is not correct because of the method used in collecting or presenting it;
9. always happening or behaving in a similar way / agreeing with something said or done previously;	10. a set of actions that is the official or accepted way of doing something/ an order or method of doing something;
11. a chemical that combines two or more elements;	12. the details or other information that someone gives to make something clear or easy to understand;
13. the way that a person, an animal, a substance, etc. behaves in a particular situation or under particular conditions;	14. something that you accept as true without question or proof;
17. to be helped by something or to help someone;	15. an electronic document in which information is arranged in rows and columns, and can be used to do financial calculations and plans;
19. an act of using something to find out if it is working correctly or how effective it is;	16. able to be measured in order to discover its exact size, amount, etc.;
21. a quality in a substance or material, especially one that means that it can be used in a particular way;	18. something that shows that a fact is true (PROOF)/ to agree with and give encouragement to someone or something because you want him, her, or it to succeed (ENCOURAGE);
22. the force holding atoms together in a molecule;	19. a test, usually over a limited period of time, to discover how effective or suitable something or someone is;
23. to try to find or get something, especially something that is not a physical object (SEARCH)/ to try to do something (TRY);	20. to think about, talk about, or study something, or to experience it, in order to find out more about it; to try to discover; learn about;
24. the process of checking something carefully in order to discover new information or prove particular facts;	25. to watch and check something carefully over a period of time (WATCH).

## VII. Communication

### 1. Read the text and entitle it. Describe the picture.

An experiment is a procedure designed to test a hypothesis. Anyone can design a scientific experiment. A proper experiment must be reproducible and reliable, include a control, and use well-designed variables. A variable is any factor, trait, or condition that can differ. An experiment usually has three kinds of variables: independent, dependent, and controlled.

- The independent variable is controlled by the scientist.
- The dependent variable changes, depending on the independent variable.

This is measured by the scientist to prove or disprove their hypothesis.

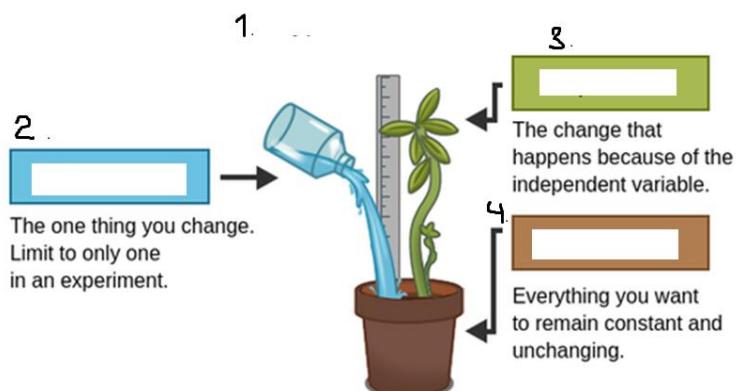
• The controlled variables are conditions which must be kept controlled and constant throughout the experiment so that they don't interfere with the dependent variable. When the experiment is repeated, the controlled variables must be exactly the same.

Scientific experiments must be reproducible. Any other researcher should be able to replicate the experiment and get similar results.

Scientific results must also be dependable. When working in a lab, one encounters many sensitive reagents, and any contamination or changes may affect your results drastically. If you cannot vouch for every ingredient and its concentration in a reaction, you cannot conclude anything based on those results.

This is also the reason why most tests and measurements are done in triplets (three identical reaction tubes for each condition being tested). This way, if similar results are obtained from all three samples, there is a greater chance that results are dependable.

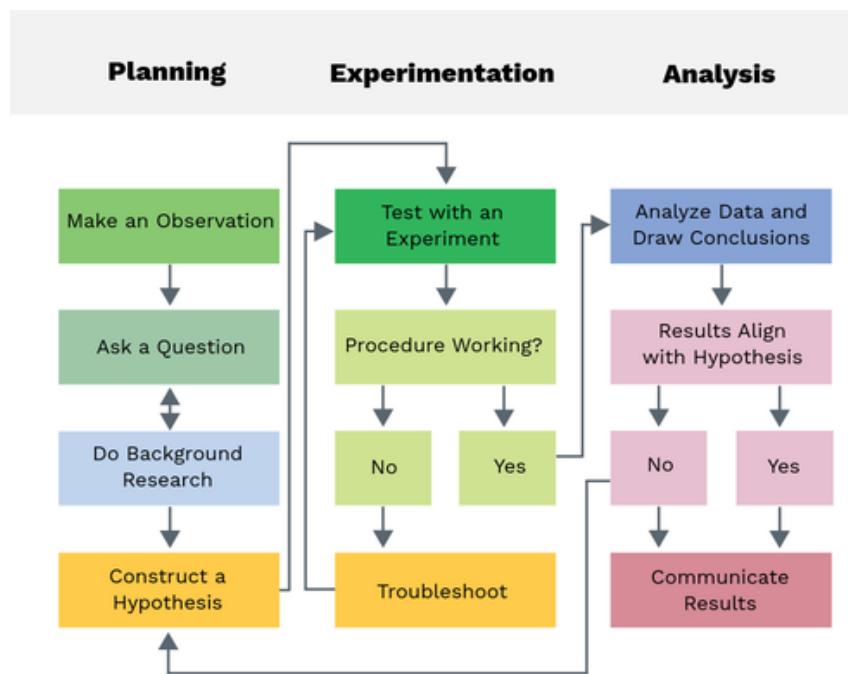
If the experiment fails to disprove your hypothesis, that means that it may be suitable for making predictions about the question you have posed. If your hypothesis constantly makes accurate predictions, it may become a theory. If the experiment disproves your hypothesis, it means that the hypothesis does not accurately predict the outcome of the situation. If the original hypothesis was incorrect then it is time to pivot and create a new hypothesis.



**2. Complete the table with the Supplementary Vocabulary. Then make up your own sentences with the words and word-combinations in the table.**

word / word combination	definition	translation
reproducible		
reliable		
be dependable		
independent variable		
dependent variable		
controlled		
done in triplets		
drastically		
vouch for		
to encounter		
to pivot		

**3. Watch the video «[The Scientific Method: Steps and Examples](#)». Be ready to discuss: Can the content of the video be visualized by the following flow chart?**



**4. Make up your own communication on a scientific problem that you are interested in and speak in front of your fellow students. Remember the information you've got from the previous texts and video.**

**5. Work in pairs and make up a dialogue out of the text below. Act your dialogue in front of your fellow students. There are a few possible situations where your dialogue could take place:**

1. Two students are discussing the lecture they've just heard.
2. A student discusses his\ her paper with the supervisor.
3. At the examination the professor asks a few questions on the scientific method, and the student answers.

The scientific method is a process for experimentation that is used to explore observations and answer questions. *Does this mean all scientists follow exactly this process?* No. Some areas of science can be more easily tested than others. For example, scientists studying how stars change as they age or how dinosaurs digested their food cannot fast-forward a star's life by a million years or run medical exams on feeding dinosaurs to test their hypotheses. *When direct experimentation is not possible, scientists modify the scientific method.* In fact, there are probably as many versions of the scientific method as there are scientists! But even when modified, the goal remains the same: to discover cause and effect relationships by asking questions, carefully gathering and examining the evidence, and seeing if all the available information can be combined in to a logical answer.

### **Active Vocabulary**

**Read the words of the Active Vocabulary, look them up and then study the word-combinations and sentences to know how to use them.**

**assumption (n)** – 1. something that you accept as true without question or proof (BELIEF): These calculations are based on the assumption that prices will continue to rise. They make the naive assumption that because it's popular it must be good. He premised his argument on several incorrect assumptions.; 2. a willingness to accept something as true without question or proof (ACCEPTING AS TRUE): The plan was based on the assumption that the schedule could be substantially speeded up by adding more people. **Make an assumption about somebody/something:** We tend to make assumptions about our staff's ability based on very little evidence. **On the assumption:** They decided to go ahead on the assumption that the figures they had been given were accurate. These calculations are **based on the assumption** that sales will continue to rise.

**background (n)** - the conditions that existed before a particular event happened, and that help to explain why it happened (SITUATION); information about something that helps people understand it: These decisions have had to be made against a background of high unemployment. **Background on:** Can you give

me some background on the situation? The official website has a wealth of background on the history of the tournament.

**behavior (n)** US (UK behaviour) - the way that a person, an animal, a substance, etc. behaves in a particular situation or under particular conditions: His research involved the study of instinctive behavior in birds. This approach can help identify common behaviors and their causes. The results of this paper can be important for the study of the behavior of laboratory and space plasmas, and also for diagnostic purposes. Process model is used to study the technical performance, behavior, and producibility of the structure.

**benefit (v)** – to be helped by something or to help someone: benefit from I feel that I have benefited greatly from her wisdom. How can we benefit those who most need our help?

**bias (n)** – the action of supporting or opposing a particular person or thing in an unfair way, because of allowing personal opinions to influence your judgment; the fact that information is not correct because of the method used in collecting or presenting it: Reporters must be impartial and not show political bias. In the market research there was a bias in the sample of people who were selected to give their opinions. There is a need to build in safeguards against statistical bias.

**bond (n)** – the force holding atoms together in a molecule (chemical bond; covalent bond): Carbon atoms can form bonds not only with themselves but with the atoms of oxygen and nitrogen.

**carry out something (v)** – to perform or complete a job or activity; to fulfill: I was elected to carry out a program, the governor said, and I have every intention of carrying it out. The study will be carried out over a six-month period. More research on the subject needs to be carried out.

**compound (n)** – a chemical that combines two or more elements (COMBINATION): Salt is a compound of sodium and chlorine. Many fertilizers contain nitrogen compounds.

**consistent (adj)** – 1. always happening or behaving in a similar way (NOT VARYING); **inconsistent** (CHANGING): There has been a consistent improvement in her attitude. Her work is sometimes good, but the problem is she's not consistent.; 2. agreeing with something said or done previously (AGREEING): The findings of the present 5-year longitudinal study are consistent with this theoretical claim. Overall, the empirical findings seem consistent with the first assumption of structural description models, but some doubts remain.

**detract from something (v)** – to make something seem less valuable or less deserving of admiration than it really is: These small faults, however, do not detract from the overall quality of the book. All that make-up she wears actually detracts from her beauty, I think.

**examination (n)** – the act of looking at or considering something carefully in order to discover something; the process of checking something carefully in order to discover new information or prove particular facts. We took a sample of the river water back to the laboratory for examination. Careful examination of the plane revealed minute cracks in the fuselage and wings.

**explanation (n)** – 1. the details or other information that someone gives to make something clear or easy to understand: She gave a detailed explanation of the administration's health-care proposal; 2. An explanation is also **a reason or an excuse** for doing something: He had no explanation for his absence the day before. **Give someone an explanation of something:** Could you give me a quick explanation of how it works? **Explanation for:** What was her explanation for why she was late? **Explanation + that:** The judge didn't believe his explanation that he had stolen the money in order to give it to charity. One possible explanation for the differing results may have to do with the fact that we were requesting summary instead of individual patient data. **By way of explanation:** He said, by way of explanation, that he hadn't seen the traffic light change to red.

**explore (v)** – to think about, talk about, or study something, or to experience it, in order to find out more about it; to try to discover; learn about (DISCOVER): We have to explore new ways to market our products. Many scholars have explored this issue. You explored the things around you. There are two sources of generative algorithms' strategies that are explored in this paper.

**falsifiable (adj)** – able to be proved to be false: In sum, we have to reject the falsifiable hypothesis that observers have internalized detailed knowledge about the rate of gravitational acceleration. Such analysis yields falsifiable hypotheses that can help to distinguish causal relationships from mere correlation.

**gather (v)** – 1. to collect several things, often from different places or people (COLLECT): I went to several libraries to gather information about the plans. We gathered blueberries from the bushes. **Gather up:** She gathered up the newspapers that were scattered around the floor. **Gather something together:** We gathered our things together and left quickly; 2. to understand or believe something as a result of something that has been said or done (UNDERSTAND): Harry loves his new job, I gather. From what I can gather, they're old school friends.

**knowledgeable (adj)** also knowledgeable - knowing a lot (intelligent, clever): He's very knowledgeable about German literature. The three men were knowledgeable, responsible, and hard-working, but what stands out even more is the intensity of their commitment to the search.

**measurable (adj)** – able to be measured in order to discover its exact size, amount, etc.: a measurable amount of precipitation. This is a useful approach because both variables are straightforwardly knowable and measurable. Soil is

defined in terms of diagnostic horizons, properties and materials which as far as possible are measurable and observable in the field. Clear and measurable goals should be agreed by all sides, and procedures for verifying whether they have been met should be established.

**monitor (v)** – to watch and check something carefully over a period of time (WATCH) - The nurse is monitoring his heart rate and respiration. Comings and goings are monitored by security cameras.

**mull something over / mull over something (v)** – to think carefully about something for a long time: I need a few days to mull things over before I decide if I'm taking the job.

**predict (v)** – to say that an event or action will happen in the future, especially as a result of knowledge or experience: We can predict changes in climate with a surprising degree of accuracy. I cannot predict what will happen next year. The papers are predicting that the prime minister will call an election in the spring. Heavy snowfalls are predicted for tonight and tomorrow. It was predicted that a comet would collide with one of the planets.

**procedure (n)** – a set of actions that is the official or accepted way of doing something; an order or method of doing something: You must follow correct procedure at all times. For example, procedures are designed to teaching someone how to make or do something. The two parameters of a synthesis procedure that researchers should be most concerned with are its effectiveness and efficiency. A synthesis procedure has two parts: a database of building blocks and an algorithm that uses this database for synthesis.

**property(ies) (n)** – a quality in a substance or material, especially one that means that it can be used in a particular way; a property is also a particular physical or chemical characteristic of a substance: One of the properties of copper is that it conducts heat and electricity very well. We value herbs for their taste, but we forget that they also have medicinal properties.

**receipt (n)** – something such as a piece of paper or message proving that money, goods, or information have been received: More retailers are switching to email receipts instead of paper. Goods will be delivered on receipt of payment (= after the money is received).

**relationship (n)** – the way in which two things are connected or work together (CONNECTION): Write an essay on the economic relationship between farming and transportation. Scientists have established the relationship between lung cancer and smoking. **Relationship between something (and something):** This research shows that the relationship between globalization and e-commerce is complex and varied.

**seek (sought, sought) (v)** – 1. to try to find or get something, especially something that is not a physical object (SEARCH): "Are you actively seeking jobs?" she asked.; 2. to try to do something (TRY): They sought to reassure the public. **Seek someone/something out** (phrasal verb with seek) – to look for someone or something, especially for a long time until you find him, her, or it: While he was at the library, Steve decided to seek out some information on the history of the area.

**spreadsheet (n)** – an electronic document in which information is arranged in rows and columns, and can be used to do financial calculations and plans; a piece of computer software used for showing rows and columns of numbers or other data, and for doing calculations with this data: The spreadsheet automatically calculates the per cent change to the value of my portfolio. She said the friend had downloaded a spreadsheet of student information from an administration computer.

**support (v)** – 1. something that shows that a fact is true (PROOF): This new evidence lends support to the theory. He produced charts and graphs in support of his argument.; 2. to agree with and give encouragement to someone or something because you want him, her, or it to succeed (ENCOURAGE): My father supported the Labour Party all his life. The majority of people in the town strongly support the plans to build a new school. I think it's important to support local businesses by buying locally. [ + obj + to infinitive]: We will always do our best to support our students to succeed.

**test (n)** – 1. a way of discovering, by questions or practical activities, what someone knows, or what someone or something can do or is like: The class are doing/having a spelling test today; 2. a medical examination of part of your body in order to find out how healthy it is or what is happening: The doctors have done some tests to try and find out what's wrong with her; 3. an act of using something to find out if it is working correctly or how effective it is: The new missiles are currently undergoing tests; 4. a situation that shows how good something is: The new missiles are currently undergoing tests.

**trial (n)** – a test, usually over a limited period of time, to discover how effective or suitable something or someone is: They're doing clinical trials on a new drug. They've employed her for a six-month trial (period). You can have the equipment on a trial basis (UK also on trial), and if you don't like it you can give it back. **Trial and error** – a way of achieving an aim or solving a problem by trying a number of different methods and learning from the mistakes that you make: There's no instant way of finding a cure - it's just a process of trial and error. **Trial run** – a practical test of something new or unknown to discover its effectiveness: We're holding a tournament in the new ice-hockey stadium, as a trial run for next year's Winter Olympics. **Blind trial** – a scientific test in which either the people being tested

or the person testing them, or both, do not know what is being tested. The opposite of a blind trial is an open trial. There are two levels of the treatment, "drug", and "placebo", administered to "male" and "female" patients in a double blind trial.

**troubleshoot** (v) – to discover why something does not work effectively and help to improve it; to try to find the cause of a product or system not working correctly, especially one involving a piece of equipment or machine, and try to find the solution: Service technicians will continue to learn about and troubleshoot the equipment. They brought me in to troubleshoot - to go in, sort out the problem, and get out again. This technology naturally involves the integration of communication systems, position and navigation, process engineering, mapping, monitoring and troubleshooting utilities, and control and guidance systems.

**unique** (adj) – being the only existing one of its type or, more generally, unusual, or special in some way: Each person's genetic code is unique except in the case of identical twins. I'd recognize your handwriting anywhere - it's unique. This problem is not unique to learners of English. As many as 100 species of fish, some unique to (= only found in) these waters, may have been affected by the pollution. (*Cambridge Business English Dictionary © Cambridge University Press*)

### Test yourself

**1. Answer the following question:** According to Sherlock Holmes, “One must follow the rules of scientific inquiry, gathering, observing, and testing data, then formulating, modifying, and rejecting hypotheses, until only one remains.” **Did Holmes use the scientific method? Why or why not?**

**2. Answer the following questions:**

1. How can thinking like a scientist help you in problem-solving and career advancement?
2. What is the first step in the scientific method?
3. Why is background research important in the scientific method?
4. What is a hypothesis in the scientific method and what are its characteristics?
5. How can hypotheses be used to make predictions?
6. What is the purpose of designing an experiment in the scientific method?
7. How should experiments be carried out to maintain objectivity and fairness?
8. What should be done if an experiment does a poor job of testing the hypothesis?
9. How can data analysis help evaluate the hypothesis?
10. Why is it important for experiments and results to be replicable?

**3. Answer the following questions choosing the correct answer out of the given ones:**

1. What is the first step in the scientific method?

- a) Formulating a question
- b) Drawing conclusions
- c) Making a hypothesis
- d) Analyzing the data
- e) Carrying out the experiment

2. Why is background research important in the scientific method?

- a) It helps you find an exact answer to your question
- b) It allows you to gain an understanding of the variables to consider in your experiment
- c) It helps you prove your hypothesis
- d) It provides instructions for carrying out the experiment
- e) It helps you analyze the data

3. Which of the following is a characteristic of a good hypothesis?

- a) It is impossible to test
- b) It cannot be disproven
- c) It is based purely on instinct
- d) It provides a definitive answer to the question
- e) It reflects an educated guess

4. What is the purpose of making predictions based on a hypothesis?

- a) To prove the hypothesis
- b) To adjust the hypothesis if necessary
- c) To gather background research
- d) To analyze the data
- e) To determine the variables in the experiment

5. What is the role of an experiment in the scientific method?

- a) To prove the hypothesis
- b) To support the hypothesis
- c) To disprove the hypothesis
- d) To make predictions based on the hypothesis
- e) To gather background research

6. Why is it important to carry out the experiment without bias?

- a) To support the hypothesis
- b) To adjust the hypothesis if necessary
- c) To gather background research
- d) To ensure replicability of the results
- e) To disprove the hypothesis

7. What should be done if an experiment does not test the hypothesis effectively?

- a) Replicate the experiment multiple times
- b) Gather more background research
- c) Redesign the hypothesis
- d) Troubleshoot the experiment and address the issues
- e) Analyze the data and draw conclusions

8. How can data analysis help in drawing conclusions about a hypothesis?

- a) By supporting the hypothesis
- b) By disproving the hypothesis
- c) By identifying trends consistent with the hypothesis
- d) By determining the variables in the experiment
- e) By gathering more background research

9. What makes an experiment or result scientific in nature?

- a) The gathering of background research
- b) The consistent support of the hypothesis
- c) The disproving of the hypothesis
- d) The use of graphs or charts to summarize the conclusions
- e) The ability to replicate the same results each time

10. Why is replicability an important aspect of the scientific method?

- a) It confirms the validity of the results
- b) It ensures consistent data analysis
- c) It allows for multiple versions of the experiment
- d) It helps support the hypothesis
- e) It helps determine the variables in the experiment

## UNIT 3

### NUMBERS, MEASUREMENTS AND GRAPHS

#### Reading numbers

Science can be either **qualitative** or **quantitative**. Qualitative implies a description of the quality of an object. For example, physical properties are generally qualitative descriptions: sulfur is yellow, your math book is heavy, or that statue is pretty. A quantitative description represents the specific amount of something; it means knowing how much of something is present, usually by counting or measuring it. Quantitative expressions are very important in science. Therefore, in this unit we will discuss how we deal with numbers and units, including how they are combined and manipulated.



**Quantities** have two parts: the number and the unit. The number tells “how many.” It is important to be able to express numbers properly so that the quantities can be communicated properly. Let’s start with the simplest task and revise different numerical concepts.

#### I. Warming-up.

##### 1. Translate the following terms:

Digit	Figure	Numeral	Number
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##### 2. What is the difference? Give your ideas.

The word «*digit*» refers to any of Arabic figures from 0 to 9.

The word «*figure*» refers both to a numerical symbol and to the numerical value of a number. It can also denote an amount, the result of calculations, expressed in numbers especially in official documents. It’s figures we use to describe graphs.

A *numeral* is a name used for denoting a number. Numerals can be in the form of any symbols denoting a number. It’s common in linguistics.

The word «*number*» refers to quantity or amount (in various fields of application) or a position in a series. It is one of the main concepts in mathematics. One of the meanings of the word "number" is "numeral". Because of that, the word "number" can be used in many cases where the word "numeral" is meant.

##### 3. Check yourself:

1. The \_\_\_\_\_ 345 contains three \_\_\_\_\_.
2. (In bank) Write the amount in both words and \_\_\_\_\_.
3. The unemployment rate is now in double \_\_\_\_\_.
4. The anticipated inflation \_\_\_\_\_ is lower than last month's.

5. It's been \_\_\_\_\_ one in the charts for six weeks.
6. The document \_\_\_\_\_ is in the top left-hand corner.
7. There are two groups of \_\_\_\_\_ in English: cardinal numbers and ordinal numbers.

## II. Reading.

### Cardinal and Ordinal Numbers

1. Look at the following numerals. What type of numbers are they? Spell them first and then write down your answers in words.

8	11	16	88	137	1793	1002589	342876285
---	----	----	----	-----	------	---------	-----------

2. Read the rules about how to read, write cardinal numbers and check your answers.

1. To avoid misunderstandings with certain similar-sounding cardinal numerals, always stress the correct syllable when pronouncing them.

- **Thirteen** (13) → **Thirty** (30)
- **Fourteen** (14) → **Forty** (40)
- **Fifteen** (15) → **Fifty** (50)
- **Sixteen** (16) → **Sixty** (60)
- **Seventeen** (17) → **Seventy** (70)
- **Eighteen** (18) → **Eighty** (80)
- **Nineteen** (19) → **Ninety** (90)

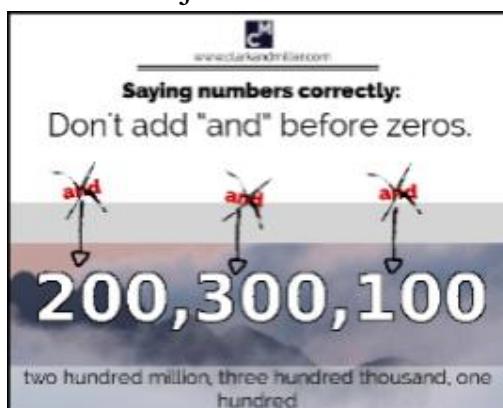
2. Compound numerals (numbers consisting of two words) from 21-99 should be hyphenated.

- We invited **twenty-five** people to the dinner.

3. For higher numerals, we can add ‘**and**’ between the second last word and the final word.

- **He requested nine hundred and ten plates.**
- **Where did you get all four hundred and fifty-five of these?**

This doesn’t work if there are just zeros after the hundred:



You can ignore this rule entirely if you prefer American English.

4. Don't make "one hundred," "one thousand," etc., plural! Just remember, when we're saying a big number, the numbers are not pluralized:

So don't say

4,000 — "four thousands"

Say:

4,000 — "four thousand"

5. "One hundred" or "a hundred" — it doesn't really matter

100 = "one hundred" or "a hundred"

1,000 = "one thousand" or "a thousand"

1,000,000 = "one million" or "a million"

Yay, freedom!

### Team work

1) Write 10 different cardinal numbers of your own in digits and ask your partner to read and write them in words.

2) Write 10 different cardinal numbers of your own in words and ask your partner to read and write them in digits.

3. Look at the following numerals. What type of numbers are they? Spell them first and then write down your answers in words.

1 <sup>st</sup>	11 <sup>th</sup>	18 <sup>th</sup>	60 <sup>th</sup>	53 <sup>d</sup>	195 <sup>th</sup>	138646	200058
						9 <sup>th</sup>	2453 <sup>d</sup>

4. [Watch the video](#) and write down the rules on how to read and write ordinal numbers. Check your answers.

5. Watch the video again and write down all the cases of using ordinal numbers. Give your own examples for each case.

### Team work

1) Write 10 different ordinal numbers of your own in digits and ask your partner to pronounce and express them in words.

2) Write 10 different ordinal numbers of your own in words and ask your partner to pronounce and express them in digits.

OK! Now we are ready to move to

**Fractions, Decimals, Radicals, Exponents**

**1. Match the following terms with numbers in the box: fraction, decimal, radical (root), exponent (power).**

0.692	$11^3$	$\frac{1}{2}$	$\sqrt{125}$	$579^{-10}$	$\sqrt[3]{32}$	$5\sqrt{4}$	$138^n$	$6\frac{8}{15}$	284.00569

**2. Watch the video and write down the rules on how to read these numerical concepts.**

### 3. Read the numbers.

Remember!

To say **mixed fractions**, we say the **whole number** first followed by “*and*” and finally the **fraction number**.

$$2 \frac{3}{4} = \text{two and three fourths /quarters}$$

In English it's **decimal point** (.) that separates whole and fractional parts in decimals. **Commas** (,) separate *thousands* in large whole numbers.

$$12.025 = \text{twelve point zero two five}$$

$$12,025 = \text{twelve thousand and twenty five}$$

Not other way around!

If a number after decimal point repeats itself forever, just say “**recurring**”.

$$0.666666 \dots = \text{zero point six recurring}$$

Sometimes, more than one number repeats itself over and over. In this case, just say the pair of numbers that repeat themselves and add “**recurring**.”

$$12.131313131313 \dots = \text{twelve point one three recurring}$$

### Team work

**1) Write 10 different numbers (fractions, decimals, roots and powers) of your own in digits and ask your partner to pronounce and express them in words.**

**2) Write 10 different numbers (fractions, decimals, roots and powers) of your own in words and ask your partner to pronounce and express them in digits.**

Ok! Now it's time for us to move to the next stage and go through some

### Mathematical operations, equations, expressions

as well as various math symbols. We will practice the most basic of them. Remember, it's English not math we are doing here!

How many basic maths operations do you know? What are they?

### 1. Match the terms and the equations.

Addition	Subtraction	Multiplication	Division
$10 * 10 = 100$	$2 + 2 = 4$	$99 : 9 = 11$	$5 - 3 = 2$

**2. Write down the equations in words. Several ways are possible.**

**3. Watch the video and correct your answers.**

What are the terms for the result in addition (subtraction, multiplication, division)?

**4. Give Russian equivalents:**

**Sum (total)** = augend + addend

**Difference** = minuend – subtrahend;

**Product** = multiplicand (factor) \* multiplier (factor);

**Quotient (fraction / ratio)** = dividend / divisor.

**Team work**

**Give equations of your own (4 in words and 4 in digits). Ask your partner to read and write them. Check the answers.**

**Maths expressions and equations** can be very complex. They can contain:

- **Numbers**, such as 1, 5, or 3.14
- **Variables**, such as x, y, or z
- **Operations**, such as +, -, \*, / (addition, subtraction, multiplication, division)
- **Functions**, such as  $f(x)$  or  $g(x, y)$
- **Grouping symbols**, such as () or [] or {} (**parentheses / round brackets and brackets / square brackets, braces/ curly braces**)

**5. What is the difference between mathematical expressions and equations?**  
**Give your ideas. Watch the video and check your answer.**

**6. Look at the following numerical concepts. Which of them are maths expressions, equations? Give your ideas on how to read them. Write down your answers.**

$\frac{x}{y}$	$4x$	$x + y$	$x^2y^2$	$(x+y)$	$\frac{x+7}{y+x^2}$	$2^{y*5}$	$\frac{11+x}{x^3} + 2x(5-x)$	$1=11+2(5 - x)$
---------------	------	---------	----------	---------	---------------------	-----------	------------------------------	-----------------

**7. Watch the video and check yourselves. Pay attention to the way letters are pronounced.**

**Team work**

**Give expressions and equations of your own (4 in words and 4 in digits). Ask your partner to read and write them. Check the answers.**

## Inequalities

There are also different types of **inequalities** that are common in science.  
Try to read them out loud:

$x \neq 5$	$x > 5$	$x < 5$	$x \geq 5$	$x \leq 5$	$x \approx 5$
------------	---------	---------	------------	------------	---------------

1. Write down your ideas.
2. [Watch the video](#) and check your answers.

## Team work

Give inequalities of your own (6 in words and 6 in digits). Ask your partner to read and write them. Check the answers.

## Calculus

And of course, scientists use different types of **calculus** in their work like

Limits                  Logarithms                  Derivatives                  Integrals  
and others. Let's look at some examples.

1. Think on how to read them and write down your ideas. Use the list of pronunciation of mathematical expressions in the end of the unit.

$\lim_{n \rightarrow 0} f(x)$	$\lim_{x \rightarrow 2^-} \sqrt[3]{x}$	$\lim_{x \rightarrow -1^+} e^x$
-------------------------------	--	---------------------------------

$\frac{dy}{dx}$	$\frac{dv}{dr}  _{r=1}$	$\frac{d}{dx} (x^2 + 1)$	$\frac{d}{dx} (\log_a x) = \frac{1}{x \ln a}$	$\frac{d}{dx} \left( \frac{dy}{dx} \right) = \frac{d^2 y}{dx^2}$
-----------------	-------------------------	--------------------------	---	--

$f'(x) = \sin x - x$	$h'' = (1)$	$S'''(t)$	$f^n(x)$
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$\int_0^{\frac{\pi}{2}} 2\pi x \cos x dx$	$\int t dt$	$\int_{t1}^{t2}  v(t)  dt$	$\lim_{n \rightarrow \infty} \sum_{i=1}^n 2x_i \Delta x = \int_0^{100} 2x dx = x^2 \Big _0^{100}$
---	-------------	----------------------------	---

2. [Watch the video](#) and check your answers.

## Team work

- 1) Why does the author of the video think that it is important to know how to verbally express questions or ideas in calculus? Do you agree or disagree with her statement. Explain your point and give your own ideas.
- 2) Give your own equations in calculus (3 in words and 3 in digits). Ask your partner to read and write them. Check the answers.

### 3. Fill in the table with all the maths symbols you have learnt in this part.

Notation / symbol	Description	Example	Reads
+	Addition	$a + b$	"a plus b" "the sum of a and b"

### 4. Continue the table with the other symbols that are common in your field of science.

### 5. Match the terms under *a* and their Russian equivalents in *b*.

- a) calculus, variable, radical (root), mathematical operation, equation, count, limit, numeral, logarithm, quantitative, derivative, express, integral, inequality, difference, mathematical expression, grouping symbol, mixed fraction, parentheses / round brackets, numerator, multiplication, brackets / square brackets, calculate, function, ordinal number, operator, decimal, sum (total), remainder, addition, fraction number, subtraction, division, recurring, comma, whole number, product, (common) fraction, exponent (power), cardinal number, digit (figure), quotient (fraction / ratio), number, (decimal) point, qualitative, present, denominator
- b) знаменатель, переменная, корень, уравнение, порядковое числительное, оператор, целое число, лимит (предел), числительное, логарифм, количественный, выражать, интеграл, неравенство, частное, математическое выражение, произведение, степень, смешанная дробь, числитель, качественный, считать, умножение, квадратные скобки, вычислять, представлять, функция, символ группирования, разность, десятичная дробь, сумма, исчисление, сложение, дробное число, вычитание, деление, математическое действие, в периоде, запятая, производная, (простая) дробь, количественное числительное, цифра, остаток, число, круглые скобки, (десятичная) точка

## Expressing Units

A number **indicates** “how much,” but the **unit** indicates “of what.” The “of what” is important when communicating a **quantity**. For example, if you were to ask a friend how close you are to Lake Erie and your friend says “six,” then your friend isn’t giving you complete information. Six what? Six miles? Six inches? Six city blocks? The actual distance to the lake depends on what units you use. In this part, we will talk about **measurements**, **systems of units**, which are used in different countries.

## I. Warming-up.

- 1) You can only officially run a mile in three countries, what are they? What system of units do they use?
- 2) What other systems of measurements do you know?

1. [Watch this video](#) and check your answers.

2. Watch the video again and answer the following questions:

1. What **physical quantities** are mentioned in the video?
2. What units are used **to measure temperature, length and weight (mass)** in **Metric system? In Imperial system?**
3. What are the advantages of the Metric system?

## II. Reading.

**Read and translate the text:**

Much of the work scientists do involves measuring - things like the mass, volume, or length of a substance or object. Because scientists must be able **to communicate** their measurements to each other all over the world, they need to speak the same measurement language. This language is the **SI (Standard International) system of measurement**, commonly referred to as the **metric system**. There are actually minor differences between the SI and metric systems, but for the most part, they're **interchangeable**.

SI specifies certain units for various types of **physical quantities**, based on seven **fundamental units** for various quantities, namely meter (symbol m, the unit of **length**), kilogram (kg, **mass**), second (s, **time**), ampere (A, **electric current**), kelvin (K, **thermodynamic temperature**), mole (mol, **amount of substance**) and candela (cd, **luminous intensity**). Metric system though uses gram (g) for mass, **degree Celsius** ( $^{\circ}\text{C}$ ) for temperature and liter (L) instead of cubic meter ( $\text{m}^3$ ) for volume.

The SI and metric systems both are decimal systems. That means they use powers of 10 **to modify** the **base units** to make them more conveniently sized for a **specific quantity**. A **numerical prefix** can be placed in front of any unit **to increase or decrease** its size by some factor of 10.

Prefix	Symbol	Meaning	Prefix	Symbol	Meaning
Yotta-	Y	$10^{24}$	Yocto-	y	$10^{-24}$
Zetta-	Z	$10^{21}$	Zepto-	z	$10^{-21}$
Exa-	E	$10^{18}$	Atto-	a	$10^{-18}$
Peta-	P	$10^{15}$	Femto-	f	$10^{-15}$
Tera-	T	$10^{12}$	Pico-	p	$10^{-12}$

<b>Prefix</b>	<b>Symbol</b>	<b>Meaning</b>	<b>Prefix</b>	<b>Symbol</b>	<b>Meaning</b>
Giga-	G	$10^9$	Nano-	n	$10^{-9}$
Mega-	M	$10^6$	Micro-	$\mu$	$10^{-6}$
Kilo-	k	$10^3$	Milli-	m	$10^{-3}$
Hecto-	h	$10^2$	Centi-	c	$10^{-2}$
Deka-	da	$10^1$	Deci-	d	$10^{-1}$

The only rule when using metric prefixes is that you cannot “double them up.” For example, if you have measurements in petameters ( $1 \text{ Pm} = 10^{15} \text{ m}$ ), it is not proper to talk about megagigameters, although  $10^6 \times 10^9 = 10^{15}$ . In practice, the only time this becomes a bit confusing is when discussing masses. As we have seen, the base SI unit of mass is the kilogram (kg), but metric prefixes need to be applied to the gram (g), because we are not allowed to “double-up” prefixes. Thus, a thousand kilograms ( $10^3 \text{ kg}$ ) is written as a megagram ( $1 \text{ Mg}$ ) since

$$10^3 \text{ kg} = 10^3 \times 10^3 \text{ g} = 10^6 \text{ g} = 1 \text{ Mg}.$$

Incidentally,  $10^3 \text{ kg}$  is also called a metric ton, abbreviated t. This is one of the units outside the SI system considered **acceptable** for use with SI units.

In addition to the **fundamental units**, SI also allows for **derived units** which can be expressed as **algebraic combinations** of the base units. The choice of base quantities (units) is somewhat arbitrary, as long as they are independent of each other and all other quantities (units) can be derived from them. Typically, the goal is to choose physical quantities that can be measured **accurately** to a high **precision** as the base quantities. The reason for this is simple. Since the derived units can be expressed as algebraic combinations of the base units, they can only be as **accurate** and **precise** as the base units from which they are derived.

You are probably already familiar with some derived quantities that can be formed from the base quantities. For example, the geometric concept of **area** is always calculated as the product of two lengths. Thus, area is a derived quantity that can be expressed in terms of SI base units using square meters ( $\text{m} \times \text{m} = \text{m}^2$ ). Similarly, **volume** is a derived quantity that can be expressed in cubic meters ( $\text{m}^3$ ). **Speed** is length per time; so in terms of SI base units, we could measure it in meters per second ( $\text{m/s}$ ). **Volume mass density** (or just **density**) is mass per volume, which is expressed in terms of SI base units such as kilograms per cubic meter ( $\text{kg/m}^3$ ). **Angles** can also be thought of as derived quantities because they can be defined as the ratio of the arc length subtended by two radii of a circle to the radius of the circle. This is how the **radian** is defined. Depending on your background and interests, you may be able to come up with other derived quantities, such as the **mass flow rate** ( $\text{kg/s}$ ) or **volume flow rate** ( $\text{m}^3/\text{s}$ ) of a fluid, **electric charge** (As), **mass flux density** [ $\text{kg}/(\text{m}^2 \text{ s})$ ], and so on.

Derived units are commonly expressed in lowercase letters. Although most of them are formed by combining base units, there are only 22 derived units with **distinct** names. However, there are more than 100 other units that are expressed in **relation** to the base units. If a unit is named after a person, it's symbol typically starts with an uppercase (capital) letter. Some examples of derived units that are named after individuals are the **watt**, **hertz**, and **coulomb**, which are abbreviated as W, Hz, and C, respectively. On the other hand other examples of derived units include **cubic meters** ( $m^3$ ), **meters per second** (m/s), mentioned above, and **joule per kelvin** (J/K).

In addition to base and derived units, the metric system also includes several other units that are neither base units nor derived units. These units are included in the metric system either because they are multiples or fractions of SI units, or because they serve practical purposes. Some of the non-SI units that are allowed in the metric system are: minute (min), hour (h), day (d) – for time; **astronomical unit** (au) – for length; **degree** ( $^\circ$ ), minute ('), second ("') – for **plane angle**; **hectare** (ha) – for area; **litre (liter)** – for volume; **tone** – for mass; **electronvolt** (eV) – for **energy**; **bel (decibel)** (B, dB) – **logarithmic unit** (ratio).

While most of the countries of the world currently use the metric system, three countries - the United States as well as it's former colonies Liberia, and Myanmar (Burma) - still use the **imperial measurement system** to this day. The imperial measurement system or the imperial weight system was the system of measurements that was officially used in Great Britain from 1824 to the time they switched over to the metric system in the year 1965. British still commonly use the old system in day-to-day life though. **The United States Customary System** (USCS) includes units for measuring length, weight, capacity, area, volume, and temperature and they are just slightly different from the imperial ones.

The imperial system is non-decimal one, which makes it quite a task **to convert** units between each other and systems as well. Despite the debates that have taken place in Congress and a number of acts on uniformity accepted through the years, the US still has not officially adopted the metric system. The reasoning behind the United States continuing to use the imperial measurement system goes back to the Industrial Revolution in the country. Since the imperial system was in place during that time, the machinery in factories and the training of workers were based on this system. Converting to the metric system now would be both time-consuming and expensive for American businesses and citizens. According to some, using the imperial system also sets apart the United States as a great leader. It's: "There are two kinds of countries – those that use the metric system and those that have landed on the moon" - this kind of nationalism that doesn't allow to switch. Finally, the imperial system has a long history in the US and people there

are used to it, and it makes sense for them. If you tell them that it is 40 degrees Celsius outside today, it never makes sense for them, as you would say it is 104 degrees Fahrenheit. Nonetheless, the USA does use the metric system especially in science and medicine but it's still voluntary rather than mandatory though.

**1. Answer the following questions:**

1. How many systems of units are mentioned in the text? What are they?
2. How many base units are there in the SI system? List them.
3. What is derived unit? List derived units that were mentioned.
4. What other derived units do you know?
5. What is the difference between a base unit and a derived unit?
6. What is the difference between a base (derived) quantity and a base (derived) unit?
7. What are the non-SI units that are allowed in the metric system?
8. What is the official title of the unit system used in the USA?
9. What letters are used to express different units in SI system?
10. What are the reasons behind the USA continuing to use the imperial measurement system?

**2. Decide whether these statements are true or false:**

1. The SI system metric system and Imperial system do have slight differences but mainly they are interchangeable systems.
2. There are base units and derived units in both SI and metric systems.
3. Metric system includes 7 derived units only.
4. There is no difference between a physical quantity and a unit.
5. Angles can also be thought of as derived quantities because they can be defined as the ratio of the arc length subtended by two radii of a circle to the radius of the circle.
6. Density is a ratio of mass to cubed length.
7. The symbols for fundamental units are expressed in capital letters.
8. Minute and second are the units of time only.
9. Degree is the unit for temperature only.
10. The USA doesn't have any rational reason for opposing SI system. They are just stubborn and old fashioned.

**3. Watch the video on Imperial system. Match the quantities and symbols.**

yd, lb, oz, gal, mil,  $^{\circ}\text{F}$ , st, in, ft, pt,  $\text{ft}^2$

Length	
Weight	
Fluid	
Surface area	
Temperature	

What new information have you learnt from the video?

**4. Find English equivalents in the text.**

Передавать измерения; система СИ (международная стандартная); метрическая система; по большей части; взаимозаменяемые; физические величины; основные (базовые) единицы измерения; длина; ампер; электрический ток; кельвин; моль; количество вещества; кандела; сила света; градус Цельсия, для изменения базовых единиц; конкретное количество; числовой префикс; приемлемый; производные единицы измерения; алгебраические комбинации; площадь; объем; скорость; объемная массовая плотность (плотность); угол; радиан; массовый расход; объемный расход жидкости; электрический заряд; плотность потока массы; выражать строчными буквами; различные названия; в соотношении; ватт; герц; кулон; джоуль; служить практическим целям; астрономическая единица; электронвольт; логарифмическая единица; имперская система измерений; Обычная система Соединенных Штатов (USCS); по Фаренгейту; преобразовывать (переводить) единицы измерения друг в друга; обоснование; принимать (адоптировать); отнимать много времени; добровольный, а не обязательный

**5. Fill in the table of derived units, named after certain scientists. Check pronunciation of Greek letters with the Greek alphabet table at the end of the unit.**

*Derived units, named after certain scientists.*

Physical quantity	Russian equivalent	Quantity symbol	SI Unit	Unit Symbol	Expression in SI base units
frequency					
force					
pressure					
energy (all forms)					
power					

<b>Physical quantity</b>	<b>Russian equivalent</b>	<b>Quantity symbol</b>	<b>SI Unit</b>	<b>Unit Symbol</b>	<b>Expression in SI base units</b>
electric charge					
electric potential difference					
electrical capacitance					
electrical resistance					
electrical conductance					
magnetic flux					
magnetic induction					
inductance					
activity (of a radionuclide)					
absorbed dose					
dose equivalent					
Celsius temperature					

**Russian equivalents:** активность радиоактивного источника, электропроводимость, мощность, магнитный поток (поток магнитной индукции), разность потенциалов (напряжение), индуктивность, частота, сопротивление, температура Цельсия, сила, магнитная индукция, поглощенная доза ионизирующего излучения, энергия, эквивалент дозы ионизирующего излучения, электрический заряд, давление, электроёмкость.

**Quantity symbols:** H, ν, D, f, F, G, E, ζ, V, P, Q, E, p, η, C, W, B, U, φ, L, R, M, A, t, Φ.

**SI Units:** herts, sievert, newton, pascal, gray, joule, henry, watt, becquerel, farad, siemens, ohm, weber, volt, tesla, degree Celsius, coulomb.

**Unit symbols:** C, Hz, T, °C, N, J, W, V, F, S, Wb, H, Bq, Ω, Gy, Pa, Sv.

**Expression in SI base units:**  $\text{m}^2\text{s}^{-2}$ ;  $\text{kg s}^{-2}\text{A}^{-1}$ ;  $\text{kg m}^2\text{s}^{-2}\text{A}^{-1}$ ;  $\text{kg m}^{-1}\text{s}^{-2}$ ,  $\text{kg m}^2\text{s}^{-3}\text{A}^{-1}$ ;  $\text{K}$ ,  $\text{A}^2\text{s}^3\text{kg}^{-1}\text{m}^{-2}$ ;  $\text{kg m}^2\text{s}^{-2}$ ;  $\text{s}^{-1}$ ;  $\text{kg m}^2\text{s}^{-3}$ ;  $\text{A s}$ ;  $\text{kg m s}^{-2}$ ;  $\text{A}^2\text{s}^4\text{kg}^{-1}\text{m}^{-2}$ ;  $\text{kg m}^2\text{s}^{-3}\text{A}^{-2}$ ;  $\text{kg m}^2\text{s}^{-2}\text{A}^{-2}$ ;  $\text{s}^{-1}$ ;  $\text{m}^2\text{s}^{-2}$ .

### Team work

- 1) Look at the table. Is it possible to give standard formulas using the information given? Complete the task for each quantity.
- 2) What other derived units do you know? Continue the table with 5 more examples.

**3) Does your field of study use any SI or metric units? List them.**

**4) Give examples of units, which are specific for your branch of science only.**

**6. Look at the table of metric prefixes given in the text. Read the prefixes paying attention to the pronunciation.**

What prefixes are commonly used in your field of study?

**7. The following times are given in seconds. Use metric prefixes to rewrite them so the numerical value is greater than one but less than 1000.**

For example,  $7.9 \times 10^{-2}$  s could be written as either 7.9 cs or 79 ms.

- (a)  $9.57 \times 10^5$  s; (b) 0.045 s; (c)  $5.5 \times 10^{-7}$  s; (d)  $3.16 \times 10^7$  s.

**8. The following lengths are given in meters. Use metric prefixes to rewrite them so the numerical value is bigger than one but less than 1000.**

For example,  $7.9 \times 10^{-2}$  m could be written either as 7.9 cm or 79 mm.

- (a)  $7.59 \times 10^7$  m; (b) 0.0074 m; (c)  $8.8 \times 10^{-11}$  m; (d)  $1.63 \times 10^{13}$  m.

**9. The following masses are given in kilograms. Use metric prefixes on the gram to rewrite them so the numerical value is bigger than one but less than 1000.**

For example,  $7 \times 10^{-4}$  kg could be written as 70 cg or 700 mg.

- (a)  $3.8 \times 10^{-5}$  kg; (b)  $2.3 \times 10^{17}$  kg; (c)  $2.4 \times 10^{-11}$  kg; (d)  $8 \times 10^{15}$  kg; (e)  $4.2 \times 10^{-3}$  kg.

**10. Give 5 problems of your own using units specific for your branch of science if possible.**

### **Visualizing data and interpreting graphs**

For the scientist it is essential to know how to produce and interpret different types of visuals to both obtain or present data. Visual devices such as diagrams, charts, graphs and tables are a convenient way of displaying large quantities of information in a form that is easy to understand. This part explains and practices the language connected with these devices.

#### **I. Warming – up.**

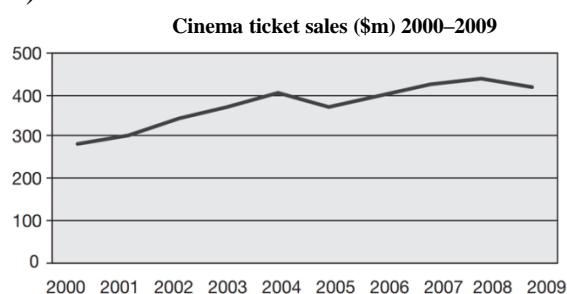
**1. Below are examples of some of the main types of visuals used in academic texts.**

**Complete the table below to show the main use (a–f) and the example (A–F) of each type.**

Uses: (a) location (d) structure (b) comparison (e) changes in time (c) proportion (f) statistical display

Types	Uses	Example
1 Diagram		
2 Table		
3 Map		
4 Pie chart		
5 Bar chart		
6 Line graph		

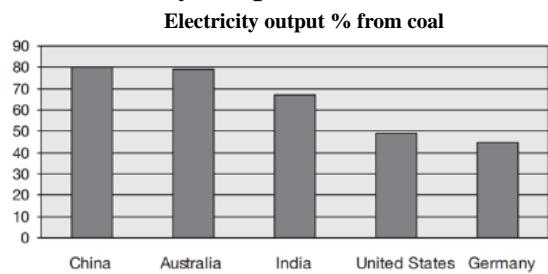
(A) Cinema ticket sales



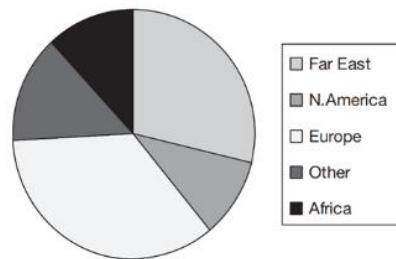
(B) Average life expectancy (in years)

Japan	81.6
France	79.0
United States	77.1
South Korea	75.5
Ghana	57.9
South Africa	47.7
Kenya	44.6
Zimbabwe	33.1

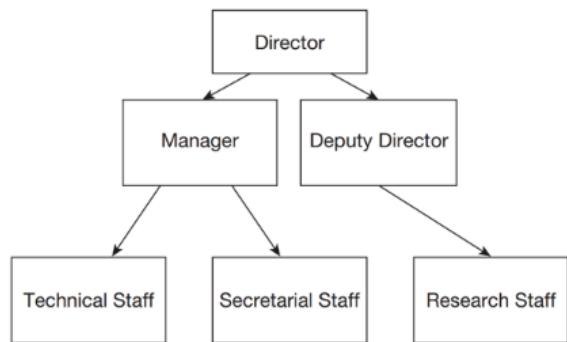
(C) Electricity output from coal



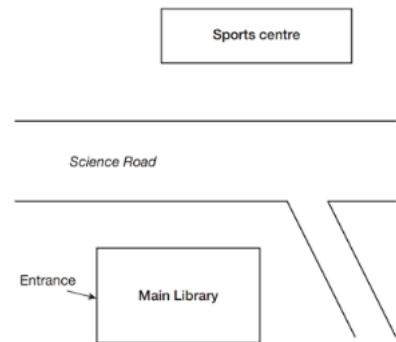
(D) Origins of international students



(E) Organisation of the research unit



(F) Position of the main library



## **II. Reading.**

**Read the following text and check your answers for the previous task.**

### **Types of graphs**

To organize and visualize data scientists use different tools like **tables**, **diagrams**, **charts** and **graphs** of various forms. The type of table, chart or graph used is determined by what the researcher wants to **illustrate** and the type of test used to **obtain** the results. Let's discuss this in more detail.

While many people use 'graph' and 'chart' interchangeably, they are different visuals. Charts are tables, diagrams or pictures that organize large amounts of data clearly and concisely. People use charts to interpret current data and make predictions. So, charts are all about showing trends, patterns, or relationships.

A table with data arranged in columns and rows is one of the most common and detailed type of charts that shows how independent and dependent variables interact. In a table, readers can look up exact values, compare those values between pairs or groups of related measurements, look at ranges and intervals, and select specific factors to search for patterns.

Next, there are different types of diagram, like **network diagrams** used to show the relationships between different elements in a system or **flowcharts** used to illustrate the flow of a process or system, etc. A diagram is commonly used to illustrate a concept, process, or system. It uses symbols, shapes, and lines to convey information in a clear and concise manner.

The other types of charts include:

- **Bar charts:** used to compare different values or categories. They consist of two axes and bars that represent the data points plotted on the graph.

- **Pie charts:** used to show proportions or percentages in other words they show how a whole is divided into parts. Pie charts are commonly used in biology and other scientific fields to show the proportions of different components in a sample.

- **Scatterplots (Scatter plots):** used to show the relationship between two variables. They consist of two axes and dots that represent the data points plotted on the graph. Scatter plots are often used in astronomy, physics, and chemistry to show the relationship between two variables to help to identify correlations or patterns.

- **Heat maps:** used to show the intensity of data over a geographic area. They consist of a map with colors that represent the data points plotted on the graph. Heat maps are commonly used in fields such as meteorology and oceanography to show the intensity of variables over a geographic area.

**Graphs (line graphs)**, however, focus on raw data and show trends over time. A **graph** specifically refers to a mathematical diagram that showcases the correlation between various numerical data points across a specific time span. Basic data is mainly 2-dimensional and represented through lines, curves, etc. So, all graphs are considered charts, but not all charts can be classified as graphs.

### 1. Give Russian equivalents to the following words and word combinations:

To organize and visualize data; to illustrate; to obtain the results; visuals; chart; to interpret data; to make predictions; to show trends, patterns, or relationships; table; to arrange data in columns and rows; independent and dependent variables; to interact; to look up exact values; to compare values; pairs of related measurements; look at ranges and intervals, to select specific factors, to search for patterns; network diagram; flowchart; bar charts; pie chart; to show proportions or percentage; scatter plot; data point; to identify correlations or patterns; heat maps; intensity of data over a geographic area; line graph; to focus on raw data.

### 2. Identify the type of visual by its description:

A type of chart that consists of two axes and bars used to compare different values or categories	
A mathematical diagram represented through lines and curves that showcases the correlation between various numerical data points across a specific time span.	
A type of visual that includes tables, diagrams or pictures to organize large amounts of data	
A type of diagram used to illustrate the flow of a process or system, etc.	
One of the most common and detailed type of charts with data arranged in columns and rows	
A chart of two axis and multiple dots used to show the relationship between two variables to help to identify correlations or patterns	
A type of visual that uses symbols, shapes, and lines to illustrate a concept, process, or system	
A circle diagram used to show proportions or percentages	
A type of diagram used to show the relationships between different elements in a system	
A type of chart used in meteorology or oceanography to show the intensity of variables over a geographic area	

## Elements of Charts and Graphs

To know how to write graphs, you must first identify different elements.

### 1. Fill in the following table matching the terms, Russian equivalents (A) and definitions (B):

Term	Russian equivalent	Definition
Data point	точка данных	an individual piece of information plotted on a chart or graph, representing a specific value for a given variable
Axis		
Legend		
Label		
Scale		
Gridlines		
Interval		
Caption		
Trendline		
Title		

A) Ось, название, интервал, масштаб, легенда, линия тренда, подпись, линии координатной сетки, метка.

B)

- the range of values represented on an axis, indicating the minimum and maximum values in a given dataset;
- a brief, descriptive heading at the top of a chart or graph that provides an overview of the data and helps readers understand the main idea of the visual representation;
- a chart component that explains what various colors or symbols used to represent different data points mean. It helps readers understand how to interpret a graph easily;
- the space or distance between markers on a scale or axis, often representing regular units or increments;
- refers to the horizontal (x-axis) or vertical (y-axis) lines on a chart or graph that help indicate the scale and context of the data being displayed;
- a line that indicates the general direction or trend, often drawn by connecting data points or using statistical methods to find the best fit;
- a word or phrase that identifies a specific element of a chart or graph, such as the x-axis, y-axis, or data series;
- horizontal and vertical lines that divide a chart or graph into smaller sections to make it easier to read and interpret the data;
- an explanation or description written beneath an image illustrating information about it.

## Describing the graph

Having the appropriate vocabulary is essential in order to create a clear and concise description. Below, we will provide some useful vocabulary related to graphs.

Verb	Adverb	Verb	Adjective + noun
Grow	Slightly	Drop	A slight drop
Rise	Gradually	Fall	A gradual fall
Increase	Steadily	Decrease	A steady decrease
Climb	Sharply	Decline	A sharp decline

Also: a peak, to peak, a plateau, to level off, a trough

**1. Study the graph below and complete the discretion with phrases from the table above:**

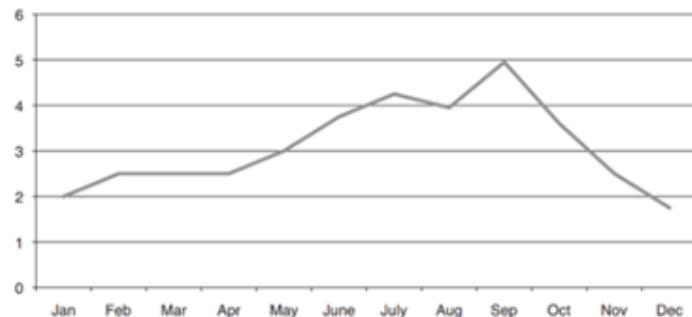


Fig.1. Inflation January – December

The graph that the rate of inflation was 2 per cent in January, and then (a) \_\_\_\_\_ to 2.5 per cent in February. After that it (b) \_\_\_\_\_ until April, and then (c) \_\_\_\_\_ (d) \_\_\_\_\_ to over 4 per cent in July. Inflation fell (e) \_\_\_\_\_ in August, but (f) \_\_\_\_\_ to a (g) \_\_\_\_\_ of 5 per cent in September. Subsequently, it (h) \_\_\_\_\_ (i) \_\_\_\_\_ to below 2 per cent in December.

Although visuals do largely speak for themselves, it is common to help the reader interpret. However, to merely go through the statistics is quite boring. Therefore, it is important to comment briefly on their main features or characteristics.

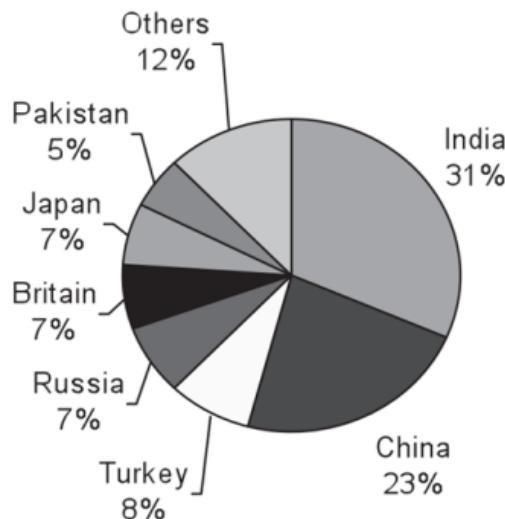
graph	shows	the changes in the price of oil since 1990.
The map	illustrates	the main sources of copper in Africa.
diagram	displays	the organisation of both companies.

**2. Read the following descriptions of the chart below. Which is better, and why?**

1) The chart (Figure 2) shows the quantity the tea consumed by the world's leading tea consuming nations. India and China together consume more than half the word's tea production, with India alone consuming one third. Other significant tea

consumers are Turkey, Russia and Britain. “Others” includes the United States, Iran and Egypt.

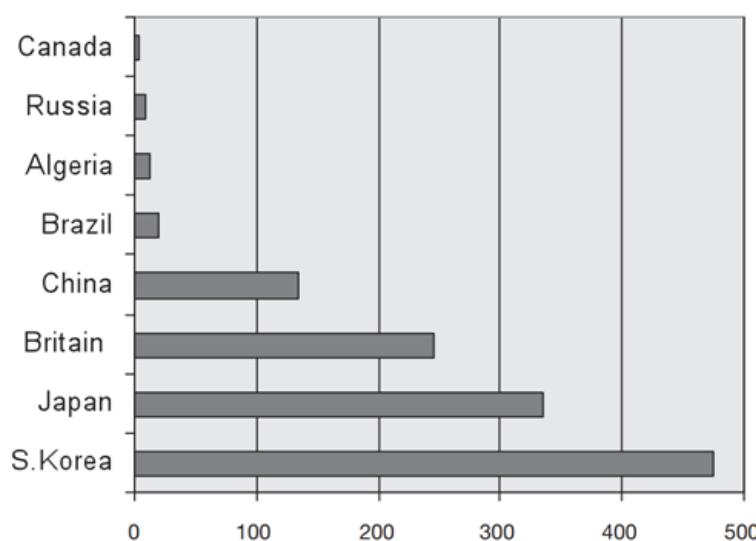
2) The chart (Figure 2) shows that 31 per cent of the world’s tea is consumed by India, 23 per cent by China, and 8 per cent by Turkey. The fourth largest consumers are Russia, Japan and Britain, with 7 per cent each, while Pakistan consumes 5 per cent. Other countries account for the remaining 12 per cent.



*Fig. 2. World tea consumption*

### 3. Complete the chart below:

The bar chart (Figure 3) shows population (a) \_\_\_\_\_ in a varieties of countries around the world. It (b) \_\_\_\_\_ extreme contrast (c) \_\_\_\_\_ crowded nations such as South Korea (people per sq. km) and much (d) \_\_\_\_\_ such as Canada (3 people per sq. km). Clearly, climate plays a major (e) \_\_\_\_\_ in determining population density, (f) \_\_\_\_\_ the least crowded nations (g) \_\_\_\_\_ to have extreme climates (e.g. cold in Russia, dry in Algeria)



*Fig. 3. Population density (people per sq. km.)*

**4. Complete the following description of the table below (one word per gap):**

Table 1. Projected population changes in various European countries 2010 – 2050 (millions)

Country	Population 2010	Projected population 2050	Change
France	62	67	+5
Germany	82	71	-11
Italy	60	57	-3
Poland	38	32	-6
Portugal	10.7	10	-0.7
Russia	140	116	-24
Spain	45	51	+6
UK	61	72	+11

The table (a) \_\_\_\_\_ the projected population changes in (b) \_\_\_\_\_ European countries (c) \_\_\_\_\_ 2010 and 2050. It can be seen that in a (d) \_\_\_\_\_ the population is expected to fall, in some cases (e.g. Germany and Russia) quite (e) \_\_\_\_\_. However, the population of France, (f) \_\_\_\_\_ and the UK is predicted to increase, in the case of the last two by more (g) \_\_\_\_\_ 10 per cent.

You may also find it helpful to use the following expressions and phrases in your description of charts and graphs:

- As we can see from the chart/ graph...
- It's worth noting that...
- According to the data presented in this graph, ...
- The diagram of this bar chart shows us that...
- This pie chart clearly illustrates/ provides information on/ represents how...
- Taking a closer look at the line graph, one can observe...
- There was a significant increase/ decrease/ rise/ fall/ jump/ drop/ spike/ plunge/ sharp dive/ slump/ growth...
- During/ outside/ between 20xx – 20yy or From Month X until Month Y... etc.
- From the data presented, we can conclude that...
- The figures demonstrate/ reveal/ indicate/ show/ suggest that...
- It is interesting to note/ highlight/ emphasize...

**5. Watch the video from IELTS Academic Writing on describing trends. Make a list of vocabulary used to describe a graph. Complete the exercises given. Describe the line graph presented in the video in 150 words.**

**6. Write the paragraph commenting on the data in the table below:**

Table 2. Student survey of library facilities: % students rating facilities as good

Library facilities	Undergraduates (%)	Postgraduates (%)
Opening hours	72	63
Staff helpfulness	94	81
Ease of using electronic catalogue	65	87
Availability of working space	80	76
Café area	91	95
Availability of short loan stock	43	35
Quality of main book stock	69	54

***Reading Mathematical Expressions***

Symbol	Reading
<b>Real numbers</b>	
$x + 1$	$x$ plus 1
$x - 1$	$x$ minus 1
$x \pm 1$	$x$ plus or minus 1
$xy$	$x$ times $y$ ; $x$ multiplied by $y$ ; $x$ by $y$ ; $xy$
$\frac{x}{y}$ ; $x/y$	$x$ over $y$ ; $x$ divided by $y$
$\frac{1}{2}; \frac{1}{3}; \frac{1}{4}; \frac{1}{10}$	a (one) half; a (one) third; a quarter\ one fourth; one tenth
$\frac{5}{2}; \frac{2}{3}; \frac{7}{10}$	five halves; two thirds; seven tenths
$x = y$	$x$ equals $y$ ; $x$ is equal to $y$ ; $x$ is $y$
$x \neq y$	$x$ is not equal to $y$ ; $x$ is different from $y$
$x \equiv y$	$x$ is equivalent to $y$ ; $x$ is identical with $y$
$x > y$	$x$ is (strictly) greater than $y$ ; $x$ is (strictly) bigger than $y$
$x \geq y$	$x$ is greater (bigger) than or equal to $y$
$x < y$	$x$ is (strictly) less than $y$
$x \leq y$	$x$ is less than or equal to $y$
$0 < x < 1$	zero is less than $x$ is less than 1
$0 \leq x \leq 1$	zero is less than or equal to $x$ is less than or equal to 1
$ x $	absolute value of $x$ ; $x$ mod; $x$ modulus
$\ x\ $	norm of $x$
$x^2$	$x$ squared
$x^3$	$x$ cubed
$x^4$	$x$ (raised) to the power (of) four; $x$ to the 4 <sup>th</sup> power; $x$ to the four
$x^n$	$x$ to the $n$ -th (power); $x$ to the power (of) $n$
$x^{-n}$	$x$ to the (power of) minus \ negative $n$
$\sqrt{x}$	(the square) root of $x$ ;

Symbol	Reading
$\sqrt[3]{x}$	cube / cubic root (of) $x$
$\sqrt[4]{x}$	fourth root (of) $x$
$\sqrt[n]{x}$	$n$ -th root (of) $x$
$(x + y)^2$	$x$ plus $y$ all squared
$(x / y)^2$	$x$ over $y$ all squared
<b>Calculus / functions</b>	
$f(x)$	$f$ $x$ ; $f$ of $x$ ; the function $f$ of $x$
$f'(x)$	$f$ prime / dash(ed); the (first order) derivative of $f$ with respect to $x$
$f''(x)$	$f$ double-prime $x$ / $f$ double dash $x$ ; the second (order) derivative of $f$ with respect to $x$
$f'''(x)$	$f$ triple – prime $x$ / $f$ triple dash $x$ ; the third (order) derivative of $f$ with respect to $x$
$f^{(4)}(x)$	$f$ four $x$ ; the fourth (order) derivative of $f$ with respect to $x$
$\frac{d}{dx} f$	$d$ by $dx$
$d_x f$	$d$ $x$ $f$ ; (the) partial (derivative) of $x$ with respect to $f$
$\frac{\partial f}{\partial x}; \frac{\partial f}{\partial x}$	the partial (derivative) of $f$ with respect to $x$ ; $df$ by $dx$ ; $df$ over $dx$
$\frac{d^2 f}{dx^2}$	the second partial (derivative) of $f$ with respect to $x$ ;
$\int_0^\infty x$	(the) integral from zero to infinity (of) $x$
$\iint_a^b f(s) ds$	(the) double integral from $a$ to $b$ (of) $f(s)ds$
$\iiint_a^b f(s) ds$	(the) triple integral from $a$ to $b$ (of) $f(s)ds$
$\lim_{n \rightarrow \infty} f(x)$	(the) limit of $f$ of $x$ as $n$ approaches (tends / goes to) infinity
$\lim_{n \rightarrow +0} f(x)$	(the) limit of $f$ of $x$ as $n$ approaches (tends / goes to) 0 from above / from more positive side
$\lim_{n \rightarrow -0} f(x)$	(the) limit of $f$ of $x$ as $n$ approaches (tends / goes to) 0 from below / from more negative side
$\log_e y$ ; $\ln y$	log(arithm) $y$ to the base $e$ ; log(arithm) to the base $e$ of $y$ ; log(arithm) in base $e$ of $y$ ; natural log(arithm) of $y$
$f: U \rightarrow V$	$f$ from $U$ to $V$
<b>Sets</b>	
$x \in A$	$x$ belongs to $A$ ; $x$ is an element (a member) of $A$ ; $x$ in $A$
$A \cup B$	$A$ cup $B$ ; $A$ join $B$ ; $A$ union $B$
$A \cap B$	$A$ cap $B$ ; $A$ meet $B$ ; $A$ intersect $B$
$A \subset B$	$A$ is contained in $B$ ; $B$ is a subset of $A$
$A \supset B$	$A$ contains $B$ ; $B$ is a subset of $A$

Symbol	Reading
A \ B	A minus B; the difference between A and B
A × B	A cross B; the Cartesian product of A and B
<b>Miscellaneous</b>	
$\sum_{k=1}^n k^2$	sum $k$ equals 1 to $n$ of $k$ squared; sum for $k$ (running) from 1 to $n$ of $k$ squared; summation $k$ from 1 to $n$ of $k$ squared
$\prod_{k=1}^n \frac{2k+1}{2k+2}$	product $k$ equals 1 to $n$ of $2k+1$ over $2k+2$ ; product for $k$ (running) from 1 to $n$ of $2k+1$ over $2k+2$
$\tilde{x}$	$x$ tilde
$\bar{x}$	$x$ bar
$\hat{x}$	$x$ hat
$x_i$	$x$ sub(script) $i$ ; $x$ suffix $i$
$x_i^j$	$x$ $j$ $i$ ; $x$ super $j$ sub $i$ [if $j$ is an index not an exponent!]
!n	$n$ factorial
sin, cos, tg, cotg	sine / sinus, cosine / cosinus, tangent, cotangent
Re (z); Im (z)	real part of $z$ ; imaginary part of $z$
5%	five percent
30 °	thirty degrees
∃	there exist
∀	for all

Reference: David Hall, Tim Bowyer. Mathematics. Nucleus: English for Science and Technology. London: Longman Group Limited, 1980.100 P.

You can also watch this video for more details: [List of mathematical symbols in English](#).

### Greek alphabet:

Greek Letter	English Name	Phonetic pronunciation	Russian Name
A, α	Alpha	['ælfə]	альфа
B, β	Beta	['bi:tə]	бета
Γ, γ	Gamma	['gæmə]	гамма
Δ, δ	Delta	['deltə]	дельта
E, ε	Epsilon	['epsələn], BrE [ep'sailən]	эпсилон
Z, ζ	Zeta	['zertə], ['zi:tə]	дзета
H, η	Eta	['eitə], ['i:tə]	эта
Θ, θ	Theta	['θeitə], ['θi:tə]	тхэта
I, ι	Iota	[ai'outə]	иота
K, κ	Kappa	['kæpə]	каппа
Λ, λ	Lambda	['læmdə]	лямбда
M, μ	Mu	[mju:], [mu:]	мю
N, ν	Nu	[nju:], [nu:]	ню
Ξ, ξ	Xi	[zai], [sai], [ksi:]	кси
O, ο	Omicron	['əmɪkrən], ['oumɪkrən]	омикрон

Greek Letter	English Name	Phonetic pronunciation	Russian Name
$\Pi, \pi$	<i>Pi</i>	[pai]	<i>nu</i>
$\mathrm{P}, \rho$	<i>Rho</i>	[rou]	<i>ro</i>
$\Sigma, \varsigma$	<i>Sigma</i>	['sɪgmə]	<i>сигма</i>
$\mathrm{T}, \tau$	<i>Tau</i>	[tɔ:], [tou]	<i>may</i>
$\mathrm{Y}, \upsilon$	<i>Upsilon</i>	['ju:pse:lən], [jup'sailən], ['ʌpsələn]	<i>иpsilon</i>
$\Phi, \phi$	<i>Phi</i>	[faɪ]	<i>фи</i>
$\mathrm{X}, \chi$	<i>Chi</i>	[kai]	<i>xu</i>
$\Psi, \psi$	<i>Psi</i>	[(p)sar], [psi:]	<i>ncu</i>
$\Omega, \omega$	<i>Omega</i>	['oumɪgə], [ou'meɪgə]	<i>омега</i>

### Pronunciation (Video)



## UNIT 4

### HISTORY OF COMPUTER AND THE INTERNET

#### I. Warming - up.

**1. Comment on the quotations about Technological Progress below. Which of them do you like most? Why?**

1. “Anything we think we know today in relation to AI will change tomorrow.” – **Roger Spitz**

2. “What you were taught 10-20 years ago is fast becoming obsolete. Upskill yourself and recreate your world” – **Nicky Verd**

3. “There are no restrictions or barriers for preventing someone from becoming an addict to a technological device.” – **Asa Don Brown**

4. “If we can progress from arrowheads to the internet, why can’t we progress from violence to peace?” – **Janet Turpin Myers**

5. “Technology and innovation may aid, speed, support and even prolong the human race - but only love and compassion can save it.” – **Rasheed Ogunlaru**

6. “We need machines, but more than that we need humans who know how to use those machines for the greater good.” – **Abhijit Naskar**

7. “The reality is that AI is there to act as a supplement to human life and expand our capacities.” – **Abhijit Naskar**

8. “The science of today is the technology of tomorrow.” – **Edward Teller**

#### II. Words to learn.

**1. Look at these words. What words do you already know? Translate the sentences.**

1. **access** ['æksəs] (**n / v**) – доступ, обращение (напр. к базе данных); иметь доступ, получить доступ

You need a password to get access to the computer system. He used a browser to access a website.

2. **advantage** [əd've:ntidʒ] (**n**) – преимущество; выгода, польза

**take advantage of smth** – воспользоваться чем-л.

**disadvantage** [,disəd've:ntidʒ] (**n**) – недостаток; ущерб; невыгодное положение

Internet connection via broadband offers many advantages. Each of these systems has its advantages and disadvantages. Whichever option we choose there will be disadvantages. I thought I would take advantage of the sports facilities there.

3. **apply** [ə'plai] (v) – использовать, применять; прилагать, прикладывать  
**application** [,æpli'keiʃn] (n) – приложение, прикладная программа (сокр. app); применение, использование

**application program** – прикладная программа, приложение

**interactive application** – интерактивное приложение; интерактивная прикладная программа

**run an application** – запустить (использовать) приложение

Scientific discoveries are often applied to industrial processes. This invention will have a wide range of applications in industry. This operating system can integrate other applications. Application programs use the services of the computer's operating system and other supporting programs. On other operating systems, finding good apps can be even more difficult. Check this option if you want to run the application with a different priority. You can run several applications at the same time.

4. **available** [ə'veiləbl] (adj) – доступный; имеющийся в наличии, наличный

**availability** [ə'veilə'biliti] (n) – доступность; наличие; готовность; возможность использования

The book you ordered is not available. Is the manager available just now? We estimate the relationship between students' educational achievement and the availability and use of computers at home and at school.

5. **contribute** [kən'tribju:t] (v) – способствовать, содействовать; делать вклад

**contribution** [,kəntri'bju:(f)(ə)n] (n) – вклад; содействие

**make a contribution to smth** – сделать вклад во что-либо

This book contributes little to our understanding of the subject. He made a very positive contribution to the success of the project.

6. **data** ['deitə] (n) – данные; информация; сведения

**database** ['deitəbeis] (n) – база данных

The computer can manipulate massive amounts of data. We are trying to create our own computerized database.

7. **develop** [di'veləp] (v) – разрабатывать, развивать, совершенствовать

**developer** (n) – разработчик

**development** (n) – разработка, развитие, совершенствование

**under development** — (находящийся) в процессе разработки

The company is spending \$650 million on developing new products/technology. The course is designed to develop your writing skills. The company is a leading software developer. The company was at the forefront of computer development. The new system is still under development.

8. **digit** ['dɪdʒɪt] (**n**) – цифра; разряд

**digital** ['dɪdʒɪtl] (**adj**) – цифровой

**digital form** – цифровая форма

**analog** ['ænəlɔ:g] **form** – аналоговая форма

The number 345 contains three digits. Converting an entire CD to digital format and downloading it to an MP3 player takes only about 10 to 15 minutes. Telephone lines carry data in analog form.

9. **dimension** [dai'menʃn] (**n**) – размер; величина; объем

**give a dimension to smth** – придавать размах (масштаб) чему-либо

**take the dimensions of smth** – измерить что-либо

A room has three spatial dimensions: length, height and width. Computer design tools work in three dimensions. This gives an important international dimension to the project.

10. **distribute** [di'stribju:t] (**v**) – распределять, распространять

**distribution** [,distri'bju:ʃn] (**n**) – распределение, распространение

Viruses are often distributed via email. We have many distribution channels for our software, including electronic distribution.

11. **diverse** [dai've:s] (**adj**) – разнообразный, разный

**diversity** [dai've:siti] (**n**) – разнообразие, многообразие

My interests are very diverse. There is a wide diversity of views on this subject.

12. **emerge** [i'mə:dʒ] (**v**) – появляться, возникать

**emergence** [i'mə:dʒ(ə)ns] (**n**) – появление, возникновение

The Internet emerged in the United States in the 1970s. This can lead to the emergence of new technologies.

13. **equal** ['i:kwəl] (**adj / v**) – равный, одинаковый; равняться

**equally (adv)** – в равной степени; равным образом, одинаково

There is an equal number of boys and girls in the class. Five and five equals ten. This job could be done equally well by a computer.

14. **hardware** ['ha:dweə] (**n**) – (аппаратное) оборудование, аппаратные средства; железо, технические средства, техническое обеспечение

**software** ['sɔftweə] (**n**) – программное обеспечение

**application software** – прикладное программное обеспечение

**system software** – системное программное обеспечение

The hardware inside the machine expresses arithmetical and logical relations. Can you load the new software for me?

15. **involve** [in'vɔlv] (**v**) – быть связанным, вовлекать

**involvement** [in'vɔlvmənt] (**n**) – вовлечение

The test involves simple calculations, such as addition and subtraction. The project needs full involvement from all members of the group.

16. **maintain** [mein'tein] (v) – обслуживать; содержать в исправности; поддерживать, удерживать, сохранять

**maintenance** ['meint(ə)nəns] (n) – текущее обслуживание; текущий ремонт; (техническое) обслуживание; эксплуатация (системы); сопровождение (напр. системы программного обеспечения); сохранение

The company has done a poor job of maintaining its computer network. A large house costs a lot to maintain. Our principle task is to maintain law and order. The network will be down for an hour for routine maintenance. The purpose of the UN is the maintenance of international peace and security.

17. **medium** ['mi:dɪəm] (pl.) **media** (n) – средство, способ; среда

Television can be a medium for giving information and opinions.

18. **perform** [pə'fɔ:m] (v) – выполнять, производить

**performance** [pə'fɔ:məns] (n) – выполнение, исполнение; работа, функционирование; (рабочая) характеристика; производительность

We usually ask interviewees to perform a few simple tasks on the computer just to test their aptitude. This device improves the system performance.

19. **process** ['prəʊses] (n / v) – процесс, способ, метод; обрабатывать; перерабатывать

**processing** (n) – обработка; технологический процесс, технология

**data processing** – обработка данных

**word processing** – обработка текстов

**processor** (n) – процессор (аппаратное устройство или обрабатывающая программа); узел обработки

**word processor** – текстовой процессор (программа подготовки и редактирования текста)

It is a normal part of the learning process. Its job is to develop new products and processes. The image is processed digitally by computer software. The berries are processed into juice. We've got a computer, but I only use it for word processing. What word processor do you have on your computer?

20. **retrieve** [ri'tri:v] (v) – отыскивать; извлекать (информацию)

**retrieval** (n) – поиск; извлечение (информации)

**data retrieval** – поиск данных; извлечение данных

Computers are used to store and retrieve information efficiently. The system allows quick storage and retrieval of data.

**2. Read and guess what the words in bold type mean. Then look the words up to make sure that you have guessed right.**

1. The whole process is **run and monitored** by computer. 2. He spends all day **playing on** his computer. 3. You'll need to download and **install the program** on your computer. 4. To **run the program**, simply click the icon. 5. She uses a **computer program** to produce these maps. 6. **The program locks** the keyboard until a password is given. 7. The details of today's flights are **displayed** on the monitor. 8. The pages are designed to be viewed on a **computer monitor**. 9. We included the costs of monitor, keyboard, mouse and **speakers**. 10. The security staff can see all the outside of the building on their **CCTV monitors**. 11. The company has **established** its first manufacturing base in Europe. 12. They used these streams to **generate power** for the mill. 13. Solar **power generation** is greatly affected by cloud cover. 14. The invention would have a wide **range of applications** in industry. 15. What are the **practical applications** of this work? 16. Take care when using old **electrical equipment**. 17. They have installed state-of-the-art medical equipment to help improve early diagnosis of the condition. 18. Most people use their phones **to access the internet**. 19. You should regularly change the password you use **to access** your online accounts. 20. This command **deletes** files from the directory.

**4. Make up your own sentences with active words/word-combinations.**

**5. Mind the pronunciation of the following international words. Compare them with Russian words with the same roots:**

Mechanical [mə'kænɪkl], command [kə'ma:nd], design [dɪ'zain], electromagnets [ɪ'lektrəʊmægnət], major ['meɪdʒə(r)], calculation [,kælkju'leɪʃn], transistor [træn'zistə(r)], arithmetic [ə'rɪθmətik], accelerate [ə'k'seləreit], circuit ['sɜ:kɪt], relay ['ri:leɪ], technology [tek'nɒlədʒi], monitor ['mɒnɪtə(r)], technique [tek'ni:k], microprocessor [,maɪkrəʊ'prəsesə(r)].

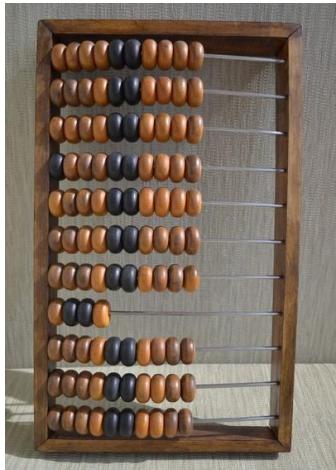
### **III. Reading.**

**1. Read the text and answer the questions.**

1. What is the main point of computing?
2. Can an abacus be considered the first computer?
3. When was the first general-purpose electronic computer constructed?
4. What was the distinguishing feature of ENIAC?
5. What were the disadvantages of First Generation computers from the technical point of view?
6. Why do you think the computers were top-secret at that time?

7. Who contributed much to the development of computers?
8. What date marked the beginning of Second Generation computers? What was it connected with?
9. What made Third Generation computers different from previous ones?
10. What indicated the start of a variety of microelectronic devices?
11. What are the differences between the fourth and fifth generations of computers?
12. How did the second-generation minicomputers differ from the first minicomputers?
13. Are all modern digital computers conceptually similar?
14. How do these abbreviations stand for: ENIAC, IBM, ABC, ICs, CPU, PC, VLSI, ULSI, AI?

### **What is a computer?**



In its most basic form, a computer is any device that aids humans in performing various kinds of computations or calculations. In that respect the earliest computer was the abacus, used to perform basic arithmetic operations.

Every computer supports some form of input, processing, and output. This is less obvious on a primitive device such as the abacus where input, output and processing are simply the act of moving the pebbles into new positions, seeing the changed positions, and counting.

That is the whole point of computing. We input information; the computer processes it according to its basic logic or the program currently running, and outputs the results.

Modern computers do this electronically, which enables them to perform a vastly greater number of calculations or computations in less time. Despite the fact that we currently use computers to process images, sound, text and other non-numerical forms of data, all of it depends on nothing more than basic numerical calculations. Graphics, sound, etc. are merely abstractions of the numbers being crunched within the machine; in digital computers these are the ones and zeros, representing electrical on and off states, and endless combinations of those. In other words, every image, every sound, and every word have a corresponding binary code.

While abacus may have technically been the first computer most people today associate the word “computer” with electronic computers which were invented in the last century and have evolved into modern computers we know of today.

## **First Generation Computers (1940s – 1950s)**

First electronic computers used vacuum tubes, and they were huge and complex. The first general purpose electronic computer was the ENIAC (Electronic Numerical Integrator and Computer), built during World War II specifically for computing values for artillery range tables. It was digital, although it did not operate with binary code, and was reprogrammable to solve a complete range of computing problems. It was programmed using plugboards and switches, supporting input from an IBM card reader, and output to an IBM cardpunch. It took up 167 square meters, weighed 27 tons, and consuming 150 kilowatts of power. It used thousands of vacuum tubes, crystal diodes, relays, resistors, and capacitors. ENIAC was the most powerful calculating device built to that date. It was the first programmable general-purpose electronic digital computer. Hungarian-American mathematician Von Neumann along with Alan Turing was one of the conceptual inventors of the stored-program digital computer.

The first non-general-purpose computer was ABC (Atanasoff–Berry Computer), and other similar computers of this era included German Z3, ten British Colossus computers, LEO, Harvard Mark I, and UNIVAC.

## **Second Generation Computers (1955 – 1960)**

The second generation of computers came about thanks to the invention of the transistor, which then started replacing vacuum tubes in computer design. Transistor computers consumed far less power, produced far less heat, and were much smaller compared to the first generation, albeit still big by today's standards.

The first transistor computer was created at the University of Manchester in 1953. The most popular of transistor computers was IBM also created the first disk drive in 1956, the IBM 350 RAMAC. Finally, in 1964, IBM released the 360 series, made up of computers that were characterized by running the same software in different combinations of speed, capacity and price. It also implemented the commercial use of microprograms, and user-friendly instructions for their use to process many types of data, not just numerical (arithmetic). IBM had two product lines, a “commercial” product line and a “scientific” line, which were unified into one.

## **Third Generation Computers (1960s)**



IBM System/360

The invention of the integrated circuits (ICs), also known as microchips, paved the way for computers as we know them today. Making circuits out of single pieces of silicon, which is a semiconductor, allowed them to be much smaller and more practical to produce. This also started the ongoing process of integrating an ever-larger number of transistors onto a single microchip. During the sixties microchips started making their way into computers, but the process was gradual, and second generation of computers still held on.

First appeared minicomputers, first of which were still based on non-microchip transistors, and later versions of which were hybrids, being based on both transistors and microchips, such as IBM's System/360. They were much smaller, and cheaper than first and second generation of computers, also known as mainframes. Minicomputers can be seen as a bridge between mainframes and microcomputers, which came later as the proliferation of microchips in computers grew.

#### **Fourth Generation Computers (1971 – present)**

First microchips-based central processing units consisted of multiple microchips for different CPU (central processing unit) components. The drive forever greater integration and miniaturization led towards single-chip CPUs, where all of the necessary CPU components were put onto a single microchip, called a microprocessor. The first single-chip CPU, or a microprocessor, was Intel 4004.

The advent of the microprocessor spawned the evolution of the microcomputers, the kind that would eventually become personal computers that we are familiar with today.

#### **Fifth Generation Computers (1981 – present)**

The period of fifth generation is 1980-till date. In the fifth generation, VLSI technology became ULSI (Ultra Large-Scale Integration) technology, resulting in the production of microprocessor chips having ten million electronic components. This generation is based on parallel processing hardware and AI (Artificial Intelligence) software. AI is an emerging branch in computer science, which interprets the means and method of making computers think like human beings. All the high-level languages like C and C++, Java, .Net etc., are used in this generation.

AI includes – Robotics, Neural Networks, Game Playing, Development of expert systems to make decisions in real-life situations, Natural language understanding and generation.

The main features of fifth generation are – ULSI technology, Development of true artificial intelligence, Development of Natural language processing, Advancement in Parallel Processing, Advancement in Superconductor technology,

More user-friendly interfaces with multimedia features, Availability of very powerful and compact computers at cheaper rates.

Some computer types of this generation are – Desktop, Laptop, NoteBook, UltraBook, ChromeBook.

### **First Generation of Microcomputers (1971 – 1976)**



Altair 8800

First microcomputers were a weird bunch. They often came in kits, and many were essentially just boxes with lights and switches, usable only to engineers and hobbyists whom could understand binary code. Some, however, did come with a keyboard and/or a monitor.

It is arguable which of the early microcomputers could be called a first. CTC Datapoint 2200 is one candidate, although it actually did not contain a microprocessor (being based on a multi-chip CPU design instead), and was not meant to be a standalone computer, but merely a terminal for the mainframes. The reason some might consider it a first microcomputer is because it could be used as a de-facto standalone computer, it was small enough, and its multi-chip CPU architecture actually became a basis for the x86 architecture later used in IBM PC and its descendants. Plus, it even came with a keyboard and a monitor, an exception in those days.

However, if we are looking for the first microcomputer that came with a proper microprocessor, was meant to be a standalone computer, and didn't come as a kit then it would be Micral N, which used Intel 8008 microprocessor.

Popular early microcomputers which did come in kits include MOS Technology KIM-1, Altair 8800, and Apple I. Altair 8800 in particular spawned a large following among the hobbyists and is considered the spark that started the microcomputer revolution, as these hobbyists went on to found companies centered around personal computing, such as Microsoft, and Apple.

## **Second Generation Microcomputers (1977 – present)**



Commodore PET2001 (Image by Tomislav Medak licensed under CC-BY-SA).

As microcomputers continued to evolve, they became easier to operate, making them accessible to a larger audience. They typically came with a keyboard and a monitor, or could be easily connected to a TV, and they supported visual representation of text and numbers on the screen.

In other words, lights and switches were replaced by screens and keyboards, and the necessity to understand binary code was diminished as they increasingly came with programs that could be used by issuing more easily understandable commands. Famous early examples of such computers include Commodore PET, Apple II, and in the 80s the IBM PC.

The nature of the underlying electronic components did not change between these computers and modern computers we know of today, but what did change was the number of circuits that could be put onto a single microchip. Intel's co-founder Gordon Moore predicted the doubling of the number of transistors on a single chip every two years, which became known as "Moore's Law", and this trend has roughly held for over 30 years thanks to advancing manufacturing processes and microprocessor designs.

The consequence was a predictable exponential increase in processing power that could be put into a smaller package, which had a direct effect on the possible form factors as well as applications of modern computers.  
[\(<https://www.britannica.com/question/What-is-a-computer>\)](https://www.britannica.com/question/What-is-a-computer)

### **2. Prove or correct the following statements with the facts from the text.**

1. In digital computers every image, every sound, and every word has a corresponding numerical calculation.
2. First electronic computers were reprogrammable to solve a complete range of computing problems.
3. The first general purpose electronic computer was IBM 1401.

4. Transistor computers consumed little power, produced little heat, and were noticeably smaller compared to the first generation.
5. Third generation computers are known as mainframes.
6. Fourth generation computers started in the sixties.
7. The first microcomputer was a standalone computer, with multi-chip CPU architecture, with a keyboard and a monitor.

### **3. Find in the text English equivalents to the following Russian words.**

Выполнять основные арифметические операции; ввод, обработка и вывод; большее количество вычислений; нечисловые формы данных; бесконечные комбинации; соответствующий двоичный код; полный спектр вычислительных задач; потреблял гораздо меньше энергии; проложил путь компьютерам; продолжающийся процесс интеграции; процесс был постепенным; распространение микрочипов в компьютерах; были помещены в один микрочип; породил эволюцию; автономный компьютер; приходят в наборах; проще в эксплуатации; визуальное представление текста; базовые электронные компоненты; увеличение вычислительной мощности.

### **4. Match the words with definitions.**

Computer	a very small piece of a material that is a semiconductor, used to carry a complicated electronic circuit
Abacus	a set of instructions in code that control the operations or functions of a computer
Program	a large, powerful computer, usually the center of a network and shared by many users
Capacitor	an electronic machine that can store, organize and find information, do processes with numbers and other data, and control other machines
Transistor	a frame with small balls that slide along wires
Circuit	a small electronic device used in computers, radios, televisions, etc. for controlling an electric current as it passes along a circuit
Microchips	the complete path of wires and equipment along which an electric current flow
Mainframes	a device used to store an electrical charge

### **5. Match the synonyms given below in a) with b):**

- a) accurate, available, communicate, essential, provide, versatile, perform, facilitate, simultaneously, search for;
- b) look for, contribute, various, significant, accessible, precise, interact, at the same time, accomplish, give.

## **6. Give antonyms of the following words:**

Advantage, available, diverse, input, current, vast, endless, general, create, destroy, ongoing, appear.

## **7. Complete the sentences with the word of a suitable form from the box. Then translate the sentences. One word is extra.**

computations, input, perform, depend on, purpose, generation, replace, device, computer, complex, digital

1. This ... allows deaf people to communicate by typing messages instead of speaking.
2. All the statistical ... were performed by the new software system.
3. The whole process is run and monitored by.... .
4. The software will accept ... from a variety of other programs.
5. A computer can ... many tasks at once.
6. It would ... the circumstances.
7. We live in an increasingly ... world.
8. The same information can be put to many .... .
9. .... technology continues to evolve rapidly.
10. My ... have grown up with the internet.

## **8. Fill the table and learn the words.**

<b>Verb</b>	<b>Noun</b>	<b>Adjective</b>	<b>Adverb</b>
	dependence		
generate			--
			computationally
		productive	
	performance		--
program			
	combination		--
		provided	

## **9. Read the text and give the most suitable title.**

What most of us think of as the Internet is really just the pretty face of the operation – browser windows, websites, URLs, and search bars. But the real Internet, the brain behind the information superhighway, is an intricate set of protocols and rules that someone had to develop before we could get to the World Wide Web. Computer scientists Vinton Cerf and Bob Kahn are credited with inventing the Internet communication protocols we use today and the system referred to as the Internet.

Before the current iteration of the Internet, long-distance networking between computers was first accomplished in a 1969 experiment by two research teams at UCLA and Stanford. Though the system crashed during the initial attempt to log in to the neighboring computer, the researchers, led by Leonard Kleinrock, succeeded in creating the first two-node network. The experiment was also the first test of “packet switching,” a method of transferring data between two computer systems. Packet switching separates information into smaller “packets” of data that are then transported across multiple different channels and reassembled at their destination. The packet-switching method is still the basis of data transfer today. When you send an email to someone, instead of needing to establish a connection with the recipient before you send, the email is broken up into packets and can be read once all of the packets have been reassembled and received.

Cerf and Kahn developed a set of guidelines for data transfer using packet switching in 1980, calling those guidelines TCP/IP, or Transmission Control Protocol and Internet Protocol. The TCP part of the protocol is in charge of packing the data before it moves across the network and unpacking it once it has arrived. The IP component acts as the trip coordinator and maps the movement of information from its start point to its end point. While Kleinrock’s experiment proved that a single network between two computer systems was possible, Cerf and Kahn’s TCP/IP provided the backbone for an efficient and large web of interconnected networks—thus the name “Internet.” Though other protocols were developed and used before TCP/IP, such as the file transfer protocol (FTP) and network control protocol (NCP), the Internet as we know it today is built on the basis of Cerf and Kahn’s “network of networks.”

## **10. Make 5 questions to the text.**

## **11. Read the text, divide it into paragraphs and title each paragraph.**

**Internet** is a publicly accessible computer network connecting many smaller networks from around the world. It grew out of a U.S. Defense Department program called ARPANET (Advanced Research Projects Agency Network),

established in 1969 with connections between computers at the University of California at Los Angeles, Stanford Research Institute, the University of California-Santa Barbara, and the University of Utah. ARPANET's purpose was to conduct research into computer networking in order to provide a secure and survivable communications system in case of war. As the network quickly expanded, academics and researchers in other fields began to use it as well. In 1971 the first program for sending e-mail over a distributed network was developed; by 1973, the year international connections to ARPANET were made (from Britain and Norway), e-mail represented most of the traffic on ARPANET. The 1970s also saw the development of mailing lists, newsgroups and bulletin-board systems, and the TCP/IP communications protocols, which were adopted as standard protocols for ARPANET in 1982–83, leading to the widespread use of the term Internet. In 1984 the domain name addressing system was introduced. In 1986 the National Science Foundation established the NSFNET, a distributed network of networks capable of handling far greater traffic, and within a year more than 10,000 hosts were connected to the Internet. In 1988 real-time conversation over the network became possible with the development of Internet Relay Chat protocols. In 1990 ARPANET ceased to exist, leaving behind the NSFNET, and the first commercial dial-up access to the Internet became available. In 1991 the World Wide Web was released to the public (via FTP). The Mosaic browser was released in 1993, and its popularity led to the proliferation of World Wide Web sites and users. In 1995 the NSFNET reverted to the role of a research network, leaving Internet traffic to be routed through network providers rather than NSF supercomputers. That year the Web became the most popular part of the Internet, surpassing the FTP protocols in traffic volume. By 1997 there were more than 10 million hosts on the Internet and more than 1 million registered domain names. Internet access can now be gained via radio signals, cable-television lines, satellites, and fibre-optic connections as well as the public telecommunications (telephone) network. By 2020 approximately 4.5 billion people, or more than half of the world's population, were estimated to have access to the Internet.

**12. Read the text again and write down the factual information.**

**13. Fill in the gaps in the text with the given words, change them if necessary. One word is extra.**

*Introduce, supplement, display, miniaturization, separate, provide, access, develop, perform, process, connect, contain*

Computer is a programmable machine that can store, retrieve, and (1)... data. Today's computers have at least one CPU that (2)... most calculations and

includes a control unit and an arithmetic logic unit. Main memory is an integral part of the computer but is (3)... from the CPU. Increasingly, personal computers (4)... specialized graphic processors, with dedicated memory, for handling the computations needed to (5)... complex graphics, such as for three-dimensional simulations and games. Auxiliary data storage is usually (6)... by an internal hard disk and may be (7)... by other media such as external hard disks, USB flash drives, or optical drives that use CD-ROMs or DVD-ROMs. Peripheral equipment includes input devices (e.g., keyboard, mouse) and output devices (e.g., monitor, printer), as well as the circuitry and cabling that (8)... all the components. Generations of computers are characterized by their technology. First-generation digital computers, (9)... during and after World War II, used vacuum tubes and were enormous. The second generation, (10)... since 1960, used transistors and were the first successful commercial computers. Third-generation computers (late 1960s and 1970s) were characterized by (11)... of components and use of integrated circuits. The microprocessor chip, introduced in 1974, defines fourth-generation computers.

#### **14. Topics for essays, oral or written reports.**

1. How has technology changed your everyday life?
2. What new "gadgets" do you particularly like?
3. What is your particular area of interest in computer science?
4. How might computers affect your future career?
5. How will computers affect our lives in future?
6. How have computers changed since the first one was introduced in the early 1940s?
7. How has the world benefited from the invention of the PC? What problems have accompanied the computer revolution?
8. How will further advances in computer technology continue to change the world?
9. When and how do you spend your time on the Internet?
10. True or false? Express your opinion.
  - Modern technology is out of control, and ruining the quality of life on Earth; we must limit technology and its influence on individuals.
  - Modern inventions are labor-saving devices. Without them people remain slaves to boring, repetitive work.

#### **15. Watch the video and answer the questions.**

1. What types of computers are there?
2. What is a computer?

3. What is hardware?
4. What is software?
5. What types of personal computers are there?
6. What are the types of OS?
7. What shapes and sizes of computers are there?
8. What is a server? What is its function?

### Test yourself

#### **1. Put the sentences in the chronological order.**

1. The invention of the transistor in 1947 led IBM to reengineer its early machines from electromechanical or vacuum tube to transistor technology. These transistorized machines are commonly referred to as second-generation computers.
2. ENIAC used plugboards for communicating instructions to the machine; this had the advantage that, once the instructions were thus “programmed,” the machine ran at electronic speed.
3. The digital computers of the 1980s and '90s employing LSI (large-scale integration) and VLSI (very large-scale integration technologies) are frequently referred to as fourth-generation systems.
4. An engineer named Vannevar Bush at the Massachusetts Institute of Technology (MIT) developed the first modern analog computer.
5. The UNIVAC I was designed as a commercial data-processing computer, intended to replace the punched-card accounting machines of the day.
6. Computers became smaller and faster and were ubiquitous in the early 21st century in smartphones and later tablet computers.
7. Professor Howard Aiken in collaboration with IBM, developed his first fully functional computer, known as the Harvard Mark I.
8. The invention of the integrated circuit made technologies of the Information Age feasible.
9. A number of computers were completed during and immediately after the war, and all were top secret at that time.
10. Microprocessors are the most-complicated ICs. They are composed of billions of transistors that have been configured as thousands of individual digital circuits, each of which performs some specific logic function.

#### **2. Quiz. What do you actually know about computers and the Internet?**

1. Which of these was the first personal computer?
  - a) Osborne 1
  - b) Apple I
  - c) Apple Lisa
  - d) Altair
2. Which of these was the first supercomputer?

- a) ENIAC
- b) Cray-1
- c) CDC 6600
- d) Sierra

3. In what year was the first text message sent?

- a) 1988
- b) 1983
- c) 1995
- d) 1992

4. Which of these is *not* an early computer?

- a) NASA
- b) SAGE
- c) ENIAC
- d) UNIVAC

5. Which of these allows the user to select a word or phrase from text and thereby access other documents that contain additional information pertaining to that word or phrase?

- a) batch-processing
- b) URLs
- c) hypertext
- d) gateways

6. Which of these is not a computer font?

- a) Times
- b) Windows
- c) Garamond
- d) Helvetica

7. What does the acronym VPN stand for?

- a) visual protocol networking
- b) visual protocol network
- c) virtual private network
- d) visual processing network

8. What technology helps make telephone calls over the Internet possible?

- a) XML
- b) Bluetooth
- c) Ethernet
- d) VoIP

9. A number that uniquely identifies each computer on the Internet is called:

- a) DNS
- b) Gopher
- c) MAC address
- d) IP address

10. Which of these is an example of an integrated circuit?

- a) rectifier
- b) thyristor
- c) sound card
- d) battery

11. What type of electromagnetic waves does Wi-Fi use?

- a) radio waves
- b) infrared waves
- c) gamma rays
- d) microwaves

12. What is WAN an acronym for in computer science?

- a) wide analysis network
- b) wide area network
- c) wide action network
- d) world area network

13. What does the acronym FTP stand for?

- a) file transfer protocol
- b) fast total processing
- c) free transistor protocol
- d) file tripling power

14. Which of these is not one of the early “protocols,” or ways to use the Internet?
- a) Gopher
  - b) Telnet
  - c) blogging
  - d) FTP
15. Which of these was the first microprocessor, developed in 1971?
- a) Intel Pentium
  - b) Intel 8088
  - c) MOS Technology 6502
  - d) Intel 4004
16. A network designed to allow communication within an organization is called:
- a) the World Wide Web
  - b) the Internet
  - c) a browser
  - d) an intranet
17. What device converts digital signals to analog signals?
- a) motherboard
  - b) central processing unit (CPU)
  - c) modem
  - d) transistor
18. What kind of computer is intermediate in size between a laptop and a smartphone and uses a keyboard, a stylus, or a touch screen to input information?
- a) supercomputer
  - b) minicomputer
  - c) tablet computer
  - d) personal computer
19. What does the acronym DNS stand for?
- a) domain network security
  - b) domain number system
  - c) domain name system
  - d) document name system
20. Which of these was the first programmable general-purpose electronic digital computer?
- a) BINAC
  - b) Acorn Network Computer
  - c) ENIAC
  - d) EDVAC
21. Which of these is not a peripheral in computer terms?
- a) motherboard
  - b) monitor
  - c) keyboard
  - d) mouse
22. Who founded Apple Computer?
- a) Sundar Pichai
  - b) Steve Jobs
  - c) Sheryl Sandberg
  - d) Bill Gates
23. Which system, developed in the early 1960s, allowed a computer’s resources to be shared in rapid succession with multiple users?
- a) batch-processing
  - b) command-and-control
  - c) host-to-host interactions
  - d) time-sharing
24. What is packet switching?
- a) a method of transferring data between two computer systems
  - b) the process of making the internet publicly accessible
  - c) word processing
  - d) the practice of long-distance networking

25. What is the name for an Internet with emphasis on social networking and content generated by users, and cloud computing?

- a) Internet 2.0
- b) Web 2.0
- c) Web 3.0
- d) the Social Internet

26. Which allows the user to select a word or phrase from text and thereby access other documents that contain additional information pertaining to that word or phrase?

- a) hypertext
- b) batch-processing
- c) URLs
- d) gateways

27. During which decade did the Internet become visible to the general public?

- a) the 1970s
- b) the 1980s
- c) the 1990s
- d) the 200s

28. What is the TCP/IP?

- a) a set of guidelines for making the Internet accessible to the public
- b) a set of guidelines for data transfer using packet switching
- c) a system that separates information into smaller “packets” of data
- d) the practice of long-distance networking

29. What technology helps make telephone calls over the Internet possible?

- a) Ethernet
- b) Bluetooth
- c) XML
- d) VoIP

30. What simple method of communicating with a computer evolved from such 1960s and 1970s innovations as the tiled screen, the mouse, and the icon?

- a) graphical user interface
- b) full-text search
- c) Web crawlers
- d) email

## UNIT 5

### MAN AND ENVIRONMENT



#### I. Warming up.

1. Listen to the following information and be ready to answer the questions.

1. Who has the greatest effect on the environment?
2. What is a threat to the environment?
3. Why is the balance of nature upset?
4. What else damages the environment?

#### 2. Agree or disagree with the statements. Explain your point of view.

1. Nature is a source of our life.
2. The pollution of the environment doesn't influence the life of animals, plants and humans.
3. Air pollution is one of the most widespread forms of pollution all over the world.
4. We can't prevent air pollution.
5. Air pollution has harmful effects on natural vegetation and human health.
6. Natural resources, both renewable and non-renewable and wildlife are continuously being under threat.
7. Since human populations expand into wild animal habitats, natural wildlife territory is displaced.

#### 3. Comment on the quotations about nature and environment below. Which of them do you like most? Why?

1. "The greatest threat to our planet is the belief that someone else will save it." – **Robert Swan**
2. "Look deep into nature and then you will understand everything better." – **Albert Einstein**
3. "My wish is to stay always like this, living quietly in a corner of nature." – **Claude Monet**
4. "To damage the earth is to damage your children." – **Wendell Berry**
5. "The truth is: The natural world is changing. And we are totally dependent on that world. It provides our food, water and air. It is the most precious thing we have and we need to defend it." – **David Attenborough**
6. "We won't have a society if we destroy the environment." – **Margaret Mead**

7. “The world is not to be put in order. The world is in order. It is for us to put ourselves in unison with this order.” – **Henry Miller**

8. “Earth provides enough to satisfy every man’s need, but not every man’s greed.” – **Mahatma Gandhi**

## **II. Words to learn.**

### **1. Read and guess what the words in bold type mean.**

1. Today humanity is facing numerous environmental **problems**. 2. The **ecological problem** is one of the **pressing** problems of our days. 3. Today the environmental problem has become a **dominant** one. 4. It is necessary to **transform** the wild **natural** environment. 5. That’s not just global warming, is it? 6. Use of water includes agricultural, industrial, household, recreational and environmental **activities**. 7. This can have **fatal** consequences to both the agriculture and ecosystem. 8. Our Earth is our home and it is rich in **natural resources** 9. From a **demographic** point of view, this region has undergone a tremendous change. 10. The **biosphere** is the layer of the Earth in which all life exists. 11. Humid habitats around streams and urban lands look like green **oases**. 12. Earthquakes can negatively affect **economic activities** on the island nation. 13. Some people think that nuclear war would mean the end of **civilization**. 16. Our Earth is our home and it is rich in **natural resources**. 17. **Intensive** development of industry leads to environmental pollution. 18. Now, some of these technologies are opening new possibilities that will **radically** change the way we did things before. 19. The most amazing thing about **nature** is its infinite variety. 20. **Nature** is perfectly balanced. 21. Custom is second **nature**. 22. The consequences of the environmental disaster in this region illustrate the **potential negative effects** from the exploitation of **natural resources**.

### **2. Note the plurals of the following nouns. Name and write down the nouns whose plurals do not follow the general rule.**

<b>Singular</b>	<b>Plural</b>
oasis	oases
thesis	theses
crisis	crises

### **3. Read the words of the Active Vocabulary, look them up and then study the word-combinations and sentences to know how to use them.**

**adversely (adv)** – in a way that has a negative or harmful effect: *adversely done; interpret adversely; adversely interested; effect adversely the strength; to hold adversely to the owner; to affect / to impact adversely*. The release of these toxic chemicals adversely impact ecological processes, wildlife, and human health.

**concerned (adj)** – 1) worried: *to have a concerned look /air/. Concerned parents have complained about the dangerous playground. I'm a bit concerned about / for your health.* 2) involved in something or affected by it: *a concerned person; concerned parties; to be vitally concerned.* Her job is something concerned with a study of viruses. *As far as somebody / something is concerned – to be about a particular thing or person. As far as I'm concerned, I'll study molecular biology.*

**consideration (n)** – the act of thinking about something carefully; a particular subject or fact that needs to be thought about when judging something: *careful / due to / serious consideration; under consideration; on /under/ no consideration; it's of no consideration at all; in consideration of; people of consideration; out of consideration for his age; after due consideration; without consideration; to take into consideration; to leave out of consideration; to show great consideration for somebody; to do something for consideration.* We must *take into consideration* all the factors that people's survival depends upon. We'll take your request *under consideration*. The whole matter needs (to be given) careful *consideration*.

**cosmic (adj)** – 1) relating to the universe and the natural processes that happen in it: *cosmic flight; cosmic research; cosmic radiation / rays / dust / iron.* The earthquake was a disaster of *cosmic scale*. 2) great: a *cosmic thinker*; of *cosmic importance*; this is not so *cosmic* after all. The discovery caused a *cosmic shift* in people's views of the world.

**current (adj / n)** – (adj) of the present time: *current thinking; current week; current affairs; current position; current trend; current realities; the words which are not current in English.* This word is no longer in *current use*. (n) – a movement of water, air, or electricity in a particular direction: *to swim against/with a current; to carry current.* He was swept out to sea by the strong *current*. Electric *current* is the passage of electricity through a wire.

**depletion (n)** – a reduction in something; becoming and making smaller or less: *ozone depletion.* The obtained data include the survey of the atmospheric ozone and its trends, including seasonal ozone *depletion* in the polar regions.

**desert (n)** - an area, often covered with sand or rocks, where there is very little rain and not many plants: *barren desert; arid / dry desert; to reclaim a*

*desert; a desert island; desert authors.* We had to cross a large area of arid, featureless *desert*.

**disastrous (adj)** – extremely bad or unsuccessful: *disastrous situation / effects / consequences / policy / event / score; disastrous accident.* Overpopulation has been *disastrous* for the planet. It would be *disastrous* to wait.

**drought (n)** – a long period when there is little or no rain: *drought resistance; catastrophic drought; severe drought; drought stress; drought damage; year of drought; blame the drought.* These plants tolerate *drought* well. The crops were damaged by *drought* and extreme heat. The *drought* did severe damage to the harvest.

**earthquake (n)** – a sudden violent movement of the earth's surface, sometimes causing great damage and even deaths: *light earthquake; severe earthquake; disastrous / devastating earthquake; artificial earthquake; earthquake victim; to record an earthquake; a pill to cure an earthquake.* The *earthquake* generated a tsunami.

**environment (n)** – the set of all natural and human-made surroundings that affect individuals, social groupings, and other life, including the air, land, water, and constructed facilities; a) the air, water, and land in or on which people, animals, or plants live: *aquatic environment; to contaminate / pollute environment; to protect / preserve the environment; to clean up environment; abuse of environment.* We're not doing enough to protect the *environment* from pollution. These activities may damage the *environment*. b) the conditions that you live or work in and the way that they influence how you feel or how effectively you can work. This man can't fit himself into our work *environment*. Studies show that if a working *environment* is pleasant, productivity increases. c) the system in which a computer or computer program operates: *software environment.* The company develops large-scale, fully integrated multimedia software *environments* for telephone company networks and cable TV systems.

**essential (adj)** – necessary or needed: *absolutely essential; an essential detail; an essential difference; an essential fault; an essential part; an essential point; essential requirements; essential vitamins; essential foods; be essential to / for.* Water is *essential* for / to living things.

**exert (v)** – to make mental or physical effort, to use power or the ability to make smth. happen: to *exert all one's strength; to exert every effort; to exert oneself; he didn't exert himself much; exert yourself on his behalf; to exert one's intelligence; to exert influence on somebody/something; to exert one's power; to exert a force; to exert pressure on somebody.* Environmental groups are *exerting pressure on* the government to tighten pollution laws. He had to *exert all of his strength* to move the stone.

**existence (n)** – a particular way of life: drab / miserable / wretched *existence*; *to lead a certain / wretched / dangerous nomad existence*; *to go out of existence*; struggle for *existence*; come into *existence*. Air and water are necessary for *existence*. Modern cosmology believes the universe to have come into *existence* about 15 billion years ago.

**flood (n /v)** - a (usually disastrous) overflow of water from a lake or other body of water due to excessive rainfall or other input of water: flash *flood*; great *flood*; raging *flood*; restless *flood*; *flood* victim; *flood* of tears; be in *flood* of tears; shed *floods* of tears; *flood* of rain; ebb and *flood*; *flood* and field; ; to row against the *flood*; at the *flood*; to take at the *flood*; *flood* protection; spring *flood*; annual *flood*. The *flood* took many lives. I found her in *flood* of tears. (v) - to cause, to fill or become covered with water, especially in a way that causes problems: to *flood* arable land. Heavy rains flooded the valley. Japanese cars have *flooded* the market.

**fraught (adj)** – full of unpleasant things such as problems or dangers: *fraught with uncertainty*; *fraught with risks*; *fraught with danger*; *fraught with (grave) consequences*; *fraught with meaning*; look very *fraught*; *be fraught*. The literature is dominated by comparisons of organic and conventional agriculture and interpretation of these studies is *fraught with difficulty*. In fact, it is *fraught with danger*.

**hurricane (n)** – a violent wind that has a circular movement, especially in the West Atlantic Ocean: disastrous *hurricane*; *hurricane* damage; eye of a *hurricane*. The *hurricane* is predicted to reach the coast tomorrow morning.

**impact (n/v)** – (n) – the strong effect or influence that something has on a situation or person: considerable / strong / dramatic *impact*; *to have a destructive impact on smth*. The environmental *impact* of this project will be enormous. (v) – to have a strong effect or influence on a situation or person. Through the effective use of resources we've been able to have a significant *impact* on these processes.

**increasingly (adv)** – more and more: *to play an increasingly important role*, *to be increasingly important/common, increasingly effective*. Every particle of matter is *infinitely divisible*. She thinks that young people today are becoming *increasingly selfish*. We conceive of space as extending *infinitely* in all directions.

**inevitably (adv)** – in a way that cannot be avoided; as is certain to happen. Their arguments *inevitably* end in tears. Travelling *inevitably* makes you more independent and confident Such a large investment *inevitably* entails some risk.

**infinitely (adv)** – very or very much: *to be infinitely obliged /indebted/ to somebody*; game with *infinitely* many strategies; *infinitely* connected; *infinitely* connected domain; *infinitely* divisible element; *infinitely* distant; *infinitely far*; *infinitely large*; *infinitely long*. Further, the classical approach assumes *infinitely* many small charges.

**interfere (with something/somebody) (v)** – to involve yourself in matters connected with other people without being asked or needed; to involve yourself in a situation when your involvement is not wanted or is not helpful: *interfere* with somebody's health; *interfere* with somebody's independence; *interfere in the management*; *don't interfere in his affairs*. The government warned its neighbors not to *interfere* in its internal affairs. Your talking *interferes* with my work! Don't *interfere*, you'll only make things worse. Even a little noise *interferes with* my concentration.

**interference (n)** – an occasion when someone tries to interfere in a situation: *harmful interference*; *inept interference*; *interference in the business of others* / *interference in the affairs of another*; *without outside interference*; *electromagnetic / electronic interference*; *to brook no interference*; *to suppress an interference*. He wanted to live his own life without *interference* from others. We had to allow their research to progress without *interference*. On the radio, television, or telephone, *interference* is noise lines, etc., that prevent a clear sound or picture from being received. The TV picture had a lot of *interference*.

**meet one's needs** – to have all the things you require. The basic needs are food, water and shelter. *To meet one's needs*, one must have all of those things.

**no longer** – in the past but now: *as long and no longer*; *like / love no longer*; *no longer needed*; *no longer required*; *no longer possible*; *no longer observable*; *this is no longer in question*; *be no longer a factor (in)*; *be no longer of school age*; *this is no longer in wear*; *this is no longer the case*. A trip to the Moon is *no longer* a dream.

**perish (v)** – to die, especially in an accident or by being killed, or to be destroyed: *to perish with hunger*; *to perish with thirst*; *to perish from starvation*; *to perish from cold*; *to perish by the sword*; *Perish the man! Perish the thought!* Severe frost *perishes* vegetation. An organism incapable of responding and adjusting to external influence would inevitably *perish*.

**pollution (n)** – damage caused to water, air, soil, etc. by harmful substances or waste: *air / water / environmental pollution*; *pollution abatement*; *noise /sound pollution*; *pollution control*; *pollution of environment*; *to control pollution*. Air *pollution* is a serious health hazard. Stricter controls on *air pollution* will help to reduce acid rain. *Pollution* caused the soil to acidify. Physical *pollution* is pollution associated with changes in the physical parameters of the environment. The company claims it is not responsible for the *pollution* in the river.

**require (v)** - to need something, or to make something necessary: *to require assistance*; *to require medical care*; *to require treatment*; *to require surgery*; *to require courage*; *to require information*; *to require little comment*; *one is not required to be a specialist to...;* jobs that *don't require a sheepskin*; *to require a*

deposit; *to require* major repair; *require* little comment; *require* plain dealing of others; *as the case may require*; *as circumstances may require*, as occasion shall *require*; *when required*; *if required*. Have you got all you require? The situation requires calmness. This plant *requires* plenty of water.

**species (n)** – a set of animals or plants in which the members have similar characteristic to each other and can breed with each other: *human species*; animal species; *plant species*; bird species; montane species; predatory species of mammals; *allied species*; alien species; bridging species; common species; *endangered species*; *endangered species act*; exotic species; extinct species; *species becomes extinct / dies out*; *species survives*; *adaptable species*; *rare species*; big game species; *the origin of species*; *distribution of species*; *abundance of this species*; *trends in abundance and distribution of selected species*; predatory species of mammals; variety of species; *to lump species*; *progress of the species in science*; *blackmail is a species of crime*. There are approximately 8,000 species of ants. The species occurs in vast numbers in this lake. Many plant and animal species are found only in the rainforest.

**suitable (adj)** – right or appropriate for a particular person, purpose, or situation: *suitable to the occasion*; *after a suitable interval*; *eminently suitable*; *suitable to one's rank*; suitable access point; suitable background; suitable condition; suitable font; *a suitable marriage*; *a suitable match*; *to be suitable to /for/ something*; *to find something suitable*; *to make something suitable for something / somebody*. He is a suitable match. We need to find a suitable person for the job. These toys are not suitable for children under five.

**take into account** – to consider or remember something when judging a situation: *to take into complete account*; *take expenses into account*; *take into account circumstances of case*; *take into account the objection raised*; *take into account the considerations of*; *taken into account*; *the work not taken into account*; *fail to take into account*. Both of these possibilities must be taken account. You need to take into account what you should do and what should not. I hope my teacher will take into account the fact that I was ill just before the exams.

**utilization (n)** – the use of something: mission *utilization*; multipurpose *land utilization*; moderate *utilization of natural resources*; *maximum utilization*; *rational utilization*; *utilization of outer space*; *utilization of solar energy*. We must utilize all the tools at our disposal.

#### 4. Translate the following sentences from English into Russian.

1. Microorganisms **require** iron for growth. 2. Some **species** exist in this small area of forest and nowhere else on the earth. 3. It's necessary to improve the collection, archiving and **utilization** of data. 4. The book is **suitable** as a text for a

course in beginning chemistry. 5. **Water pollution** adversely affects spawning. 6. Ecological **pollution** takes place when chemical **pollution**, organic **pollution** or thermal **pollution** is caused by nature rather than by human activity. 7. Air **pollution** also **adversely** affects natural ecosystems, for instance, through damage to plant growth, acidification of waterways, accumulation of mercury in the food chain, all leading to **impacts** on agriculture, fisheries, forests and a host of “ecosystem services” upon which all life depends. 8. Degradation of the **environment** is destroying hundreds of **species** each year. 9. The state of Florida was hit by a **hurricane** that did serious damage. 10. **Pollution** has a **disastrous** effect on the ecology of a region. 11. We need to assess the **impact** on climate change. 12. Dragons have no objective **existence**. 13. The problem of the endangered **species** must also **be taken into account**. 14. When you live in the **desert**, water is your most vital resource. 15. The **impact** of tourism on the **environment** merits attention where tourism **adversely** affects the preservation of declared world heritage sites, or the state of nature reservation and reserves. 16. Today’s lesson **is concerned** with climatic change. 17. If something or someone **interferes with** a situation or a process, it spoils it or prevents its progress. 18. Writing about science at a popular level is a task **fraught** with difficulty. 19. Three hundred people **perished** in the **earthquake**. 20. Animals and plants that cannot survive at higher temperatures eventually *perish*. 21. The panda is becoming an **increasingly** rare animal. 22. As far as biology **is concerned**, it has a glorious past and a great future. 23. Global warming will **adversely** affect the world’s hydrological cycle and result in more **droughts** and **floods**. 24. The **drought** led to an insufficiency of food. 25. The prolonged **drought** did severe damage to crops. 26. Certain chemicals have been banned because of their damaging effect on the **environment**. 27. Many animal **species** are on the brink of extinction. 28. It is sometimes totally impossible to find any **suitable** comeback to the remark. 29. We upgraded the computer to make it **suitable** to our needs.

## 5. Make up your own sentences with active words / word-combinations.

### III. Reading.

#### 1. Read, translate and title the text.

The ecological problem is the global problem of our time. Man is adversely affecting the environment and his activity is sometimes fraught with fatal consequences. Human civilization can inevitably perish as a result of industrial urban, vehicular and demographic pollution of the environment and the depletion of non-renewable natural resources. It is becoming increasingly clear that man cannot and must not use tremendous power so carelessly, infinitely interfere in

nature and radically try to change it, without taking into account possible negative effects of his economic activity. Current ecological research shows that man can turn oases into deserts, threatening to destroy everything on Earth if he continues exerting mostly uncontrolled impact on the biosphere.

In the 19-th century and even in the first half of the 20-th century material production did not require taking into account the consequences which man's interference in nature may have in the distant future and it was not considered an objectively essential condition for the existence of the 20-th century such a consideration is becoming vitally important.

Hence man should carefully study the impact of his activity on various components of the surrounding nature. It is not only possible but necessary to transform the wild natural environment, which often has a disastrous effect on man (earthquakes, typhoons, hurricanes, floods, droughts, magnetic and solar storms as well as radioactivity, cosmic radiation, etc.) into a safe environment suitable for man and meeting his needs. This means that the ecological problem is not simply the problem of man's economic activity, but the problem of turning man's uncontrolled impact on nature into a purposeful and planned interaction with the latter. Of course, the biosphere as a complex system also possesses enormous possibilities for self-regulation. Despite the fact that certain biological species, i.e. individual elements of the biosphere, may become extinct as a result of various impacts thereon, it is still capable on the whole of existing and developing. The impact of industry on the biosphere is compensated for by the inner resources of homeostatic self-organization. Today, however, this impact has reached such proportions that the biosphere's inner resources can no longer compensate for society's harmful influence on the environment, both on individual species and on all of life on earth without help from outside.

The task of mankind is to protect our nature, scientific rational utilization of the environment and to realize different measures on preserving a healthy environment. All this means that at present a pressing necessity has arisen to change the character of the interaction between man and nature. The rational utilization of resources and the conservation of nature are a matter of general state policy in all countries of the world.

## **2. Share your thoughts on the text with your fellow students.**

### **3. Match the words with definitions.**

1. civilization	a. relating to the whole world
2. utilization	b. to affect or change how someone or something develops, behaves or thinks
3. global	c. the power to have an effect on people or things, or a person, or thing that is able to do this
4. affect	d. the whole of the human race, including both men and women
5. non-renewable	e. the stage of human social development and organization that is considered most advanced
6. mankind	f. existing in limited quantities that cannot be replaced after they have all been used
7. influence	g. the act of using something in an effective way

### **4. Name the adjectives having the same root with following nouns and translate them.**

Disaster; care; ecology; environment; harm; purpose; nature; possibility.

### **5. Name the English verbs forming the following nouns and translate them.**

Production; interaction; transformation; radiation; activity; regulation; interference; extinction; depletion; existence; exploration; consideration.

### **6. Match the synonyms.**

- a) current; complicated; effect; enormous; protection; interpret; consider; pure; understand; necessary; adverse; research.
- b) regard; investigation; explain; harmful; clean; realize; complex; essential; present; impact; tremendous; conservation.

### **7. Give antonyms of the following words using appropriate prefixes and suffixes.**

Harmless; controlled; careful; appearance; suitable; infinite; soluble; pure; useful; purposeless; advantage.

### **8. There are some words for "мусор" in English language:**

***rubbish, trash, garbage, waste, litter, junk, debris.*** Do you know the difference between them?

**Trash** (*American English*) – consists of unwanted things or waste material such as used boxes, bags, paper, plastic, empty containers and bottles, and waste food. *Take out the trash, please.* – Убери, пожалуйста, мусор.

If you say that something such as a book, painting, or film is trash, you mean that it is of very poor quality. (INFORMAL)



*Pop music does not have to be trash, it can be art... –* Поп-музыка не обязательно должна подвергаться жесткой критике, она может быть искусством.

**Garbage** (American English) – it is wet, damp rubbish, especially waste from a kitchen. Wet garbage is something that spoils; food waste is most often implied.

*a garbage bag* – пакет для мусора; *rotting piles of garbage* – гниющие кучи / груды мусора. *Throw the can in the garbage* – Выбрось эту банку в мусор.

If someone says that an idea or opinion is garbage, they are emphasizing that they believe it is untrue or unimportant ((INFORMAL). – *I personally think this is a complete garbage.* – Лично я думаю, что это полная чушь.

However, nowadays both words are very often used as synonyms in American English, and in British English they correspond to the word rubbish. So, the short conclusion is American English: trash (paper, plastic) or garbage (food waste), British English: rubbish.

**Rubbish** (British English) – consists of unwanted things or waste material such as used paper, empty tins and bottles, and waste food;

*unwanted household rubbish* – ненужный бытовой мусор.

*The British are throwing out rubbish* – Британцы выбрасывают мусор.

If you think that something is of very poor quality, you can say that it is *rubbish*. (INFORMAL) – *He described her book as absolute rubbish.*

The second meaning of trash/garbage/rubbish is "nonsense". This is the sense in which they are most often used in movies and TV shows.

*Maybe you should read a book instead of watching that garbage on TV.* – Может, ты почитаешь книгу, вместо того, чтобы смотреть эту ерунду по телевизору.

*The food at that restaurant is complete rubbish.* – Еда в этом ресторане – полнейшая дрянь.

*I can't believe you're reading that trash.* – Не могу поверить, что ты читаешь эту ерунду.

The word combinations with the words trash/garbage/rubbish most often refer to some kind of objects or people associated with garbage collection. *Rubbish/trash/garbage bin* – урна, контейнер для мусора. *Rubbish/trash/garbage dump* – свалка. *Trash/garbage man* – мусорщик. *Trash-talk* – словесная

перепалка, обычно с целью похвалить себя и принизить, деморализовать соперника.

Refuse is a more formal word for trash, garbage and rubbish that is used in both British and American English.

Litter – if trash / garbage / rubbish is not in its place in the garbage can, but in the street and on the road, it automatically becomes litter – garbage left in the wrong place. The verb, accordingly, has the meaning "to litter" – сорить, мусорить.

*The streets were littered with paper and popcorn after the parade.* – Бумажки и попкорн валялись на улицах после парада.

*We decided to pick up the litter in the park.* – Мы решили собрать мусор в парке.

*Litter basket/litter bin* – урна для мусора.

*Litterbug* – человек, который мусорит на улицах.

You can even get fined (fine) for throwing *litter*, so pay attention to this sign:



*Waste* – is closest in meaning to the word "отходы". That is, they are materials or substances left over after you have used something: *industrial waste* промышленные отходы. *nuclear waste* – ядерные отходы, *waste (wastepaper) basket* – корзина для мусора, etc.

*Industrial waste* – The air is being polluted, *industrial toxic waste* is thrown into rivers and lakes which causes great damage to people and nature.

Also, *waste* means something unnecessary, unused. – *We need to find ways to recycle unnecessary waste.* – Мы должны найти способы утилизации ненужных отходов.

As an adjective the word *waste* means “ненужный; напрасный, e.g. *waste talents* – растратченные таланты; *tex.* отработанный, e.g. wastewater reclamation — очистка промышленных вод.

In addition to a noun, the word *waste* can be a verb meaning "напрасно тратить (*деньги и т. п.*); терять (*время и т. п.*)", e.g. He was not going to *waste time* – Он не собирался терять время даром. All his efforts were *wasted* – *Все его усилия были безрезультатны. / Все его усилия были тщетны.* *He always wasted* his money on useless gadgets. – Он постоянно тратил деньги на бесполезные гаджеты.

There are some expressions and proverbs with the word *waste*:

*to waste one's life* – прожигать /проводить бесцельно/ жизнь;

*his efforts were wasted* - его усилия пропали даром;

*to go to waste* – пропадать впустую;

*lay waste to* – разрушать;

*to waste one's words / breath* - говорить попусту, трепать языком;

*to be wasted on /upon/ smb.* – остаться непонятым, непризнанным, не произвести впечатления на кого-либо, e.g. *my joke was wasted on him* – моя шутка до него не дошла;

*to waste an opportunity* – упустить возможность;

*waste not, want not* – мотовство до нужды доведёт: кто попусту не тратит, тому не знать нужды;

*haste makes waste* – поспешишь – людей насмешишь.

**Junk** is usually used when talking about things that have no value or are completely useless: *junk shop* – магазин подержанных вещей; *junk food* – нездоровая, суррогатная пища; *junk e-mail* - ненужные сообщения электронной почты (спам); *junkyard* - 1) мусорная свалка, помойка 2) кладбище / свалка старых автомобилей: *We ought to clear out this cupboard - it's full of junk. I can't stand watching the junk that's on TV these days.*



Sometimes junk has no value to one, but may well be of value to another. There is even a saying: "One man's junk is another man's treasure". — "Что мусор для одного — сокровище для другого".

As a verb *junk* is used to mean "to get rid of something". — *We decided to junk our old computer and buy a new one.* — *Мы решили выбросить наш старый компьютер и купить новый.*

**Debris** ['debri:] — now this word is often used in news and means broken or torn pieces left from the destruction of something larger: *construction debris* — строительный мусор; *clearing of rubble and debris* — уборка строительного мусора; *space debris* — космический мусор; *road debris* — дорожный мусор; *removal of debris* — уборка / вывоз строительного мусора; разбор завала; *debris from vacant lands* — мусор с пустырей; *explosion debris* — радиоактивные продукты взрыва; *atomic debris* — радиоактивные продукты ядерного взрыва; *airborne debris* — радиоактивные продукты в воздухе; *debris container* — ящик для отходов.

*Debris from the aircraft was scattered over a wide area.* — Осколки самолета были разбросаны на обширной территории. *Everything was covered by dust and debris.* — Все было усыпано обломками и пылью.

**9. A well-known English proverb says: “One man's trash is another man's treasure”. How do you understand it?**

**10. Make up a situation / dialogue illustrating the proverb “Haste makes waste”.**

**11. Make up your own sentences with the words *trash, rubbish, garbage, refuse, litter, waste, junk and debris*.**

**12. What kinds of environmental pollution do you know? Listen to the audio about environmental pollution and fill in the blanks.**

1. Nowadays \_\_\_\_\_ at international conferences. 2. Governments from all over the world discuss the situation and \_\_\_\_\_. 3. \_\_\_\_\_ are the most discussed ones. 4. First of all, \_\_\_\_\_ when they are using fuel.
5. Second, humans \_\_\_\_\_ through industrial activities and \_\_\_\_\_. 6. Nowadays, many countries are trying \_\_\_\_\_ both waste disposal and CO<sub>2</sub> emission. 7. Probably, the most well-known way \_\_\_\_\_ is waste sorting. 8. Switching to electric vehicles is one of the most promising ways to \_\_\_\_\_. 9. For example, \_\_\_\_\_ might be caused by direct discharge of industrial waste into the ocean. 10. \_\_\_\_\_ is another factor that causes pollution, as well as a

number of other problems. 11. Overpopulated cities tend to be the ones \_\_\_\_\_. 12. First of all, we \_\_\_\_\_ in general. 13. Second, we should stop being careless \_\_\_\_\_. 14. Third, \_\_\_\_\_ that not only the governments are responsible for the planet, but every single human as well. 15. \_\_\_\_\_ I would like to say that our planet is our home, and we must \_\_\_\_\_.

**13. Do you agree that the ecological problem is the global problem of our time? Why?**

**14. Read the text, divide it into paragraphs and title each paragraph.**

**Man and environment**

Human progress has reached the stage of intensive exploration of nuclear and solar energy, the World Ocean and outer space, and the problem of man and his environment has become one of the most difficult problems for many sciences due to its great significance for the whole mankind. Today the contradictions between man and nature have dramatically increased. Industrialization and globalization are accompanied by a dramatic increase in the consumption of energy and raw materials and in the output of pollutants and industrial wastes. There are several kinds of environmental pollution: air pollution, water pollution, soil pollution, and pollution caused by solid wastes, noise and radiation. The increasing noise level is a special problem nowadays. We need silence as much as we need fresh air and unpolluted water. Noise does not only do physical damage to the hearer but can weaken his energy and break down his nerves. Many cities now are too noisy to live in. In fact, progress can be blamed for many environmental problems. Transport is a major source of environmental pollution. Every car consumes many tons of air. Its exhaust gases contain poisonous carbon dioxide which makes difficult the emission of the earth's heat into space. One more aspect of the problem is water pollution. Humans and other organisms depend on clean water for nutrients. Unfortunately, human activities cause worldwide water pollution. To protect ourselves, we must also protect our water supply. The other problem is that our forests are dying from acid rains. Deforestation, especially destruction of tropical forests, affects the balance of nature in many ways. It kills animals, changes the climate and ecosystem in the world. Deforestation continues to be a worldwide problem, over 78% million acres of trees are cut down every year. The greenhouse effect is another topical problem. It is the result of heat absorption by certain gases in the atmosphere (called greenhouse gases because they trap heat) and re-radiation downward of a part of that heat. Water vapor is the most important greenhouse gas, followed by carbon dioxide and other trace gases. Human activities lead to the enhancement of the greenhouse effect. An enhanced

greenhouse effect is expected to bring about the effect of global warming which may result in ecological problems and disasters. Scientists say the temperature of the earth can rise by 3°C over the next 50 years. This may cause droughts in some parts of the world and floods in others. Soil pollution and soil degradation are major problems facing agriculture today. These problems result from a variety of problems. Salinity can have a negative impact on soil and plant growth. Any time you use chemical fertilizers, pesticides, or herbicides, they must be carefully controlled to prevent damage. Use of chemicals should be minimized whenever possible. The major aspect of solving environmental problems is the restoration of the unity between man and nature. Today's man commonly feels a certain responsibility to nature. As the most powerful being on earth, he feels he must protect the welfare of his world and all it contains. Nature protection is everyone's concern and we are all responsible for taking care of our environment to save it for the sake of the future.

**15. Define the main idea of the text.**

**16. Translate the sentences into English.**

1. Охрана окружающей среды – долг каждого человека. 2. Единство человека и природы может быть восстановлено только усилиями всего человечества. 3. Мы не должны допустить исчезновение редких животных и птиц на нашей планете. 4 Внутренние ресурсы биосферы не беспредельны, бесконтрольное влияние деятельности человека пагубно для биосферы. 5. Вредоносное влияние человека на природу чревато ужасными последствиями. 6. Основные экологические проблемы сегодня должны быть приняты во внимание правительствами всех стран мира. 7. Деятельность человека может превратить нашу планету в пустыню. 8. Совместное решение глобальных проблем может изменить характер взаимодействия человека и природы. 9. Становится ясно, что человек должен прекратить вмешиваться в природу и принять во внимание факт исчезновения некоторых видов животных. 10. Мы должны осознать зависимость нашей цивилизации от нашей планеты Земля, ее почвы, полезных ископаемых, атмосферы.

**17. Write an essay on the theme: “How can you personally save our fragile planet?”**

**18. Speak on one of the themes: “Ecology is a priority”, “Preserving the environment”, “Rational use of natural resources”, “Pollution is one of the most burning problems of nowadays”, “Human impact on the environment”, “Save our planet”.**

## Test yourself

### **1. Group the following words into the pairs of synonyms.**

Protection, harmful, essential, present, realize, exploration, influence, tremendous, complex, consider, interpret, result, pure, understand, impact, complicated, effect, enormous, explain, regard, clean, conservation, research, adverse, necessary, current.

### **2. Make up word-combinations and translate them into Russian.**

affect	man and nature
to be fraught with	pollution
to interfere in	general state policy
to take into	fatal consequences
environmental	society's harmful influence
to compensate for	account
to be a matter of	environment

### **3. Make up your own sentences with them.**

### **4. Insert the words.**

1. Environmental ... is fraught with ... of many species on the Earth.
2. Man's activity ... to destroy everything.
3. The ... of the unity between man and nature is of great ... to all mankind.
4. Interfering infinitely in nature we do not ... .... possible negative effect on it.
5. ... is one of the possibilities of the biosphere to restore the unity between man and nature.
6. The ... of the environment must be solved by the efforts of all countries.
7. ... coming from the industrial enterprises ... all living things on the Earth.

### **5. Read the statements and say if they are true or false.**

1. The population on the Earth is over 6000 million now.
2. The population of the world is growing slowly.
3. Every day we throw away millions of tons of rubbish.
4. Plastic, metals and chemicals will not disappear for hundreds of years.
5. Many natural resources like coal, gas, oil and others are renewable.
6. Only 3% of the world's water is fresh water.
7. In the USA, people use 380 liters of water a day. In deserts, people use 5 liters a day.

**6. Complete the gaps with the following words: rubbish, garbage, trash, litter, waste, junk.**

1. Do you often eat \_\_\_\_\_ food?
2. After the earthquake everything was covered with \_\_\_\_\_.
3. For her shopping is \_\_\_\_\_ of time.
4. There was a lot of \_\_\_\_\_ in the park.
5. Don't let good food go to \_\_\_\_\_.
6. Don't \_\_\_\_\_ your life complaining about life.
7. This house is a piece of \_\_\_\_\_.
8. My grandmother always told me: haste makes \_\_\_\_\_.

## UNIT 6

### TECHNOLOGY IN EVERYDAY LIFE

#### I. Warming-up.

**1. In pairs or groups, take turns brainstorming as many technological devices or innovations as possible within a specified time limit (e.g., 1 minute). Participants should call out or write down their ideas quickly without overthinking. Aim to generate a long list of technology-related items.**

**Example:**

Participant 1: Smartphone

Participant 2: Laptop

Participant 3: Smartwatch...

#### **2. Comment on the quotations about technology below. Which of them do you like most? Why?**

1. "Technology is anything that wasn't around when you were born." – **Alan Kay** (computer scientist)
2. "The science of today is the technology of tomorrow." – **Edward Teller** (physicist)
3. "Any sufficiently advanced technology is indistinguishable from magic." – **Arthur C. Clarke** (science fiction writer and futurist)
4. "Technology is just a tool. In terms of getting the kids working together and motivating them, the teacher is the most important." – **Bill Gates** (co-founder of Microsoft)
5. "The greatest danger in technology is not that it will empower machines, but that it will empower some people over others." – **Ray Kurzweil** (futurist)
6. "Technology is nothing. What's important is that you have a faith in people, that they're basically good and smart, and if you give them tools, they'll do wonderful things with them." – **Steve Jobs** (co-founder, chairman, and CEO of Apple)

#### II. Words to learn.

##### **1. Read the words of the Active Vocabulary, look them up and then study the word-combinations and sentences to know how to use them.**

**unrecognizable (adj)** – not able to be recognized or identified; completely different in appearance or nature: *unrecognizable place, unrecognizable world*. The transformation brought by virtual reality has made the gaming experience unrecognizable from what it used to be.

**proliferation (n)** – rapid increase or growth in numbers; multiplication: *proliferation of smartphones, proliferation of users*. The proliferation of online streaming services has revolutionized the way we consume entertainment.

**impact (n)** – powerful effect or influence that something has on a person, thing, or situation: to *have a significant impact, a profound impact on global communication*. The impact of social media on youth culture is undeniable.

**vicinity (n)** - the area or region near or surrounding a particular place or object: *within close vicinity, explore the vicinity*. - The navigation app showed nearby restaurants in the vicinity of the user's current location.

**huge (adj)** – extremely large in size, amount, or degree: *huge growth, huge progress*. The adoption of cloud computing has resulted in huge cost savings for businesses.

**enable (v)** – give someone the authority, means, or opportunity to do something: *enable control, enable the user*. The internet enables us to access information from all around the world. Technology has enabled remote work possibilities for many professionals.

**unprecedented (adj)** – never done or known before; extraordinary: *unprecedented speed, unprecedented innovation*. - The speed at which information can be shared online is unprecedented in human history.

**accessible (adj)** – able to be reached, entered, or used; easy to approach or use: *accessible information, accessible design*. Mobile applications have made banking services more accessible to individuals in remote areas.

**available (adj)** – able to be used or obtained, ready for use or at hand: *available update, available online shopping*. The app developers made sure their product is available on both iOS and Android platforms.

**advancement (n)** – development or improvement made in a particular field or area: *rapid technological advancements, medical advancements*. The advancements in renewable energy have the potential to address climate change.

**debilitate (v)** – make someone weak and infirm; impair the strength or energy of: *debilitate one's physical health, debilitate a company's operations and reputation*. Malware infections can debilitate a computer system, causing data loss and disruption of services.

**equation (n)** – a mathematical statement that says two things are equal: *to solve complex equations, algebraic equations*. Solving a complex equation requires a deep understanding of mathematical concepts and the ability to apply various solving techniques.

**share (v)** – to give a portion or part of something to someone else: *share a photo, share information, share a meal*. They used social media to share their company developments.

**execute (v)** – to carry out or perform a task or action: *execute a plan, execute a project*. The computer program was designed to execute tasks automatically without human intervention.

**fraction (n)** – a numerical value that is a part of a whole: *substantial fraction, decimal fraction, volume fraction*. You only possess a small fraction of her genetic material.

**consume (v)** – means to use up or take in something completely or entirely: *to consume energy, to consume food*. And as those devices get smaller, they get faster, they consume less power, and they get cheaper.

## 2. Translate the following sentences from English into Russian.

1. Excessive screen time can **debilitate** one's physical health.
2. The **advancements** in technology have made our world almost **unrecognizable**.
3. The smartphone industry has experienced **huge** growth in recent years.
4. The new smartphone model is so different; it renders the previous version **unrecognizable**.
5. The invention of the internet had a profound **impact** on global communication.
6. Social media platforms have seen a **proliferation** of users in recent years.
7. Artificial intelligence has the potential to bring **huge advancements** to various fields.
8. With these computers you can compute thousands of data in the **fraction** of a second.
9. Cyberattacks can **debilitate** a company's operations and reputation.
10. Algebraic **equations** play a crucial role in programming and computer science.
11. And that will **enable** machines, along with the ability to look further ahead than humans can.
12. The introduction of artificial intelligence into healthcare has the potential to provide **unprecedented** levels of precision and efficiency.
13. The design of the new software is user-friendly and **accessible** to all.
14. Online shopping makes a vast range of products easily **available** to consumers.
15. Only a **fraction** of the total population attended the technology conference, but it still provided valuable insights and networking opportunities.
16. We've got limited power and your fields **consume** a lot of energy.
17. The **proliferation** of smartphones has revolutionized the way we communicate and access information.
18. Only a **fraction** of the original documents survived the fire, causing a significant loss of historical data.
19. Prolonged exposure to harmful radiation can **debilitate** the human body and cause health issues.
20. Solving a **complex equation** requires a deep understanding of mathematical concepts and problem-solving skills.
21. Being in close vicinity to nature can have a calming impact on our mental well-being.
22. Technological **advancements** have enabled us to connect with people from all around the world in an instant.
23. The team worked diligently **to execute** the project plan and deliver the desired outcomes.
24. Spending excessive time on social media can **consume** a significant portion of our day if not managed properly.
25. The **impact** of artificial intelligence on various industries is undeniable, transforming the way we work and live.

### **3. Make up your own sentences with active words / word-combinations.**

#### **III. Reading.**

##### **1. Read the text and think up the title to it:**

Modern technology has changed our lives in countless ways – revolutionizing how we work, live, and play. As recently as the 1990s, televisions were the height of technology in many American homes. According to the Census Bureau, a mere 15% of residences had a personal computer in 1989. By 2011, that number had climbed to 75%. Modern offices would be unrecognizable to workers of the past, due to the proliferation of emails, video conferencing, smartphones, and laptops.

**Communication.** One of the areas where technology has made the biggest impact is in the realm of communication. Conversing with people outside of your immediate vicinity was once a difficult process, requiring physical letters and a lot of patience. For most of the last century, professional communication involved letter writing, faxing, or spending hours on the telephone. No longer. Email is now the primary mode of business communication in today's workplace.

**Education.** Computers and the Internet have transformed education. Computers store huge amounts of data in a very small space, shrinking shelves of reference books down to a single flash drive. They enable better presentation of information, making the process of teaching easier and more effective. Online education has provided unprecedented learning opportunities to people all over the world. Lectures and lessons can be uploaded to websites in written or video form, making information more accessible. All of the information you want is available and accessible 24 hours per day, thanks to the World Wide Web.

**Health.** Technology has had a huge impact on the healthcare industry. Advancements in diagnostic tools permit doctors to identify health problems early, improving the odds of successful life-saving treatments. Vaccines have been incredibly effective, practically eradicating diseases such as measles, diphtheria, and smallpox – which once caused massive epidemics. Modern medicine allows patients to manage chronic conditions that were once debilitating and life-threatening, such as diabetes and hypertension. Advancements in medical technology have increased lifespans and improved the quality of life for people worldwide.

**Productivity.** Technology has vastly increased productivity, since the ability of computers to solve complex mathematical equations has allowed them to speed up practically every task. Computer modeling permits engineers to simulate structures, vehicles, and materials to provide information on performance prior to prototyping. In the office, the ability of networked computers to share and

manipulate data can speed up a variety of tasks – permitting employees to work more efficiently and maximize productivity. Technological advancements in agriculture have increased food production. In so many areas of our lives, critical time-consuming processes can now be executed with ease – and in a fraction of the time they once required.

Advancements in technology have improved virtually every aspect of our lives, and the best is yet to come. (<https://www.jfg-nc.com/technology-in-everyday-life/>)

## **2. Be sure you can pronounce these words correctly.**

1. Census Bureau ['sensəs 'bjuroʊ].
2. Vaccines: ['væksi:nz]
3. Measles: ['mi:zəlz]
4. Diphtheria: [dɪf'θɪrɪə]
5. Smallpox: ['smɔ:lpa:ks]
6. Diabetes: [,daɪə'bɪ:tɪ:z/]
7. Hypertension: [,haɪpər'tenʃən]

## **3. Discuss the following questions:**

1. How has modern technology changed your everyday life?
2. Which technological advancements do you find most impactful and why?
3. How has communication been transformed by technology, especially in professional settings?
4. How has technology transformed the field of education? Are there any drawbacks?
5. What is the impact of technology on healthcare?
6. In what ways has technology improved productivity?
7. What was the percentage of American homes with personal computers in 1989 compared to 2011?
8. What is the area where technology has made the biggest impact?
9. Which diseases have vaccines practically eradicated?
10. Do you believe technology will continue to enhance our lives in the future? Why or why not?

## **4. Find the words in the text to match with the following definitions.**

1. The application of scientific knowledge and techniques in order to create tools, devices, or systems that can be used to solve problems, simplify tasks, or improve human life.

2. An electronic device that is capable of receiving, storing, and processing data to perform various tasks.
3. A digital communication method that allows individuals to send and receive messages, documents, or files through computer networks.
4. The exchange of information, thoughts, ideas, or messages between individuals or groups.
5. A global network of interconnected computer networks that enables the exchange and sharing of information around the world.
6. An instrument or device designed to carry out a specific task or function. It can range from simple hand-held implements to more complex machinery or software applications, used to accomplish work efficiently.
7. The field of study and practice concerned with the prevention, diagnosis, treatment, and management of illnesses, diseases, and injuries in order to promote health and well-being.
8. Pieces of information that are collected, organized, or stored in a structured or unstructured format.
9. To imitate or replicate the characteristics or behavior of a real system or process using a different medium or technology.
10. The act or process of becoming greater in size, quantity, or degree.

### **5. Match the synonyms to the highlighted words.**

<b>Debilitate</b>	<b>execute</b>	indistinguishable	growth	<b>impact</b>	enormous
<b>available</b>	<b>proliferation</b>	extraordinary	<b>accessible</b>	<b>enable</b>	
influence	<b>equation</b>	ready	progress	<b>huge</b>	weaken
<b>unprecedented</b>	formula	distribute	perform	<b>unrecognizable</b>	
reachable	<b>fraction</b>				
	<b>advancement</b>	allow	<b>share</b>	piece	

### **6. Match the antonyms to the highlighted words.**

<b>Unrecognizable</b>	decrease	recognizable	<b>proliferation</b>	unreachable
<b>impact</b>	restrict	<b>unprecedented</b>	insignificance	tiny
<b>enable</b>	<b>advancement</b>	unavailable	ordinary	keep
<b>available</b>	regression	<b>debilitate</b>	<b>share</b>	<b>huge</b>
			<b>execute</b>	strengthen

### **7. Using the following expressions agree or disagree with the given statements.**

<b>Agreement</b>	<b>Disagreement</b>
That's right.	You're not right, I'm afraid.
You're quite right.	Not quite right.

Fine.	Just the opposite, I'm afraid.
True.	Just on the contrary, I'm afraid.
Quite true.	It's not quite so.
Right.	I can't quite agree with you.
Quite right.	You're wrong. I'm afraid.

1. Modern technology has revolutionized how we work.
2. Televisions were not the height of technology in many American homes as recently as the 1990s.
3. According to the Census Bureau, only 15% of residences had a personal computer in 1989.
4. By 2011, the percentage of residences with personal computers had reached 75%.
5. Modern offices would be unrecognizable to workers of the past due to the decrease of emails, video conferencing, smartphones, and laptops.
6. Email is now the primary mode of business communication in today's workplace.
7. Computers and the Internet have transformed education by storing large amounts of data and enabling better presentation of information.
8. Online education has provided ordinary learning opportunities worldwide.
9. Technology has had a huge impact on the healthcare industry through advancements in diagnostic tools and life-saving treatments.
10. Advancements in medical technology have increased lifespans and improved the quality of life for people worldwide.

**8. Complete the sentences with the word of a suitable form from the box then translate the sentences. One word is extra.**

debilitate share execute huge vicinity advancement equations proliferation consume impact enable accessible fraction
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1. You can now create and edit math ... using LaTeX syntax.
2. Before anyone can ... a kilowatt-hour, a liter of water, or a bus ride, somebody has to get a copper wire, a pipe, and a road to their house.
3. The sudden disappearance of a significant portion of their income would ... their motivation.

4. The proliferation of smartphones has ... people to easily access information and stay connected.

5. The impact of climate change is having a ... effect on the environment and wildlife.

6. The library is fully ... for people with disabilities.

7. Social media platforms have made it easier ... photos and updates with friends and family.

8. Modern automation systems can ... complex tasks with precision and efficiency.

9. Only a ... of the population has access to clean drinking water in some remote regions.

10. Scientific advancements have had a significant ... on human life.

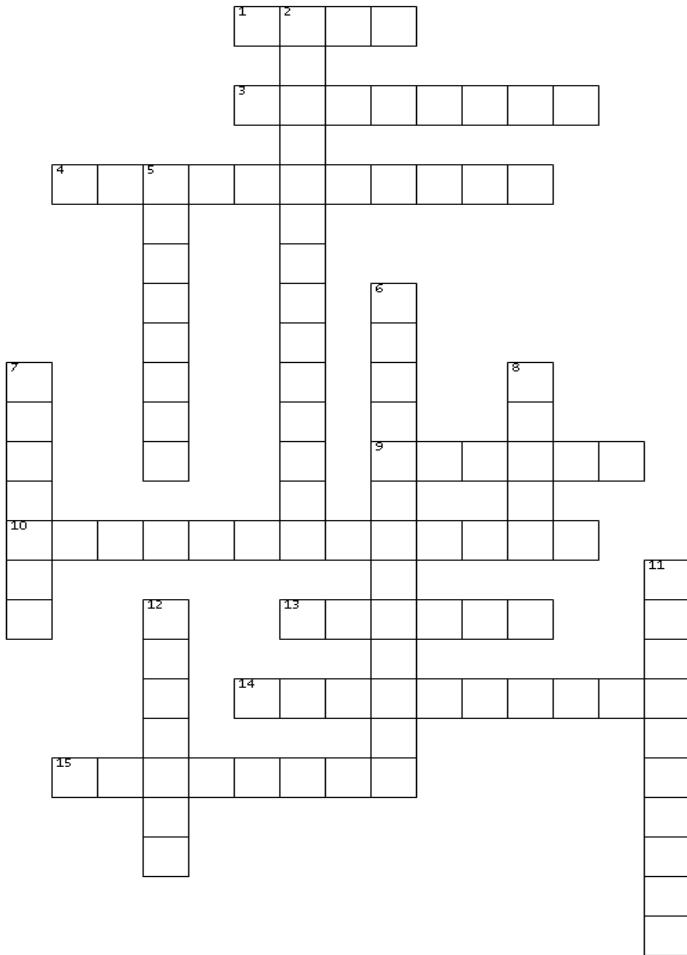
11. The ... of fake news has had a negative impact on public trust in the media.

12. The ... of renewable energy technologies is crucial for reducing dependence on fossil fuels.

## **9. Find in the text English equivalents to the following Russian words.**

Сфера здравоохранения; хранить огромные объемы данных; увеличить продолжительность и улучшить качество жизни; предоставить беспрецедентные возможности для обучения; за пределами вашего непосредственного окружения; современные технологии; вершина технологий; на протяжении большей части прошлого века; искоренить заболевания; доступная информация; основной способ делового общения; оказывать наибольшее влияние; повышать шансы; благодаря распространению электронной почты, видеоконференций, смартфонов и ноутбуков; огромное влияние; изменить образование; флешка; позволить лучше представлять информацию; загружать на сайты; совершенствование диагностических средств; невероятно эффективные; развитие медицинских технологий; критически важные процессы, требующие много времени; моделировать структуры; математические уравнения; выполнять с легкостью; повысить производительность труда.

## 6. Do the crossword.



### ACROSS

1. extremely large in size
3. a numerical value that is a part of a whole debilitate, equation
4. a development or improvement made in a particular field or area
9. powerful effect or influence that something has on a person, thing, or situation
10. never done or known before; extraordinary
13. to give someone the authority, means, or opportunity to do something
14. to make someone weak and infirm
15. a mathematical statement that says two things are equal

### DOWN

2. not able to be recognized or identified
5. the area or region near or surrounding a particular place or object
6. rapid increase or growth in numbers
7. to use up or take in something completely or entirely
8. to give a portion or part of something
11. able to be reached, entered, or used
12. to carry out or perform a task or action

**11. Analyze the grammatical structure of the text in ex.1 (section “Reading”). Identify the Tense and Voice of the predicate in the sentences (Use [Table 2](#) in APPENDIX).**

Example: Modern technology **has changed** (Present Perfect, Active) our lives in countless ways...

**12. Read 10 rules for using new technologies. Fill in the blanks with modal verbs can/cannot, should/should not, must/must not, may/may not (Use [Table 9](#) in APPENDIX) and translate the sentences into Russian.**

1. Users ... share personal information online without secure encryption.
2. Individuals ... use technology to engage in cyberbullying or harassment.
3. People ... rely solely on technology for their decision-making.
4. Companies ... implement robust security measures to protect sensitive data.
5. Users ... customize the privacy settings on their devices to control data collection.
6. People ... underestimate the potential risks associated with new technologies.
7. Parents ... educate their children about responsible and safe technology usage.
8. Individuals ... use technology to enhance their productivity and efficiency.
9. Companies ... prioritize user privacy and ensure transparent data practices.
10. People ... benefit from the convenience and accessibility offered by new technologies but ... also remain cautious.

**13. In the text below choose the suitable form of the verb in brackets.**

Tech-savvy individuals (1) ... (to be) crucial in today's digital world, as they (2) ... (to possess) the knowledge and skills to improve technological solutions. They can easily identify technological gaps and find innovative ways to fill them. Furthermore, these individuals (3) ... (to provide) valuable assistance and support to others who may struggle with technology. With the proliferation of smartphones and other devices, being tech-savvy (4) ... (to become) a vital attribute. However, this proficiency can also debilitate those who (5) ... (not to possess) it, as technology (6) ... (to continue) to evolve at a rapid pace.

In our modern society, tech-savvy people (7) ... (to have) the ability to consume and process vast amounts of information quickly. They (8) ... (to understand) the equation of how to make technology work for them, rather than being overwhelmed by it. These individuals (9) ... (to share) their knowledge and (10) ... (to expertise) with others, making technology more accessible to a broader

audience. Moreover, most of them (11) ... (to possess) the expertise to execute complex tasks using various digital tools.

Tech-savvy individuals (12) ... (to enable) organizations to streamline their processes and achieve greater efficiency. They can identify solutions that (13) ... (to integrate) seamlessly with existing systems, resulting in cost savings and increased productivity. In addition, their proficiency in technology (14) ... (to allow) them to adapt to new software and hardware quickly, ensuring minimal disruptions and smooth transitions.

In conclusion, tech-savvy individuals (15) ... (to play) a vital role in our technologically advanced society. It (16) ... constantly (to change) due to both these individuals and new technologies.

#### **14. Translate the following text into English using the Active Vocabulary.**

Современные технологии улучшили многие аспекты нашей жизни. Постоянное развитие технологий привело к революции в различных отраслях, от здравоохранения до транспорта. Кроме того, технологии предоставляют нам большое количество информации и ресурсов, которые помогают в решении повседневных задач. Например, распространение мобильных устройств и интернета сделало информацию и услуги более доступными, чем когда-либо. Теперь мы можем выполнять транзакции, обмениваться файлами и общаться с людьми в любой точке мира одним кликом. Онлайн-образование предоставило беспрецедентные возможности для обучения людям во всем мире. В офисе возможности компьютеров по обмену данными и работе с ними способствуют ускорению выполнения различных задач. Развитие медицинских технологий позволяет увеличить продолжительность и улучшить качество жизни.

Однако технологии могут и ослабить нас, если мы станем слишком зависимы от них. Необходимо следить за тем, сколько времени мы им уделяем, и находить баланс. В уравнении современной жизни технологии играют большую роль. Они позволяют нам делиться своими мыслями и идеями с другими людьми и выполнять различные задачи более эффективно.

#### **15. Speak on modern technology in everyday life. Mind using the Active Vocabulary.**

#### **16. Choose the correct heading for each passage from the list of headings below.**

**Example:** A-6

## List of headings

1. Easy Accessibility to Information
2. Instant Connection using Social Media
3. Advanced Business and Marketing
4. High-tech Traveling & Transportation Facilities
5. Online Shopping and Secured Bill Payment
6. Improved & Advanced Communication
7. Flexibility in Work Life
8. Easy Accessibility to Healthcare Facility
9. Better Housing and Lifestyle
10. Distance Education and Modern Learning

Your attraction to this article suggests you must be wondering *how does technology help us?* Or *how does technology impact our lives?* Read on to find more about them.



### A

The journey of technology and communication began with the invention of telephones. Presently, we have a more advanced form of devices that have reduced size and come packed with many features. The continuous developments in technology have improved modern communication methods. A person can connect

with anyone globally by using different platforms to send messages, email, and make audio or video calls.

These electronic and digital communication tools have helped us eradicate time and distance to make communication more comfortable, effective, and better. *Technology in our lives* has impacted businesses and our personal life. Companies can effectively interact with existing and potential customers in real-time. The Internet has made this world a global village by providing an opportunity to communicate with people from different countries and cultures. Modern technology also helps users connect with multiple people on online audio or video calls using video conferencing. Many types of software have made it possible and revolutionized the way we communicate in today's world.

## B

Modern technology benefits customers by making it easy for them to buy products or services online. Similarly, technology has transformed the way we do business. Setting up and running a new business has become much easier and faster than before. Prior, a seller needed a physical space to start his shop or a company. Presently, we owe so many devices like laptops, tablets, mobile phones, etc. Now, one only needs an idea and a computer with a good internet connection to start his store. Many website builders can help a seller build a professional-looking online shopping store within a few minutes.

Companies can sell their products and services to customers living on opposite ends of the globe, and transactions are made quickly in real-time. Digital currency has made it much easier to send and receive payments all around the world. Business tech solutions like CRM-enabled POS systems, telematics, productivity tracking software, accounting solutions, and mobile payments have made various business operations and processes accessible and efficient by minimizing the possibility of errors.

## C

We can't ignore the *use of technology in daily life*. Thanks to smart home devices and gadgets, the latest technology has made our life organized, easier, and safer. Improved housing and lifestyle are among the positive *impact of technology on our lives*. Modern technology has brought the latest tech and advancements to our doorsteps.

The smart home tech industry has made thousands of smart home gadgets that are automatic and controllable via mobile apps. We can turn the lights on, open the door, keep an eye on the main gate, and even make coffee using our smartphones. Moreover, we can get news updates, order food from restaurants, buy day-to-day stuff, and communicate with friends and family from the comfort of our homes even without leaving the bedroom.

## D

Modern technology used in the transportation sector has made it easier for people to travel long distances, conveniently and comfortably. Not only this, tech experts are regularly working on making traveling and transportation more efficient and faster. In this advanced era of life, we cannot imagine traveling without the latest transportation means like high-speed cars, buses, subways, and airplanes to reach the destination safely and quickly. Moreover, technologies like GPS trackers for car and fleet tracking solutions have made it easier to keep the vehicles secure and keep track of traveling efficiently.

Modern devices like smartphones are the best invention of all time. We cannot imagine traveling anywhere without these pocket-friendly devices. They make it possible to access multiple services at the fingertips, like advanced booking of hotels, flight tickets, dining area, etc. They also reduce the hassle of carrying cash or cards and make it easy to pay bills. Technology is still improving each day, and we may witness many advancements in the coming years. Driverless vehicles are on their way to eliminate the need for drivers for traveling and transportation.



## E

Technology has changed education in many ways. No doubt, books are one of the significant learning materials, and you can download anything (including books and other learning resources) from the web these days. Students can watch informative videos on

YouTube to enhance their knowledge in a specific subject or field of life. The introduction of modern technology in classrooms makes learning more interactive and fun for children.

Technology has opened many doors and provides resources for people willing to learn something. Online platforms like YouTube have a vast collection of videos that a user can access free of cost to learn a new activity or a hobby. Many other educational platforms of institutes offer paid certification programs that a user can access from anywhere. These virtual educational institutes allow students to earn degrees from the comfort of their homes. Students can communicate with their teachers and educators in real-time by using the latest communication methods to learn more effectively.

## F

We have seen the *impact of technology on our lives*, especially in the healthcare sector. Highly skilled medical professionals paired with the latest technology can provide the best treatments for several serious medical issues and

problems. Diagnosis processes have made it easier than ever due to the latest medical equipment and tools' availability. The invention of the latest medications has also made it possible to treat illnesses like heart disease, cancer, etc. People can get quick information and details about almost all medical issues to prevent several diseases and medical problems from staying healthy and fit on the Internet.

Modern health or fitness tracking devices have changed the way we take care of ourselves. For example, a fitness band/watch can track users' heartbeat, blood pressure, sleeping pattern, and much more. The user can connect these devices to their smartphones to get instant feedback and recommendation depending on recent activity. Some dedicated apps ask for a bit of information and use it to plan everything, from the user's diet to exercise routine.

Technology today also allows us to consult a doctor and share his medical history online. Some apps even allow patients to order the required medicines at their homes.

## G

Online shopping is becoming more famous in recent years, all thanks to *technology in everyday life*. It has made it quite convenient for people with busy schedules to shop and have all necessary things delivered to their doorstep. These online shopping platforms keep everything, including groceries, home essentials, clothing, toys, books, etc. Some dedicated apps sell products related to specific areas, like fashion, home appliances, medicines, etc. These sites/apps provide a vast collection of products from different local to international brands that one may not find at a single store. It saves the hassle of roaming store to store and saves time as well.

Still, many prefer buying things from the store to check the product's quality after touching it with hands. It doesn't mean technology hasn't changed anything about physical shopping. The most significant *impact of technology* is it allows the customer to pay money online, saving him the hassle of carrying cash or entering a pin. The user can tap and pay the bill using his smartphone.

## H

Some decades ago, people used to go to the library or pick up a dictionary to find the meaning of something and learn more about it. It was quite a hectic task for which you needed time in your hands. But with the *use of technology in daily life*, we can search for anything on the internet without even leaving our spot. You can also ask your smart home assistants the same. It will also respond to you with the most relevant and latest information available on the web.

You don't also need to Google everything up. There are many dedicated apps available that will solve your queries within a few seconds. One such example is Google Maps. These advanced services have made it possible to find new places, see the direction of unfamiliar paths with the best route, see satellite images, etc.

Some apps also work delicately for businesses and provide them information about safety, traffic, weather, and legal advice.

These apps are more easily accessible on smartphones than other devices like laptops or tablets. It has given rise to the number of smartphone users over the last few decades. The pocket-friendly size of smartphones has made them famous for accessing the online world. Modern technology has changed the way we learn, date, dine, or converse online. It has made our lives convenient by making every process simpler and faster.

## I

Social media handles are another significant advancement and example of the *impact of technology on our lives*. These platforms became a part of our lives soon after they got introduced to the world. People access services like Facebook, Instagram, WhatsApp, Snapchat, Twitter, TikTok, etc., to have an insight into others' lives, be it someone we know from the neighbors or a celebrity.

Social media has also impacted the business world and provided them a platform for marketing their brand and product. Companies now understand these platforms' value and hire social media managers who can either make or break the brand's image. Social media provides a platform to communicate with anyone around the world instantly. However, the world has also witnessed them as a platform to start a social commentary or movement.

These platforms can prove to be quite helpful and fun to use. Above 3.6 billion people were using social media platforms in 2020, which can reach 4.41 billion in 2025, as per the survey report of Statista. However, we can't deny the negative impacts of social media on our mental health. The urge to stay connected and updated with what's happening worldwide has made us more dependent or addicted to these platforms.

## J

Technology has helped us stay connected to the office and work while staying at home. This trend may have started as a compulsion. But now it is converting into a reality for the employees working in many large-scale companies. Though working outside of an office has its challenges, it has benefited employees in many ways. For example, an employee doesn't have to commute from home to the office, gets more flexible working hours, chooses where to work, etc. All these made possible, all thanks to the *technology in our lives*.

It may have raised some challenges for the companies to keep track of all the employees spread across different locations. But technological advancements have solutions to this problem as well. Some productivity apps and software help in time management, organization, goal focus, and keeping track of employees' activity.

[\(https://www.techprevue.com/technology-impacts-our-daily-lives/\)](https://www.techprevue.com/technology-impacts-our-daily-lives/)

**17. Construct three questions to any passage (Use [Table 4](#) in APPENDIX).**

**18. Write out key sentence or sentences expressing the main idea(s) of each passage.**

**19. [Watch the video](#) and answer the questions.**

1. What are the key requirements for harnessing (using) the strange physics of matter at small scales in quantum computing?
2. How does a qubit in a quantum computer differ from a classical computer's bit in terms of information processing?
3. How does a quantum computer theoretically handle more complex problems compared to a classical computer?
4. What are the challenges in managing the fragile quantum states of particles in quantum computing?
5. What are the two leading approaches in quantum computing for managing quantum states effectively?

### Test yourself

**1. Complete the expressions from the Active Vocabulary.**

- (v)... less power
- (v)... tasks
- (n)... of a second
- (n)... in technology
- to have a significant ... (n)
- (adj)... levels of precision and efficiency
- a complex ... (n)
- (v)... information
- (adj)... online shopping
- (adj)... world

**2. Change the synonyms with the words from the Active Vocabulary.**

1. **Growth** of technology enables connectivity on a global scale.
2. The impact of social media has been **enormous** in shaping modern society.
3. Computers have enabled access to vast amounts of information, making it more **available** than ever before.
4. Technological **progress** have revolutionized the way we communicate and share information.

5. The ability ***to perform*** tasks quickly and efficiently has been enhanced by technological innovations.
6. ***Extraordinary*** opportunities for learning and growth are available through online education.
7. The lack of access to modern technology can ***weaken*** individuals in their tendency of educational and career opportunities.
8. Technology has had a huge ***influence*** on various industries, from healthcare to agriculture.
9. The accessibility of smartphones and laptops ***has allowed*** people to stay connected wherever they go.
10. Distributing data securely has become ***crucial*** in the digital age.

## UNIT 7

### INFORMATION TECHNOLOGIES SCIENCE

#### I. Warming-up.

**1. Discuss the questions in pairs or small groups and be ready to give your feedback.**

1. Can you think of ways computers help us in scientific research?
2. What do you know about artificial intelligence? How can it be helpful?

Have you ever used it?



#### II. Words to learn.

**1. Read the words of the Active Vocabulary, look them up and then study the word-combinations and sentences to know how to use them.**

**artificial intelligence (AI)** (n) [ə:tɪ'fɪʃəl ɪn'telədʒəns] – the capability of a machine to imitate intelligent human behavior: *a robot with artificial intelligence, capabilities of artificial intelligence, AI based systems*.

**data (n)** ['deɪtə] – information or facts: *detailed research data, accurate data, reliable data, statistical data, to collect data, analyze data, store data, process data*. Newer computers can process data much more quickly.

**predict (v)** [pri'dikt] – to say that something will happen, before it happens. Sales were five percent lower than predicted. In the future, it may be possible to predict earthquakes. Syn.: **forecast** (=to say what is likely to happen in the future, especially in relation to the weather or the economic or political situation; to forecast the weather).

**aid (v / n)** [eɪd] – to help someone do something: *aid in something, aid somebody in/with (doing) something, legal aid, humanitarian aid, first aid, to*

*send/provide aid, to get/receive aid.* Officers were aided in the search by drug-sniffing dogs. The new equipment has been provided to aid in the diagnosis of liver disorders.

**pattern (n)** – 1) the regular way in which something happens, develops, or is done: *a weather pattern, a behavior pattern, to follow a pattern.* Our data indicates that weather patterns are likely to get more extreme. Her headaches did not seem to follow any particular pattern. 2) a regularly repeated arrangement of shapes, colors, or lines on a surface, usually as decoration: *a black and white striped pattern, a pattern of dots.*

**neural network** ['njuərəl] (n) – a computer architecture which is able to learn by a process of trial and error. The app uses an AI neural network – a machine learning program designed to let technology excel at a specific skill – to identify objects and how far away those objects are.

**neuron (n)** ['njuərən] – a type of cell that makes up the nervous system, a nerve cell. Huge numbers of neurons organize themselves into groups, which then form larger regions that work together.

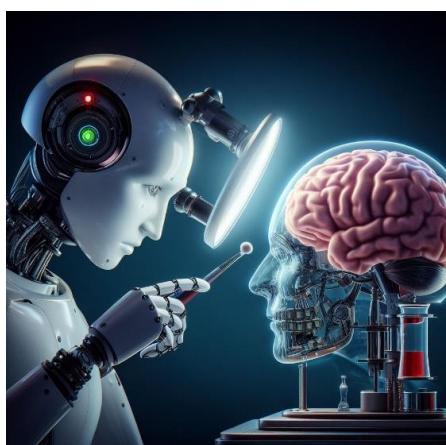
**sequence (n)** ['si:kwəns] – the order that something happens or exists in. DNA sequence, logical sequence, the sequence of events. He's had a sequence of business failures. The questions should be asked in a logical sequence.

**emphasize (v)** ['emfəsaɪz] – to say strongly or show clearly that a fact, idea etc is especially important: *emphasize that/how.* Syn.: **to stress, accentuate.** My teacher always emphasized the importance of studying hard. Gesticulation emphasizes speech.

**recognize (v)** ['rekəgnaɪz] – to know who someone is or what something is, because you have seen, heard, experienced, or learned about them in the past. I didn't recognize you in your uniform. It was malaria, but Dr Lee hadn't recognized the symptoms. Syn.: **to identify, distinguish.**

## I. Reading.

### 1. Read the text and answer the question: How is artificial intelligence used by scientists?



#### Artificial intelligence in science

Today, AI is used in almost every industry, and tools provided by artificial intelligence in science are no exception. The amount of data generated by many of today's physics and astronomy studies is so great that no human or group of humans could keep up. Some of them daily record gigabytes of data, and the torrent is just getting bigger.

Many scientists are looking to artificial intelligence for assistance because of frequent information updates. Artificial neural networks are computer-simulated neurons replicating the function of brains, which can get through massive amounts of data, emphasizing abnormalities and seeing patterns that people would never have noticed.

Prospects for scientists are generally good because AI promises to speed up the research process. Some innovators are already using AI to plan, execute, and interpret experiments, which opens the door to automated science.

Below you can find some of the most interesting examples of AI in science and research field:

### **Protein structures can be predicted using genetic data**

The function of a protein in the body can be understood by taking into account its form. Scientists are able to discover proteins that are involved in diseases, which helps with diagnostics and the creation of new medicines by foreseeing their structures.

Researchers are creating machine learning methods that can predict the three-dimensional structure of proteins from DNA sequences to aid in our understanding of this process. That is a great development regarding artificial intelligence in science field. For instance, the AlphaFold project at DeepMind has developed a deep neural network that forecasts the separations between pairs of amino acids and the angles between their bonds, producing a highly accurate overall prediction of a protein structure.

### **Recognizing how climate change affects cities and regions**

The requirement to analyze vast volumes of collected data and simulate complicated systems is combined in environmental research. Predictions from global climate models need to be understood in terms of their effects on cities or regions in order to guide decision-making at the national or local level. For instance, forecasting the number of summer days where temperatures reach 30°C within a city in 20 years.

### **Analyzing astronomical data**

Large volumes of data are produced during astronomy research, making it difficult to separate the interesting features or signals from the background noise and classify them appropriately. A machine learning system can recognize and delete a lot of unnecessary data. Identifying star and supernova features, classifying galaxies, and detecting new pulsars from existing data sets are just a few examples of how machine learning has been used to discover new celestial events.

In conclusion, artificial intelligence and data analytics is poised to revolutionize a wide range of industries. Surely, artificial intelligence in science

plays its own part. These changes are producing significant economic and social advantages.

(<https://dataconomy.com/2022/11/09/artificial-intelligence-in-science-examples/> )

**2. Be sure you can pronounce these words correctly.**

gigabyte ['gigəbait]

generate ['dʒenəreɪt]

identify [aɪ'dentifai]

icon ['aɪkɒn]

industry ['ɪndəstri]

artificial intelligence [,a:tɪ'fiʃəl ɪn'telədʒəns]

data ['deɪtə]

protein ['prəʊti:n]

receive [rɪ'si:v]

ceiling ['si:lɪŋ]

seize [si:z]

height [haɪt]

weight [weɪt]

**3. Share your thoughts on the text with your fellow students. Do you think there are more ways for AI application in science?**

**4. Find the words in the text to match with the following definitions.**

1. A series of algorithms that seek to identify relationships in a data set via a process that mimics how the human brain works.
2. The order of nucleotides (adenine, guanine, cytosine, and thymine) in a strand of DNA.
3. Large biomolecules and macromolecules consisting of amino acids.
4. A complex mathematical representation of the major climate system components (atmosphere, land surface, ocean, and sea ice), and their interactions.
5. A nerve cell.
6. A unit of digital information as much as 1 billion bytes.
7. The chemical force that holds atoms together in a molecule.

## 5. Match the synonyms.

Bond	forecast	data	accurate	predict	research
get	concerning	tie	separate	fact	behind
receive	study	correct	divide	aid	background
astronomical	regarding		celestial		

## 6. Match the antonyms.

Exception	frequent	insignificant	overall	pattern
appropriately	miss	partial	great	detect
structure	rare	natural	disorganization	overlook
recognize		artificial		

## 7. Prove or correct the following statements with the facts from the text.

1. Data updates in science are too frequent for any human to follow precisely.
2. Many scientists are against AI application in science.
3. The AlphaFold project at DeepMind forecasts the weather.
4. AI separates all interesting features from unnecessary data to recognize any astronomical events.

## 8. Complete the sentences with the suitable form of the word from the box then translate the sentences. One word is extra.

data	pattern	appropriately	intelligence	sequence
prediction	overall	interpret	aid	detect
				emphasize

1. They are studying behavior ... among high-school students.
2. We need someone to ... these results for us.
3. We don't want all the details now, just the ... picture.
4. He exhibited high ..., had an exceptional memory, but was unpopular and solitary because he hated games.
5. The system is so sensitive that it can ... changes in temperature as small as 0.003 degrees.
6. White, who is doing research on the disease, was able to determine its DNA ....
7. This aspect was ... by the title of his paper on Penicillium.
8. This is going to sound really offensive and probably not ... to say, but I'm going to say it.

9. People make ... all the time. Some are very serious and are based on scientific calculations, but many are just guesses.

10. She applied for financial ... in order to go to college.

### 9. Find in the text English equivalents to the following Russian words.

Инструменты, предоставляемые ИИ; не являются исключением; объемы данных; исследования в области физики и астрономии; успевать за; поток данных только увеличивается; прибегают за помощью к ИИ; частые обновления данных; воспроизводящие функции человеческого мозга; указывающие на аномалии; ускорить процесс исследования; планировать, проводить и интерпретировать эксперименты; белковые структуры; принимая во внимание; создание новых лекарств с помощью прогноза этих структур; методы машинного обучения; прогнозировать трехмерное строение белков; например; прогнозирует разрывы между парами аминокислот и углы между их соединениями; высокоточный прогноз строения белковой структуры; оценка влияния перемены климата на города и регионы; анализировать большие объемы полученных данных; экологические исследования; сопутствовать принятию решений на местном или национальном уровне; отделять интересные особенности или сигналы от фонового шума; опознавать и удалять неважную информацию; открывать новые астрономические события.

### 10. Fill the table and learn the words.

Verb	Noun	Adjective	Adverb
except			
	assistance		
predict			
separate			
-		necessary	
	requirement		
	development		
			environmentally

### 11. Find in the text all sentences containing a) Present Progressive; b) Present Perfect Tenses; c) Passive Voice. Explain the usage of tenses in these sentences (See [Table 2](#) in APPENDIX).

**12. Translate into English using there is/are construction (Use [Table 18](#) in APPENDIX).**

1. Существует специальный комплекс оборудования и программ для распознавания номерных знаков автомобилей (license-plate numbers).
2. Компьютерные технологии оказывают положительных эффект в развитии детей при правильном их использовании.
3. На борту Международной космической станции есть доступ в Интернет.
4. Всё ещё нет свидетельств того, что сильный искусственный интеллект когда-либо будет создан.
5. Этому не существует прецедента, никогда в мире не было столь быстрого технологического развития.

**13. Complete the text below with a suitable form of the verb in brackets (Use [Table 2](#) in APPENDIX).**

As in many areas of life recently, generative AI and large language models like ChatGPT (1) ... also ... (change) the astronomy world.

The team that (2) ... (create) the first image of a black hole in 2019 (3) ... (use) a generative AI to produce its new image. To do so, it first taught an AI how to recognize black holes by (4) ... (feed) it simulations of many kinds of black holes. Then, the team used the AI model it (5) ... (build) to fill in gaps in the massive amount of data collected by the radio telescopes on the black hole M87.

Using this simulated data, the team (6) ... (be able to) create a new image that is two times sharper than the original and is fully consistent with the predictions of general relativity.

Astronomers (7) ... also ... (turn) to AI to help tame the complexity of modern research. A team from the Harvard-Smithsonian Center for Astrophysics created a language model (8) ... (call) astroBERT to read and organize 15 million scientific papers on astronomy. Another team, based at NASA, (9) ... even ... (propose) using AI to prioritize astronomy projects, a process that astronomers (10) ... (engage) in every 10 years. (<https://www.pbs.org/newshour/science/analysis-how-ai-is-helping-astronomers-study-the-universe>)

**14. Make up 5 questions to the text (Use [Table 4](#) in APPENDIX).**

**15. Make sure you understand the following words and expressions by looking them up in the dictionary. Then make up sentences with each word and ask your partner to translate them.**

Convey information, make sense, record audio, around the clock, database, differentiate.

## **16. Watch the video and answer the questions.**

1. What does professor Y. Yovel study?
2. Why is it so hard to understand vocal messages of bats? What does professor Yovel compare the bat cave with?
3. What is so unique about the colony of bats in Tel Aviv University?
4. How do the scientists apply a voice recognition program in the research of bat language?
5. What has the study revealed?
6. Dr. Dolittle is a character of English children's books who can talk to animals. Can you remember a similar character in Russian literature?

## **17. Translate the following text into English using the Active Vocabulary.**

Минприроды России (Ministry of Natural Resources and Environment) уже сегодня успешно применяет *искусственный интеллект*. Вести учет животных или обеспечивать поимку браконьеров *помогают* фотоловушки (trail cameras). Однако для наибольшей точности информации фотоловушки ведут съемку любого движения — от падения ветки до перемещения животных или человека. Просмотр тысяч фотографий потребует от человека очень большого количества времени, но это легко можно решить с помощью *нейронных сетей*. «ИИ смогли научить различать кошачьих: у каждой особи свой неповторимый *рисунок*, который нейросеть “запоминает”. В итоге мы фотофиксируем жизнедеятельность каждой особи, не нарушая ее жизненный ареал. Для обучения ИИ необходима *большая база* данных, и такую базу для кошачьих мы уже получили от заповедника “Земля леопарда”. Скоро мы *определим* каждого тигра и леопарда на данной территории», — рассказал А.В. Леус, доцент кафедры радиоэлектроники и прикладной информатики Московского физико-технического института.

[\(<https://scientificrussia.ru/articles/iskusstvennyj-intellekt-v-nauke>\)](https://scientificrussia.ru/articles/iskusstvennyj-intellekt-v-nauke)

## **18. Read the text and entitle each paragraph.**



(1) The inventing of computers has contributed greatly to the fields of science. They have allowed for the collection and recording of vast amounts of data. They allow scientists to store information indefinitely and review it easily.

(2) The first large scale computer was called "Colossus" and it was used in World War II to crack German wartime codes, an aspect of

combinatorics. As of 2010, computers can manipulate data more quickly than most people can imagine. This allows for high-speed recording of data and analysis of results. This is very useful in just about all fields of science.

(3) Computers interact with science in several specific ways. The first one is dealing with collecting and processing data. This is how the "Colossus" was used. Computers are also used in the field of mathematics. Calculations are done that would take humans more than one lifespan to complete. The computation of the digits of Pi is a good example. Finally, computers can be used as a method of detecting data. Computers can be used to detect events that would easily pass the notice of the human eye. High-speed photography can only be controlled with computer components and is a valuable asset. A computer can sample information billions of times a second, which allows for scientific detection that would otherwise be impossible. A pertinent example is the Large Hadron Collider; without computers and the time-sensitive components involved, it would not be possible to record the data.

(4) Automated machines are machines that are controlled all or in part by a computer. Computer automation is used mostly by industry in factories. However, it is also useful in science. Machines can be used to run automated tests and complete simple tasks. One example of a machine used in science is the robotic arm that is used to handle radioactive samples. These robotic arms allow the scientist to safely handle and test a highly dangerous sample.

(5) The Internet, which was developed by scientists in conjunction with the government, has advanced the progress of science in many ways. The first proof of the concept was shown in 1972 and, since then, it has allowed for the vast dissemination of ideas and information. The Internet allows for almost instantaneous sharing of data across any distance. This allows for easier collaboration with colleagues anywhere in the world.

(6) Computers allow us to manipulate the data that we gather in easier ways. Most people are accustomed to this aspect of computers through a word processing program. A word processor allows us to manipulate data in the form of words. Without computers, we might still be using typewriters.  
<https://www.techwalla.com/articles/how-are-computers-used-in-science>)

## **19. Read the text again and say if the following statements are True or False.**

1. One of the first computers was used for military purposes.
2. The computation of the digits of Pi appears in the text to illustrate how computers collect and process data.
3. Computers can detect very fast events.

4. The Large Hadron Collider couldn't have happened without help of computers.
5. Computers can't substitute humans in working with hazardous materials.
6. The Internet has slowed down the scientific research.
7. Word processing programs are important part of data processing.

**20. Write out key words out of each paragraph and the sentence(s) expressing the main idea(s) of each paragraph.**

**21. Write an abstract/summary to the text.**

### **Test yourself**

**1. Complete the expressions with the words from the Active Vocabulary.**

A... intelligence

Neural n...

To f... the weather

DNA s...

a behaviour p...

statistical d...

humanitarian a...

**2. Change the definitions and synonyms with the words from the Active Vocabulary.**

1. (Smart algorithms) in medicine serves to (say that something will happen) and prevent diseases.

2. I hadn't seen her for ten years, but I (knew who it was) her immediately.

3. We get gigabytes of (information) from trail cameras every day.

4. Elon Musk is a kind of person who (stresses, accentuates) how dangerous AI is and then creates it.

5. The dance is basically a (order) of steps that you repeat over and over again.

6. A (nerve cell) is the most fundamental unit of processing.

## UNIT 8

### FUTURE SCOPES OF SCIENCE

#### I. Warming-up

**Work in groups.** Make a list of cutting-edge scientific insights which you consider the most useful and practical. As a class, decide which item is currently the most desirable or fashionable. Give reasons.



#### II. Words to learn.

**2.1. Look at the words. Which of them do you know? Match the words with their Russian equivalents.**

eventually	достижения
profound	конкурировать
acidification	срочный
agenda	предприятие
converging	одновременно
simultaneously	сходящийся
advances	в конце концов
emergence	результат
impact	решение
enterprise	доход
disruptive	разрушительный
urgent	закисление
compete	глубокий
solution	влияние
income	программа
outcome	появление

**2.2. Choose the word from the right column that matches the definition on the left.**

Very strongly felt, of great importance, absolute or complete	advances profound impact
The ability to see, hear, or become aware of something through the senses	emergence perceptions profound
This is what happens when the pH value of water or soil decreases	alkalinization neutralization acidification
This is when something (lines, roads, paths, ideas, opinions, etc.) moves towards the point where they join or meet	converging simultaneously emergence
Have a strong effect on someone or something	advances impact compete
Causing or tending to cause disturbance	urgent eventually disruptive
The state of thinking or hoping that something, especially something good, will happen.	expectancy income solution

**III. Reading I.**

**3.1. Read the text. Fill in the gaps with the correct option. Use the table below the text.**



**MEGATRENDS IN SCIENTIFIC AND TECHNOLOGICAL REVOLUTION**

Our future is uncertain, shaped by a multitude of powerful, complex and interconnected forces. What is more, it is (1) ..... altered by improbable,

unpredictable and highly disruptive events. Seen over a time horizon of 10 - 20 years, some of the big trends we see unfolding before us are large-scale social,

economic, political, environmental or technological changes that are slow to form but which, once they have taken root, exercise a (2) ..... and lasting influence on most human activities, processes and perceptions. Those megatrends are expected to have a strong impact on science, technology and innovation (STI) systems. By way of overview, the main megatrends include global population growth and urbanization, or the ageing of societies in many parts of the world; the warming of the planet and rising sea levels or the (3) ..... of our oceans and seas; the deepening of globalization; and the growing momentum of digitalization, big data and bioengineering. Considering the impacts of the main global megatrends on STI, some common themes emerge.

First, the megatrends will shape future research & development (4) ..... and the scope and scale of future innovation demand expected to influence the research and innovation activities carried out by firms and the public science system.

Second, multiple disciplines, including the life, chemical, physical, mathematical, computational, and engineering sciences, are (5) ..... . Many parallel tracks and fields of research are developing (6) ..... . Namely, when (7) ..... in multiple fields reach a stage where they can be successfully combined to build upon each other, there is the potential for the (8) ..... of new fields of discovery and the development of new, powerful techniques. The dynamics and (9) ..... of many of these factors call for a more internationalized framing of STI activities and policies through the activities of multinational (10) ..... and international scientific co-operation among research universities and public research institutes.

Third, the megatrends suggest that STI activities could be confronted with (11) ..... resource constraints over the next few decades. Many megatrends raise (12) ..... issues that demand public policy responses and these could (13) ..... with STI for policy attention and resources.

The direction of influence is not one-way, of course, and developments in STI will guide the dynamics of megatrends and offer (14) ..... to the challenges they raise. For example, from a shaping perspective, future (15) ..... growth will be increasingly driven by STI developments; and improved health (16) ..... and increasing life expectancy are heavily dependent on health technology innovation.

1	A	environmentally	B	simultaneously	C	urgently	D	eventually
2	A	profound	B	dependent	C	disruptive	D	simultaneous
3	A	expectancy	B	enterprise	C	acidification	D	urgency
4	A	emergences	B	agendas	C	impacts	D	obstacles
5	A	converging	B	emerging	C	disappearing	D	competing
6	A	urgently	B	completely	C	separately	D	simultaneousl

								y
7	A	joint ventures	B	advances	C	constraints	D	demands
8	A	emergence	B	enterprises	C	impact	D	solutions
9	A	constraints	B	roots	C	impacts	D	outcomes
10	A	forces	B	emergences	C	constraints	D	enterprises
11	A	interconnected	B	disruptive	C	powerful	D	converging
12	A	urgent	B	emergent	C	disruptive	D	profound
13	A	advance	B	compete	C	converge	D	urge
14	A	solutions	B	advances	C	agendas	D	perceptions
15	A	competition	B	acidification	C	income	D	enterprise
16	A	outcomes	B	perceptions	C	influences	D	solutions

### Test yourself

**3.2. Choose the correct answer. Only one answer is correct.**

1. What, eventually, changes our future?
  - a. income growth
  - b. improbable, unpredictable and highly disruptive events
  - c. improved health outcomes and increasing life
2. What do technological changes lead to?
  - a. a profound and lasting influence on most human activities, processes, and perceptions
  - b. increasing natural disasters
  - c. making people healthier
3. What is an example of one of the megatrends that the text describes?
  - a. extinction of many animal species
  - b. acidification of our oceans and seas
  - c. development of the virtual reality of the metaverses
4. According to the text, which of the following will shape the megatrends in the future?
  - a. increase in the number of scientific communities
  - b. emergence of subdisciplines
  - c. the scope and scale of future innovation demand
5. What happens simultaneously when multiple disciplines are converging?
  - a. the decay of cross-disciplinary inquiry
  - b. many parallel tracks and fields of research are developing
  - c. scientific and technological progress is suspended
6. Where is the potential for the emergence of new fields of discovery and the development of new powerful techniques?
  - a. when advances in multiple fields reach a stage where they can be successfully combined to build upon each other
  - b. in elimination of hot-button issues
  - c. in the dissemination of scientific information to the public.

7. What do the dynamics and impact of many of these factors call for?
  - a. solving global problems such as global warming
  - b. income growth and quality of life improvement
  - c. a more internationalized framing of STI activities and policies
8. What could STI activities be confronted over the next few decades as megatrends suggest?
  - a. disruptive resource constraints
  - b. the possibility of using unlimited resources
  - c. the transition to a new level of technology
9. What can compete with STI for policy attention and resources?
  - a. civil unrest or war
  - b. urgent issues that demand public policy responses
  - c. political elections
10. What will guide the developments in STI?
  - a. the dynamics of megatrends and offering solutions to the challenges they raise
  - b. intellectual independency from all preconceptions about technological stagnation
  - c. attraction of additional sources of financing for the development of STI
11. What will determine future income growth from a shaping perspective?
  - a. political decision
  - b. STI developments
  - c. economic and world situation
12. What do improved health outcomes and increasing life expectancy heavily depend on?
  - a. a healthy lifestyle
  - b. the availability of medical care
  - c. health technology innovation

#### **IV. Learning Grammar: Forms to express Future**

- |  |
|--|
| <ul style="list-style-type: none"> <li>✓ be + <b>likely/ unlikely / certain /sure</b> + <i>to V</i></li> <li>✓ <b>will</b> + <i>V</i></li> <li>✓ be + <b>going</b> + <i>to V</i></li> <li>✓ <b>may/might</b> + <i>V</i></li> </ul> |
|--|

#### 4.1. Translate the following sentences into English:

1. Производители жестких дисков обязательно будут отслеживать потенциально революционные исследования в этой области.

2. Выяснилось, что воздействие на биосферу, скорее всего, будет на 34 процента сильнее, чем прогнозировалось ранее.

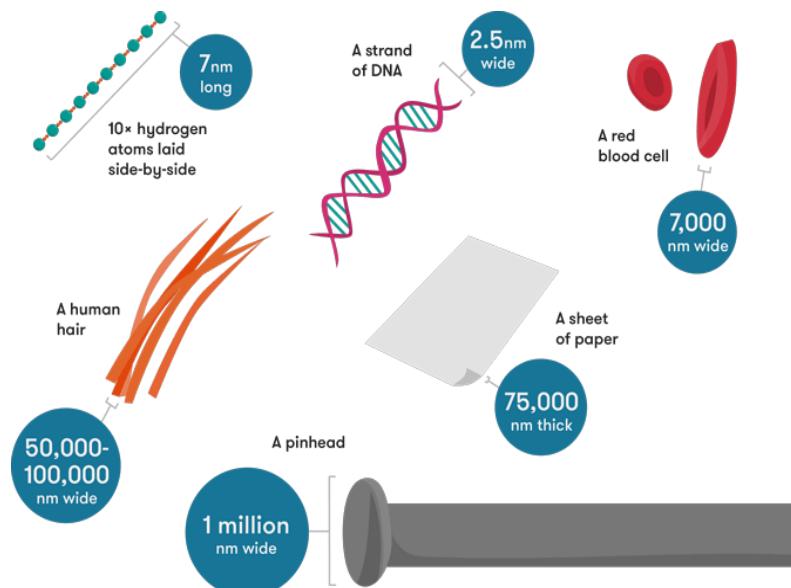
3. Эти так называемые “достижения четвёртой промышленной революции” могут стать потенциальной угрозой человечеству, поскольку мы не сможем рассчитать все возможности искусственного интеллекта.

4. Массовое производство прозрачных дисплеев начнётся осенью следующего года.

5. Результаты новаторских экспериментов вряд ли в ближайшее десятилетие откроют путь для новой технологии, основанной на квантовой информации.

#### V. Concerns with Nanotechnology.

##### 5.1. Provide an explanation for the following examples. What area of science do they relate to?



<https://www.science.org.au/curious/nanoscience>

##### 5.2. Watch and listen. You are going to watch a video about nanotechnology changing our life. What are the following numbers for?

2020    1959    2025    90%    4D

##### 5.3. Watch the video and check your guess.

##### 5.4. Watch the video again and choose a correct answer:

1. The nanometer is
  - a) a millionth of a meter

- b) a billionth of a meter
2. The size of a human hair is
- a) one hundred thousand nanometers
  - b) one thousand nanometers
3. The phrase “There's plenty of room at the bottom” ( Richard Feynman ) is about
- a) transistor shrinking
  - b) constructing buildings for nano-labs
4. The difference between one thing and another is
- a) its atomic makeup
  - b) the order in which the atoms are put together
5. The end of laundry will be due to
- a) building-in a video projector that produces 3D imager.
  - b) to making textiles, where dirt literally fluffs
6. We need a robot building another robot because the robots that the robots are building are
- a) fueled by infection that they devour
  - b) down to the molecular level
7. In eye surgery the traditional methodology is being replaced by
- a) nanoparticles, that float in eyedrops
  - b) nanoinjections instead of eyedrops
8. Graphene is
- a) the cheapest material ever built
  - b) the thinnest material ever built
9. Graphene has
- a) width and length
  - b) height and width
10. You can make grapheme if you take a lead pencil
- a) and draw a single atom on the page.
  - b) draw it across the page and keep healing off layers of the graphite until there's only one layer left, a single atom tall
11. Graphene can be used for
- a) computing, 4D printing, military, healthcare, fun, and environment among them
  - b) computing, 4D printing, military, healthcare, with the exception of environment
12. Nanotech products
- a) are not going to be free in future
  - b) are going to be free in future

**5.5. Watch the video again and complete the table about *graphene*, one of the most promising technologies on the marketplace.**

	Graphene is a <i>substance</i>
Historical note	Graphene has been theorized for <i>d</i> .....and it was isolated in the lab in <i>2</i> .... Today there are over ..... patents.
Height	It is .... ..... height
Strength	It is the ..... material ever measured; a ..... times stronger than steel
Transparency	It is almost completely .....
Light transmission	It transmits almost .....% of the light that passes through it
Pliability	It is as pliable as ....., you can stretch it to ..... percent of its size
Conductivity	It is highly conductive, ..... times more so than silicon
Impenetrability	It is completely impermeable to ..... and gas
Weight	It weighs almost .....

**6. Reading II.**

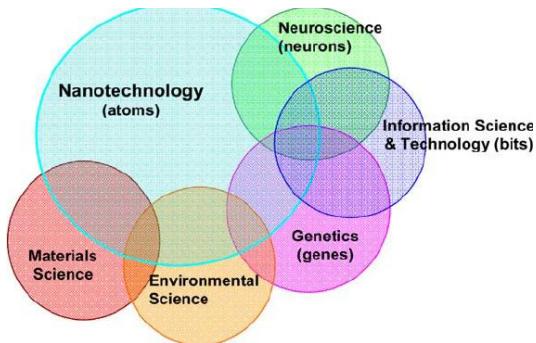
**6.1. Glance through the text about nanoscience. Divide the words in *italics* into the following groups:**

Verb	Noun	Adjective

**6.2. Read the text. Which of the following points are described in the text?**

- 1) Nanoscience is the study of structures and materials on an ultra-small scale.
- 2) Nanoscience and nanotechnology are often used interchangeably, but they are in fact two very different things.
- 3) Nanotechnology has the potential to revolutionize a diverse range of fields, from health care to manufacturing.
- 4) The physical and chemical properties of matter change at the nano level.
- 5) Nanomaterials occur in nature and can be engineered in labs.
- 6) The safety of nanomaterials and nanotechnology is still being debated, tested and assessed.

## CONCERNS WITH NANOSCIENCE



and engineering are studying it and using it to better understand our world. Nanoscience has the potential to *reshape* the world around us. It could lead to revolutionary *breakthroughs* in fields ranging from manufacturing to health care. Meanwhile, as with the spread of any powerful new technology, there are likely to be a range of negative as well as positive outcomes associated with nanotechnology.

As investment in nanoscience and nanotechnology continues, some people are voicing ethical, environmental and economic *concerns*. For example, how do manufactured nanoparticles interact with biological systems of the human body and what health effects may this have? Long-term *exposure* to nanoparticles, particularly as they become more common in everyday items, is something that needs to be monitored.

The way that nanomaterials interact with the environment also needs further study. How a particle behaves in the lab may be very different to how it behaves in water, air or *soil*, and how it interacts with organic matter. Indeed, the way nanoparticles behave in the environment depends not only on their individual physical and chemical characters, but also on the character of the receiving environment (whether it is hot, wet, acidic and so on). When exposed to an environment, nanoparticles may remain intact, or undergo one of the following processes:

- *dissolution*
- *speciation* (association with other ionic or molecular dissolved chemical substances)
- *settling*
- *agglomeration / deagglomeration*
- biological or chemical transformation into other chemicals.

Further research is needed in these areas and appropriate controls set up in relation to risk assessment.

There is also the possibility that nanomaterials may move from organism to organism, or through food chains. The fact that there are many different types of nanomaterials means there is the potential for a wide range of effects. Some

experiments have shown that they could have harmful effects on *invertebrates* and fish, including changes to their behavior, development and reproduction.

Risk *assessment* and testing needs to keep pace with the technology, especially as the use of nanomaterials expands into the production of ever more *consumer* goods. Testing needs to include methods for *estimating* exposure and identifying *hazards*. At present, the nanoparticles that *possess* the highest potential risk are free, insoluble nanoparticles, such as those *dispersed* in a dust or liquid.

As we have seen, the unique physical and chemical properties of nanomaterials also often differ from those of *bulk* materials and require special assessment. Despite these concerns, most scientists believe that nanoscience will lead to huge advances in medicine, biotechnology, manufacturing, information technology and other equally *diverse* areas.

### **6.3. Read the text again. In what order are the following points argued in the text?**

- a) Long-term exposure to nanoparticles is something that needs to be monitored.
- b) Testing needs to include methods for estimating exposure and identifying hazards.
- c) Nanoscience is cross disciplinary.
- d) Nanoscience will lead to huge advances in diverse areas.
- e) When exposed to an environment, nanoparticles may remain intact, or undergo dissolution, speciation, settling, transformation.
- f) Nanoscience is an emerging area of science.
- g) Some experiments have shown that they could have harmful effects on invertebrates and fish.
- h) Nanoscience has the potential to reshape the world around us.
- i) The way nanoparticles behave in the environment depends on their individual physical and chemical characters.
- j) Some people are voicing ethical, environmental and economic concerns.

### **6.4. Answer the following questions. Then construct more questions. Let your partner answer them while you answer his / hers.**

- 1) How can scientists see what is going on in the nanoworld?
- 2) What are the fundamental properties of the materials built by molecules?
- 3) Why do the physical and chemical properties of the substance change in the course of work?
- 4) Does the public have a role to play in nanotechnology decision making?

## VII. Watch and listen.

### 7.1. Watch the video about the future of technology and humanity.

### 7.2. What does it say about the following?

1. defining factor of our society
2. fixing our cholesterol
3. at the price of losing our privacy
4. exponential changes
5. the capacity of the human brain
6. cognitive computing
7. the unintended consequences

### 7.3. Watch the video again. Work with a partner. Answer the questions below.

- 1) What period of time is the forecast of humanity change given for?
- 2) How is technology changing?
- 3) What will never change?
- 4) How does the author specify the future?
- 5) What is common between AI and cognitive computing (CC)?
- 6) What does the future of humanity depend on?

## Reading III.

### 7.4. Read the text. Look for the things that have the most meaning to you.

#### TECHNOLOGICAL HUMANISM

Today, we live in a world that is immersed in a digital transformation and disruptive technologies that can be considered the fourth industrial revolution.

## Navigating the next industrial revolution



Revolution	Year	Information
	1 1784	Steam, water, mechanical production equipment
	2 1870	Division of labour, electricity, mass production
	3 1969	Electronics, IT, automated production
	4 ?	Cyber-physical systems

*Fig. 1. Industrial revolutions*

Technological humanism emerges in response to the new challenges posed by digital transformation. Technological innovations such as 5G, intelligent connectivity and collaborative technology promise great changes at the social level.



The concept of technological humanism encompasses a wide spectrum of ideas. In general terms, it can be described as a philosophy or ideological current that focuses on the intersection between ethics and technological innovation. However, this increase in interconnectivity also comes with greater responsibility: greater technological capacity empowers individuals, companies and governments to influence the day-to-day lives of citizens in all aspects of their lives. In this sense, it defends the responsible use of innovative technology for the benefit of society and promotes innovation through ethical channels that ensure the development of the human being.

Technological humanism framework of action includes several areas, among which stand out digital rights, the defense and protection of private data, network security, the fight against the exclusion of the digital divide and the study of the ethical impact of high technology in fields such as science, education, politics and economics. A transition to a hybrid society between the digital and the real implies a transfer of power to large technology companies. In other words, life in society will be marked by the decisions of private entities that operate on a global scale.

Accordingly, technological humanism has several objectives.

- Eliminating the digital divide. In order to eliminate the digital devide, it is necessary to offer training on new technologies to all members of society. Lack of access to advanced technologies produces social, economic and cultural inequality.
- Ensuring user privacy. The transfer of private data on the Internet is a major problem. Strict regulation is necessary to protect the privacy of all users and to ensure that their data is not used without their consent.
- Ensuring the ethical use of new technologies. Innovations such as machine learning algorithms have not yet been regulated. Companies that have the ability to collect, interpret and use user data have a power that must be limited by the public authorities.
- Identifying sustainable solutions. Scientific and technological progress has unavoidable impacts on the environment. It is imperative that technological solutions are also sustainable and carried out in an energy-efficient manner to minimize the impact on the environment.



- Keeping the focus on humans. “The future of humanity depends not on benevolent robots but on benevolent businesses,” (K. O’Neill). As more processes, including hiring and training employees become automated, keeping human needs at the forefront becomes more essential. This means grounding technology and innovation in human scale, senses, and needs. That is the essence of technological humanism.

(<https://www.makeuseof.com/reasons-artificial-intelligence-cant-replace-humans/>)

### 7.5. Match the words to their definitions on the right.

1. emerges	a. to make something certain to happen
2. encompass	b. permission or agreement
3. ensure	c. someone's right to keep their personal matters
4. empower	d. to remove or take away someone or something
5. exclusion	e. radically reconfiguring a particular field of something, as by implementing new technologies or a more competitive model
6. worthwhile	f. to give someone official authority or the freedom to do something
7. immerse	g. not allowing someone or something to take part into something
8. implementation	h. to include different types of things
9. disruptive	i. to appear
10. imply	j. to communicate an idea or feeling without saying it directly
11. eliminate	k. useful, important, or good enough
12. privacy	l. kind and helpful
13. consent	m.-the act of putting a plan into action or of starting to use something
14. benevolent	n. become completely involved in something

### 7.6. Read the text again. Complete the following table.

Technological Humanism Objectives

TH objective	Potential problem	Solution

### V111. Consider the following issues to be discussed in groups.

- 1) “The future of humanity depends not on benevolent robots but on benevolent businesses,”
- 2) “Data is the new oil”
- 3) “The IOT and the AI will change us for bad rather than good”.
- 4) “We don’t have to be scared about evolution of technology”

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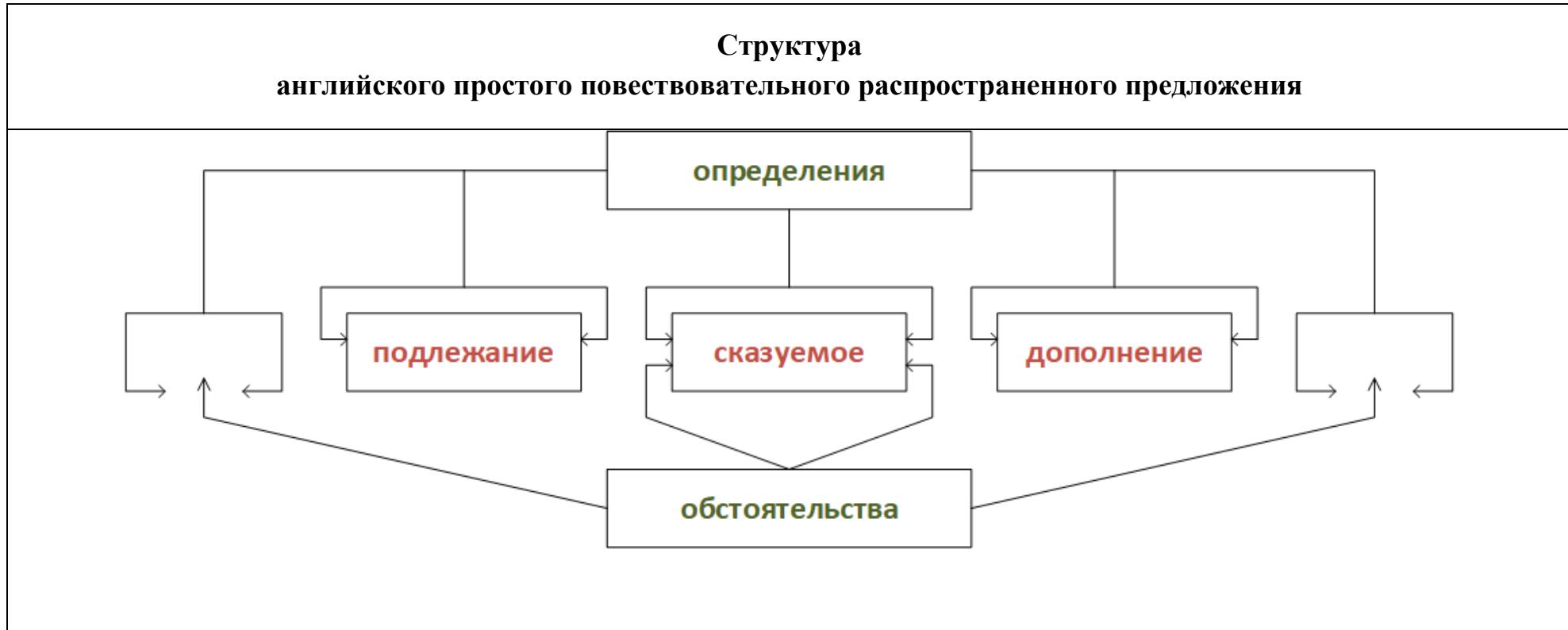
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## APPENDIX

### Grammar Material

**Table 1 – The Structure of English Narrative sentence**

(Структура английского простого повествовательного распространенного предложения)



**Table 2 – Tenses in the Active and Passive Voice (Сводная таблица употребления времен)**

Сводная таблица употребления времен (Tenses in the Active and Passive Voice) (Изъявительное наклонение)														
Active Voice <b>to ask</b>			Indefinite			Continuous			Perfect			Perfect Continuous		
to ask			to be asking			to have asked			to have been asking					
Present	Past	Future	Present	Past	Future	Present	Past	Future	Present	Past	Future			
asks	asked	shall ask will	am is asking are	was were asking	shall will be will asking	has asked	had asked	shall will have asked	has been asking	had been asking	shall have been asking will			
Употребление														
действие как факт (обычное, регулярно повторяющееся)			действие как процесс (незаконченное, длиющееся)			действие, предшествующее какому-то моменту, связанное с ним			действие, начавшееся в прошлом и продолжающееся вплоть до какого-то момента					
usually every day often seldom sometimes	yesterday last week 5 days ago	tomorrow next week in 5 days	now	1. at 5 p.m. from 6 till 7 p.m. 2. другое действие	today this week already ever, never just, not yet	1. by 4 p.m. 2. другое действие	for since since when	for	for	for				
Перевод														
гл. несовершенного вида			гл. несовершенного вида			гл. совершенного вида прошлого времени			гл. несовершенного вида					
Passive Voice <b>to be asked</b>														
<b>to be asked</b>			<b>to being asked</b>			<b>to have been asked</b>								
am is are	was asked were	shall be asked will	am is are	being asked	was being were asked	-----	has been asked	had been aske d	shall will	have been asked	-----	-----	-----	

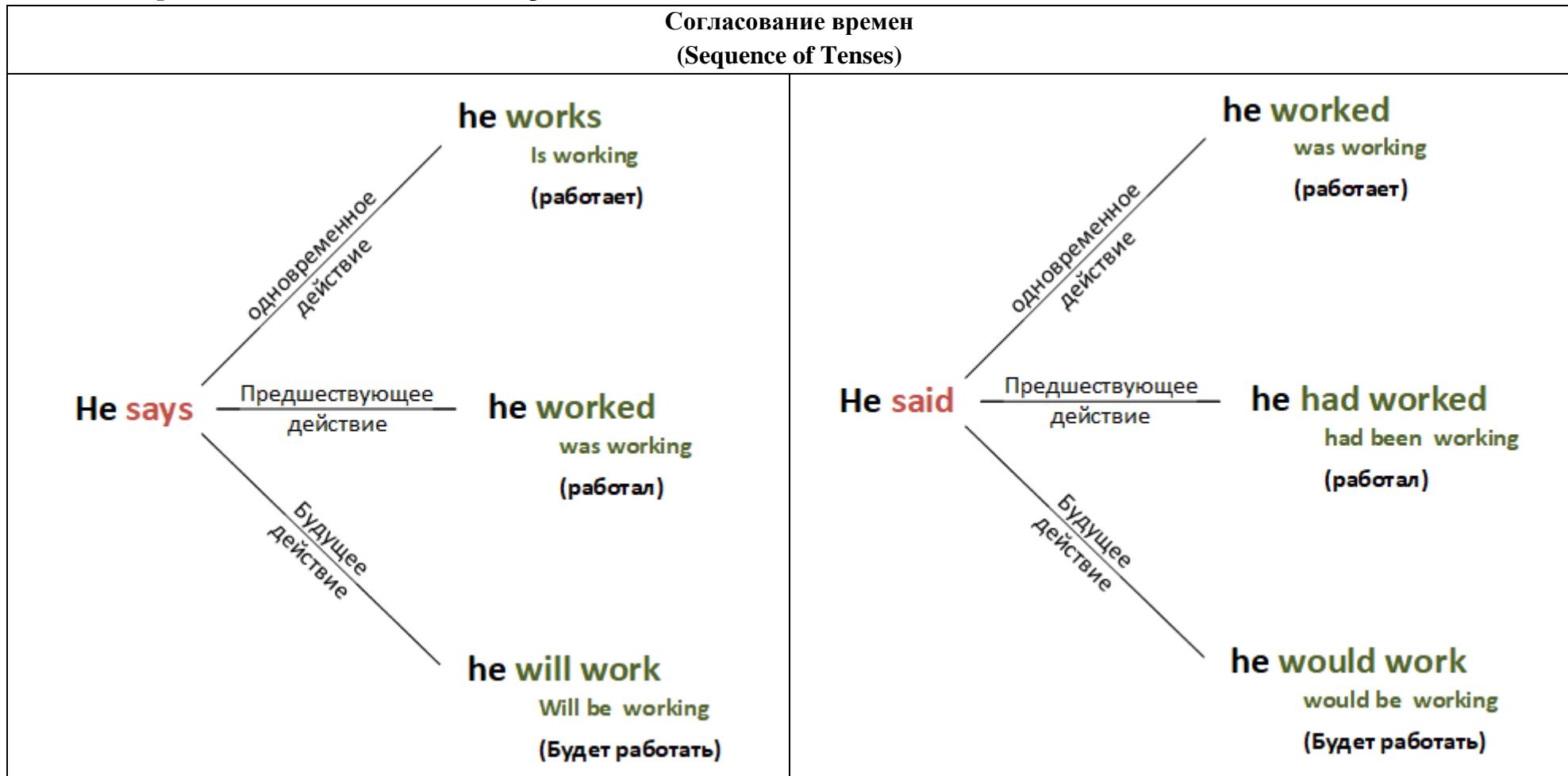
**Table 3 – Passive Voice to be + Participle II (Страдательный залог)**

<b>Страдательный Залог (Passive Voice) to be + Participle II</b>	
<b>Active Voice</b>	<b>Passive Voice</b>
I <b>read</b> the book. прямое дополнение	The book <b>is read</b> (by me).
He <b>gave</b> me a book. косвенное дополнение	I <b>was given</b> a book. Мне дали книгу.
We <b>speak</b> much <b>about</b> it. предложное дополнение	It <b>is</b> much <b>spoken</b> about. Об этом много говорят.
Глаголы: <b>to affect</b> , <b>to follow</b> , <b>to influence</b> в страдательном залоге X <b>is affected by</b> Y - на X действует Y, X подвергается воздействию Y X <b>is followed by</b> Y - за X следует Y X <b>is influenced by</b> Y – на X влияет Y	

**Table 4 – Types of Questions (Типы вопросительных предложений)**

<b>Типы вопросительных предложений (Types of Interrogative Sentences)</b>		
Общие вопросы	Do you <b>work</b> ? Is she <b>reading</b> ?	Yes, I <b>do</b> . No, I <b>don't</b> . Yes, she <b>is</b> . No, she <b>isn't</b> .
Специальные вопросы	Where <b>do</b> you <b>work</b> ? What <b>is</b> she <b>reading</b> ?	I <b>work</b> at an Institute. She <b>is reading</b> a book.
Вопрос к подлежащему	Who <b>knows</b> this story	He ( <b>does</b> ).
Разделительные вопросы	You <b>work</b> much, <b>don't</b> you? She <b>can't sing</b> , <b>can</b> she?	Yes, I <b>do</b> . No, I <b>don't</b> . No, she <b>can't</b> . Yes, she <b>can</b> .
Альтернативные вопросы	Have you a flat or a room? Does he <b>know</b> French or English?	I <b>have</b> a flat. He <b>knows</b> English.

Table 5 – Sequence of Tenses (Согласование времен)



**Table 6 – Rules for Changing from Direct into Indirect Speech (Обращение прямой речи с косвенную)**

<b>Обращение прямой речи в косвенную (Rules for Changing from Direct into Indirect Speech)</b>	
<b>Прямая речь</b>	<b>Косвенная речь</b>
He <b>said to me</b> , “I <b>shall do</b> it tomorrow”.	He <b>told me</b> (that) he <b>would do</b> it the next day.
She <b>asked me</b> , “ <b>Have you written</b> the paper?”	She <b>asked me</b> if ( <b>whether</b> ) I <b>had written</b> the paper.
He <b>asked me</b> , “Where <b>do you live</b> ?”	He <b>asked me</b> where I <b>lived</b> .
She <b>said to him</b> , “ <b>Come</b> at 3 o’clock”.	She <b>asked him to come</b> at 3 o’clock.
He <b>said to me</b> , “ <b>Don’t go</b> there!”	He <b>told me not to go</b> there.
this (these) now today yesterday tomorrow ago here	that (those) then that day the day before the next day before there

**Table 7 – Types of Subordinate Clauses (Типы придаточных предложений и союзы, которыми они вводятся)**

<b>Типы придаточных предложений и союзы, которыми они вводятся</b>		
Придаточные подлежащие	союзы: that, if, whether соединительные местоимения: who, what, which	Who can do it is not known The question is if (whether) he will come
Придаточные сказуемые	соединительные наречия: when, where, how, why	He said (that) he had done it.
Придаточные дополнительные		
Придаточные определительные	относительные местоимения: who(m), whose, which, that относительные наречия: when, where, how, why	which Here is the book we've spoken about. that
Придаточные обстоятельственные	союзы: when, while, before, after, till (untill), as, as long as, as soon as, since	
времени		She'll do it when she returns.
места	where, wherever	The plant grows where the others couldn't.
причины	because, since, as, for	As it was raining, we stayed at home.
цели	that, in order that, so that, lest	She must hurry lest she (should) be late.
условия	if, unless, provided (that), supposing, in case	I'll do this work if I have time.
уступительные	though, although	Though he was very young, he was a good worker.

**Table 8 – Conjunctions (Союзы)**

<b>Союзы</b> <b>who(m), which, that</b> <b>в определительных придаточных предложениях</b>			
1.	<b>Who (m)</b> <b>that</b> <b>Which</b>	подлежащее придат. Предл. (не опускаются)  Не подлежащее прид. Предл. (опускается)	<p>The man <b>who / that</b> is sitting there is my friend.          The man (<b>whom / that</b>) you see there is my friend.          The book (<b>which / that</b>) you need is on the shelf.</p>
2.	<b>whom</b> <b>that</b> <b>which</b> (с предлогами)	<p>Here is the man</p>	<p><b>about whom</b> we have spoken.  <b>whom / that</b> we have spoken <u><b>about</b></u>.          we have spoken <u><b>about</b></u>.</p> <p>This is the house</p> <p><b>in which</b> I live.  <b>which / that</b> I live <u><b>in</b></u>.          I live <u><b>in</b></u>.</p>

**Table 9 – Modal verbs (Модальные глаголы)**

<b>Модальные глаголы (Modal verbs)</b>		
<b>can</b> <b>may</b> + bare Infinitive (Perfect Infinitive) <b>must</b>		
<b>CAN</b> <b>could</b>	1. мочь, уметь 2. возможно (Pr. Perf. в утврд. предл) 3. неужели (вопросит. предл.) не может быть (отриц. предл)	She <b>can</b> do it. She <b>can</b> have done it. <b>Can</b> she do (have done) it. She <b>can't</b> do (have done) it.
<b>to be able to</b>	быть в состоянии, удаваться	She will be able to do it.
<b>MAY</b> <b>might</b>	(просьба в вопросит. предл.) 1. можно (разрешение в утврд.предл.) 2. возможно	<b>May</b> I come in? You <b>may</b> take the book. She <b>may</b> do (have done) it.
<b>to be allowed (to)</b> <b>to be permitted (to)</b>	Иметь разрешение	He was permitted to go there.
<b>MUST</b>	1. должен 2. должно быть	She <b>must</b> do it. She <b>must</b> do (have done) it.
<b>to have (to)</b> <b>to be (to)</b>	Должен в силу обстоятельств Должен в силу плана, неизбежности	She has to do it. She is to do it.
shall (should) – <b>должен</b> will (would) – <b>хотеть</b> need – <b>нужно, надо</b> ought (to) – <b>следует, следовало бы, должен</b> to be obliged (to) – <b>быть вынужденным</b>		

**Table 10 – The Subjunctive Mood (Сослагательное наклонение)**

Сослагательное наклонение (The Subjunctive Mood)		
Аналитические формы	Синтетические формы	
	Present Future	<b>Present Subjunctive</b> I (we) ask (be, have, do) He (you, they)
I (we) <b>should</b>  He (you, they) <b>would</b>  ask (do)		<b>Past Subjunctive</b> I (we) asked (were, had, did) He (you, they)
I (we) <b>should</b>  He (you, they) <b>would</b>  have asked (have done)	Past	<b>Past Perfect Subjunctive</b> I (we) had asked (had been, had had, had done) He (you, they)
<b>Употребление</b>		
<b>1. В простых предложениях и главных</b>  I <b>should do</b> this work ( <i>today, tomorrow</i> ) I <b>should have done</b> this work ( <i>yesterday</i> )	<b>1. В условных придаточных предложениях</b>  if I <b>had time</b> if I <b>had had time</b>	if, unless, provided
<b>2. В 3-х типах придаточных предложений</b>  а) подлежащих ( <i>it's necessary ..., it's possible...</i> ) It <b>is necessary</b> that he ( <b>should</b> ) <b>do</b> this work	<b>2. после глагола wish</b>  I wish I <b>were</b> stronger.	
б) дополнительных ( <i>to order, to demand, to suggest ...</i> ) The chief <b>demanded</b> that we ( <b>should</b> ) <b>do</b> this work in time.		
в) цели ( <i>so that, lest</i> ) She must hurry <b>lest</b> she ( <b>should</b> ) <b>be</b> late.		
Had I time I <b>should do</b> this work.		had, were, could
<b>Перевод: глагол прошедшего времени + бы</b>		

**Table 11 – Conditional sentences (Условные предложения)**

Условные предложения (Conditional Sentences)		
	Изъявительное наклонение	Сослагательное наклонение
Present	I do this work if I have time.	I should do this work if I had time
Future	I shall do this work if I have time	
Past	I did this work if I had time.	I should have done this work if I had had time.

**Table 12.1 – Non-finite form of the verbs (Общая таблица неличных глагольных форм)**

Общая таблица неличных глагольных форм						
Причастие (Participle)		Герундий (Gerund)		Инфинитив (Infinitive)		
	I – ing	II – ed		- ing	to ...	
<b>Причастие I</b>	<b>Active</b>	<b>Passive</b>	<b>Active</b>	<b>Passive</b>	<b>Active</b>	<b>Passive</b>
Indefinite	asking	being asked	asking	being asked	to ask	to be asked
Continuous	-----	-----	-----	-----	to be asking	-----
Perfect	having asked	having been asked	having asked	having been asked	to have asked	to have been asked
Perf. Cont.	-----	-----	-----	-----	To have been asking	-----
<b>Причастие II</b>	<b>asked</b>					
Употребление						
1.	часть сказуемого ----- определение обстоятельство	(предлог) определение обстоятельство	подлежащее часть сказуемого дополнение (предлог) определение (предлог) обстоятельство		подлежащее часть сказуемого дополнение определение обстоятельство	
2.						
3.						
4.						
5.						
Перевод						
1.	(опр.) – причастием (обст.) - деепричастием личной формой глагола (обороты)		существительным инфinitивом деепричастием прилагательным личной формой глагола (обороты)		инфinitивом существительным деепричастием прилагательным личной формой глагола (обороты)	
2.						
3.						
4.						
5.						

**Table 12.2 – Non-finite forms of the verbs** (Общая таблица неличных глагольных форм)

**Table 13 – Participle (Причастие)**

**Table 14 – Gerund (Герундий)**

<b>Герундий (Gerund)</b>			
	<b>Active</b>	<b>Passive</b>	
Indefinite	asking	being asked	действие одновременное
Perfect	having asked	having been asked	действие предшествующее
<b>Употребление</b>		<b>Перевод</b>	
1. подлежащее	Walking	is useful.	существительное, инфинитив
2. часть сказуемого	Our aim is mastering	English.	инфинитив, существительное
3. дополнение	She likes sinning.		существительное, инфинитив
4. определение	Its boiling point is very low. (point of boiling)		существительное
	His working place is always in order. (place of work)		прилагательное
5. обстоятельство	There are many ways of solving this problem.		существительное, инфинитив
	He left the room without saying good-bye.		деепричастие, инфинитив,
	She went there for studying physics.		существительное
<b>Герундиальные обороты</b>			
(предлог) + существ. (притяж. п.) притяж. мест. Предлог + сущ. (общ. п.) + Gerund	+ Gerund	He insisted on the student's doing / their it. My friend's taking / His part in this work helped me greatly. They objected to the books being sent immediately.	
Перевод: придаточными предложениями с союзами: <i>то, что; того, чтобы и др.</i>			

**Table 15.1 – Infinitive (Инфинитив)**

Инфинитив (Infinitive)			
	Active	Passive	
Indefinite	To ask	To be asked	действие одновременное
Continuous	To be asking	-----	действие длительное
Perfect	To have asked	To have been asked	действие предшествующее
Perfect continuous	To have been asking	-----	действие длительное
Употребление	Перевод		
1. подлежащее	To walk is useful.		
2. часть сказуемого	Our aim is to master English.		
3. дополнение	She likes to sing.		
4. определение	The desire to find the solution was very strong. It will be done in the years to come. He was the first to prove it. The method to be used is not new.		
5. обстоятельство	She went there to study physics. Hydrogen reacts with oxygen to form water.		

*Разрыв таблицы 15*

**Table 15.2 – Infinitive (Инфинитив)**

Обороты		
«Объектный падеж с инфинитивом»	«Именительный падеж с инфинитивом»	Оборот «for + сущ. + инф.»
сущ. (общ. П.) глагол мест. (объект. П.)	глагол в страд. зал. сущ. (общ. п.) мест. (им. п.)	сущ. (общ. п.) For + мест. (объект. п.)
+ Infinitive	в действ. зал. + Infinitive to be + прилаг.	+ Infinitive
a) to assume, to expect, to think, to consider, to see, to hear и др.		
б) to see, to hear, to feel, to watch, to observe, to let, to make (инфinitив без to)	б) to seem, to appear, to happen, to prove, to turn out	He spoke loudly for the people/them to hear him.  It is necessary for us to do this work in time.
в) to allow, to permit, to enable, to cause, to make, to let	в) to be (un) likely, to be sure, to be certain и др.	
a) He considers the problem / it to be complicated. б) We see the boys play / them football. в) The pressure causes the ice to melt. It enabled the particles to be observed.	a) The problem / it is considered to be complicated. The boys / them are seen to play football. б) The data proved to be wrong. в) This is likely to be the case.	
Перевод		
1) прид. доп. предл (а, б) 2) простым предложением (в)	1) прид. предл. (а, б) 2) простым предложением (а, б, в)	1) прид. обст. предл. 2) простым предл.

**Table 16 – Substitution for nouns and verbs (Заместители существительных и глаголов)**

<b>Заместители существительных и глаголов</b>		
<b>Заместители существительных</b>		
<b>one (s) that (of) those (of)</b>	переводятся существительным	The result of the experiment is much better than <b>that of the previous one.</b> The results of the experiments are much better than <b>those of the previous ones.</b>
<b>Заместители глаголов</b>		
<b>to do (did)</b>	переводятся глаголом	Do (did) you work? Yes, I do (did). He works (worked) as well as his friend does (did).

**Таблица 17 – Эмфатические конструкции (Emphatic Construction)**

<b>Эмфатические конструкции (Emphatic Constructions)</b>		
<b>It is (was) .... that (which) (who) (whom)</b>	именно, как раз и др.	It is <b>the data that (which)</b> are reliable. It was <b>I who (that)</b> met him in the street yesterday. It was <b>he whom (that)</b> I met in the street yesterday It was <b>in the street that</b> I met him yesterday. It was <b>yesterday that</b> I met him in the street.
<b>It was not until (till) ... that</b>	только в, только после, только тогда, когда	It was not until the 1950's <b>that</b> the theory was developed.
<b>to do (did) + bare Infinitive</b>	действительно, фактически и др.	He <b>does (did) speak</b> English fluently.

**Table 18 – There is /are construction (Конструкция There is / are)**

Описательные обороты <b>There is (There are)</b> – “есть, имеется, находится” ставится в начале предложения, а переводится такое предложение с конца			
	+	?	-
<b>present</b>	<b>There is / There are</b>	<b>Is there...? / Are there ...?</b>	<b>There is no... / There are no... There isn't any... / There aren't any...</b>
	There is a picture on the wall. There are some pictures on the wall. There is a carpet and 2 pictures on the wall.	Is there a picture on the wall? Are there any pictures on the wall? What is there on the wall? How many pictures are there on the wall?	There is no picture on the wall. There isn't any picture on the wall. There are no pictures on the wall. There aren't any pictures on the wall.
<b>past</b>	<b>There was / There were</b>	<b>Was there...? / Were there...?</b>	<b>There was no... / There were no... There wasn't any... / There weren't any...</b>
	There were some pictures on the wall.	Was there a picture on the wall? Were there any pictures on the wall? What was there on the wall? How many pictures were there on the wall?	There was no picture on the wall. There weren't any pictures on the wall.
<b>future</b>	<b>There will be</b>	<b>Will there be...?</b>	<b>There will be no... / There won't be any...</b>
	There will be a picture on the wall. There will be pictures on the wall.	Will there be a picture on the wall? Will there be pictures on the wall? What will there be on the wall?	There will be no picture(s) on the wall. There won't be any picture(s) on the wall.
Помни о согласовании между первым существительным и глаголом “to be”! There is a pen and 2 books on the table. <b>HO!</b> There are 2 books and a pen on the table.			