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З.В. МАНЬКОВСКАЯ

АНГЛИЙСКИЙ ЯЗЫК ДЛЯ ТЕХНИЧЕСКИХ ВУЗОВ

УЧЕБНОЕ ПОСОБИЕ

Рекомендовано Межрегиональным учебно-методическим советом профессионального образования в качестве учебного пособия для студентов высших учебных заведений, обучающихся по техническим направлениям подготовки (квалификация (степень) «бакалавр»)
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Учебное пособие предназначено для развития у учащихся навыков аналитического, просмотрового и поискового чтения общенаучных текстов, пересказа текстов по опорным сигналам, а также для формирования грамматических и лексических компетенций, умения участвовать в диалоге по изученной теме, извлекать информацию для обсуждения вопросов, касающихся истории и сегодняшнего состояния физики, биологии, информатики, инноватики и других областей знаний, необходимых современному специалисту. Включает основной курс, практикум по грамматике, поурочные и заключительный тесты. Раскрываются текущие научные и технические проблемы, широко обсуждаемые в мировом информационном пространстве, что дает возможность студенту поддержать диалог на актуальные темы современной науки и техники.

Соответствует требованиям федеральных государственных образовательных стандартов высшего образования последнего поколения.

Для студентов первых и вторых курсов технических вузов любой направленности.

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Оглавление

PART IV. WORKSHOP (ФАКУЛЬТАТИВ)

APPENDIX

Предисловие

Поскольку «научно-технологический прорыв» и международное сотрудничество в XXI веке стали «национальной идеей» и приоритетными направлениями развития российского общества, появилась необходимость как можно более раннего приобщения обучаемых к научно-техническим проблемам и подготовки будущих инициативных и творческих специалистов, способных участвовать в продвижении российских научно-технических достижений на мировом уровне и превратить науку в индустрию. Наши выпускники вузов должны составить здоровую конкуренцию мировым исследователям и уметь обмениваться инновационными идеями на английском языке.

Учебное пособие по английскому языку предназначено студентам бакалавриата первого и второго курсов технических университетов всех направлений подготовки, поскольку построено на знании общенаучных и общетехнических предметов, таких как физика, биология, химия, экология, информатика, инноватика и материаловедение, входящих в программу подготовки ФГОС.

Основная цель пособия — систематизировать и закрепить полученные в средней школе знания по английскому языку, обогатить словарный запас общенаучными и узкоспециальными терминами, активизировать основные грамматические структуры для формирования навыков чтения научных текстов, извлечения из них полезной и интересной информации, передачи их содержания на английском языке, а также сформировать навыки диалогического общения по изученным темам.

В результате изучения предлагаемого учебного пособия обучающийся должен:

знать

— основы грамматики английского языка;

уметь

грамотно переводить текст по специальности с английского языка на русский и наоборот;

— компрессировать текст;

— задавать вопросы по тексту;

— пересказывать текст;

— осуществлять диалогическое общение на основе пройденной лексики и грамматики;

владеть

достаточным словарным запасом для выражения своих мыслей по тематике, определенной в программе по иностранному языку для профессионального общения;

— навыками выделения из научных текстов наиболее существенной информации, позволяющей обучающемуся обмениваться своими идеями с иностранными коллегами на английском языке.

Дидактически каждый урок содержит одну грамматическую трудность, что позволяет студенту даже с серьезными пробелами в знаниях, восстановить или преумножить свои знания. Сведения по грамматике представлены в сжатой форме — в виде таблиц — в начале каждого урока, что позволяет обращаться к ним при выполнении грамматических заданий в случае необходимости.

Особенностью данного учебного пособия является обучение пересказу научных текстов с помощью концептуальных карт (карт памяти). Процедура работы с пересказом включает в себя знакомство с содержанием текста, работу со словарем, выделение ключевой информации в тексте с помощью предложенных вопросов и, наконец, самый главный этап — организацию имеющихся в концептуальной карте опорных сигналов в единое целое.

Пособие содержит диалоги, расширяющие представления студентов по тематике урока и обогащающие словарный запас студента дополнительными словарными единицами. В пособие включены три типа заданий к диалогам: 1) разыграть готовый диалог; 2) перевести недостающие реплики одного из участников диалога и воспроизвести диалог в парах; 3) восстановить диалог по предложенным вопросам путем поиска ответов в сети Интернет.

В пособие включены дополнительные тексты для внеаудиторного чтения, что дает возможность обучить студентов поисковому и просмотровому чтению, а также переводу по теме урока. Тексты актуальны и разнообразны по форме и содержанию. Они позволяют пробудить интерес студента к тому или иному научному направлению.

В конце каждого урока имеется словарь общенаучных и узкоспециальных терминов, которые помогают студентам работать с предлагаемым материалом на уроке и дома и использовать его для самоконтроля.

Для проверки знаний обучаемого в пособие включена система поурочных тестов (Unit 1-8 Tests), тестов для промежуточного контроля (Revision Tests 1-3) и итоговый тест (Final Test).

Необходимость учета индивидуальной траектории обучения студентов потребовала включения в учебное пособие практикума по грамматике, т.е. дополнительного материала для отработки наиболее сложных грамматических явлений и трудностей, не вошедших в основной курс (нерегулярные формы множественного числа существительных, модальные глаголы и их эквиваленты, придаточные времени, относящиеся к будущему, предлоги, словообразование). Задания из практикума могут выполняться студентом самостоятельно на уроке во время индивидуального опроса текущего материала преподавателем.

Для более подготовленных студентов в пособие включен раздел «Факультатив (Workshop)», в котором предлагаются дополнительные задания повышенной сложности по словообразованию и способам выражения различных членов предложения в английском языке. Задания выполняются под руководством преподавателя или самостоятельно с последующей проверкой в аудитории.

В пособии имеется приложение, в котором приводится краткая дополнительная информация об исследователях, внесших существенный вклад в развитие мировой науки и техники, что будет способствовать созданию научной картины мира у обучающихся. В конце книги приведены список употребленных сокращений и библиография (включая сайтографию).

Part I
BASIC COURSE

UNIT 1
NATURAL SCIENCE

GRAMMAR

THE PRESENT SIMPLE TENSE
(НАСТОЯЩЕЕ ПРОСТОЕ ВРЕМЯ)

Exercise 1. **Изучите формы глаголов *to be* (быть, являться, находиться), *to have* (иметь, обладать), *to ask* (просить, спрашивать) в настоящем неопределенном (простом) времени (The Present Simple Tense).**

Глагол	Утвердительная форма	Вопросительная форма	Отрицательная форма
to be	*Единственное число* I am (I'm) You are (you're) He/she/it is (he's/she's/it's) *Множественное число* We are (we're) You are (you're) They are (they're)	*Единственное число* Am I? Are you? Is he/she/it? *Множественное число* Are we? Are you? Are they?	*Единственное число* I'm not You are not (you aren't) He/she/it is not (isn't) *Множественное число* We/you are not (we/you aren't) They are not (they aren't)
to have	I/you/we/they have (got) (I've got / You've got / we've got / they've got) *3-е лицо, единственное число* He/she/it has got (He's got / she's got / it's got)	Have I got? Have you got? Have we/they got? *3-е лицо, единственное число* Has he got? Has she got? Has it got?	I have not (haven't) got You/we/they have not (haven't) got *3-е лицо, единственное число* He has not (hasn't) got She has not (hasn't) got It has not (hasn't) got

Окончание таблицы

Глагол	Утвердительная форма	Вопроси-тельная форма	Отрицательная форма
to ask	I/you/we/they ask *3-е лицо, единственное число* He/she/it asks	Do I/you/we/they ask? *3-е лицо, единственное число* Does he/she/it ask?	I/you/we/they do not (don't) ask *3-е лицо, единственное число* He/she/it does not (doesn't) ask

PRACTICE

Exercise 1. Найдите в следующих предложениях сказуемые. Распределите их по группам: единственное число и множественное число.

Единственное число	Множественное число

1. Natural science explains and predicts nature's phenomena. 2. Natural science has two main branches: life science and physical science. 3. Physical science studies non-living systems, in contrast to the biological sciences. 4. Geophysics is the physics of the Earth and its environment in space. It is the study of the Earth that uses quantitative physical methods. 5. Earth sciences include geology, geophysics, hydrology, meteorology, physical geography, oceanography, and soil science. 6. Earth sciences today analyze petroleum and mineral resources, climate research and deal with environmental assessment and remediation. 7. Materials physics describes materials in many different ways such as force, heat, light, and mechanics. 8. Nuclear physics studies the building blocks and interactions of atomic nuclei. 9. Pharmacology is a branch of medicine and biology which studies drug action. 10. Organic chemistry considers the structure, properties, composition, reactions, and preparation (by synthesis or by other means) of carbon-based compounds, hydrocarbons, and their derivatives.

Exercise 2. **Задайте вопросы к следующим предложениям, употребляя вспомогательные глаголы *do/does/is/are*.**

1. Some scholars trace the origins of natural science as far back as pre-literate human societies. 2. Mathematical chemistry deals with novel applications of mathematics to chemistry; it concerns itself principally with the mathematical modeling of chemical phenomena. 3. Polymer chemistry is a multidisciplinary science that deals with the chemical synthesis and chemical properties of polymers or macromolecules. 4. Chemical biology is a scientific discipline that involves the application of chemical techniques and tools and manipulation of biological systems. 5. Materials science applies the properties of matter to various areas of science and engineering. 6. Nanotechnology is the study of manipulating matter on an atomic and molecular scale. 7. Earth science is a branch of physical science. 8. Atmospheric sciences study the atmosphere, its processes, the effects other systems have on the atmosphere, and the effects of the atmosphere on these other systems. 9. Soil science is the study of soil formation, classification and mapping; it looks at physical, chemical, biological, and fertility properties of soils and how these properties relate to the use and management of soils. 10. Many of the most pressing scientific problems are due to the limitations of the existing materials.

Exercise 3. **Ответьте на вопросы утвердительно (+) или отрицательно (–), используя подсказки в скобках.**

Model:
Yes, it is. No, it isn't.
Yes, it does. No, it doesn't.
Yes, they do. No, they don't.

1. Is materials science a relatively new interdisciplinary field? (+) 2. Does materials science study the structure of materials? (+) 3. Does physical science include physics, space science, chemistry, and Earth science? (+) 4. Does the scale of biology range from sub-component biophysics up to complex ecologies? (–) 5. Do early experiments in biology have their roots in the system of alchemy? (–) 6. Does physics rely on mathematics for formulation and quantification of its principles? (+) 7. Do key historical developments in soil science include Isaac Newton's theory of universal gravitation and classical mechanics,

an understanding of electricity and its relation to magnetism? ( ) 8. Does the mathematical treatment of astronomy begin with Newton's development of celestial mechanics and the laws of gravitation? (+) 9. Does Earth science relate to the study of soil? (–). 10. Do Earth sciences today deal with petroleum and mineral resources, climate research, and environmental assessment? (+).

Exercise 4. Опровергните следующие высказывания, используя отрицательные предложения и подсказки, данные в скобках.

Model: Natural science includes biology, physics, chemistry, geology, and social studies (not social studies). Natural science *doesn't deal with* social studies.

1. Geologists use a limited number of methods to understand the Earth's structure and evolution (a wide variety).
2. *Environmental Earth Sciences* is a British multidisciplinary journal about all aspects of interaction between humans, natural resources, ecosystems, special climates or unique geographic zones, and the Earth (international).
3. Natural science uses empirical evidence from observation and experimentation as well as pure logic (not pure logic).
4. Biology deals with the characteristics, classification and behaviours of organisms, their atomic structure as well as interactions of species with each other and the environment (not atomic structure).
5. The success of chemistry plays a significant role in the world politics (economy).
6. Physics is a secondary science, because all other natural sciences use and obey the principles and laws which physics formulates (fundamental).
7. The atmospheric science is a dependent branch of natural science (separate).
8. The distinctions between the natural science disciplines are always sharp, and they share a number of cross-discipline fields (undefined/blurred).
9. Ecology studies the interactions of physical, chemical, geological, and biological components of the environment, with a particular regard to the effect of human activities and the impact on biodiversity and sustainability (environmental science).

10. The resistance of materials covers chemistry, physics and engineering applications of materials including metals, ceramics, artificial polymers, and many others (materials science).

READING

Exercise 1. Прочтите текст. Озаглавьте его.

Natural science is a broad and multidisciplinary notion. It includes the subjects of biology, biochemistry, chemistry, pharmacology and physics which help look at the natural world from various perspectives — chemical, physical, mathematical, environmental, or geological.

Chemistry describes the composition of substances, their properties and reactions. Organic chemistry studies compounds which contain carbon or artificially synthesized substances. Inorganic chemistry looks at compounds that don't contain hydrocarbon radicals. It can study physical, geochemical, nuclear properties of materials.

Physics is the study of matter and energy and the interaction between them. Physics answers the questions: How did the universe begin? What are the building blocks of matter? What is an electron? Physical sciences also cover materials science and computer science. The results of physicists' work are the technological applications such as games consoles, mobile phones, MP3 players and DVDs.

Biological Sciences describe many things. Firstly, they deal with purely biological, biochemical/pharmacological issues. Secondly, they raise ecological/evolutionary problems which combine biology and Earth sciences. Thirdly, they handle physical subjects such as chemistry, physics, and biology of cells.

To sum up, natural sciences explore the scientific concepts which explain the natural world (the properties of novel nano-materials such as graphene), the richness of the living world, and complex dynamic systems such as the Earth's climate.

Exercise 2. Найдите в тексте английские эквиваленты следующих словосочетаний.

широкое понятие, мир природы, с разных сторон, искусственно синтезированные вещества, углеводородный радикал, ядерные свойства, составные части материи, биология клетки, биохимические вопросы, раскрывать научные понятия, сложные динамические системы

Exercise 3 **Заполните пропуски в предложениях, употребляя слова, данные в рамочке, в соответствующей форме.**

explore; handle; deal with; include; describe; explain

1. Natural science ... the problems of the natural world.
2. Biology ... biochemical, ecological, and physical subjects.
3. Natural sciences ... the richness of the living world.
4. Inorganic chemistry ... compounds that don't contain hydrocarbon radicals.
5. Natural sciences ... the subjects of biology, biochemistry, chemistry, pharmacology, and physics.
6. Biological sciences ... physical subjects such as chemistry, physics, and biology of cells.

RETELLING

Exercise 1. Ответьте на вопросы к тексту. Используйте эти вопросы для того, чтобы выделить в тексте основную мысль и наиболее важные детали.

1. What is natural science?
2. What perspectives does natural science look at the natural world from?
3. What does chemistry describe?
4. What are the two fields of chemistry?
5. What do physical sciences cover?
6. How do materials science and computer science interact with physics?
7. What are the major technological applications of physics?
8. What three fields of scientific interest can we subdivide biology into?

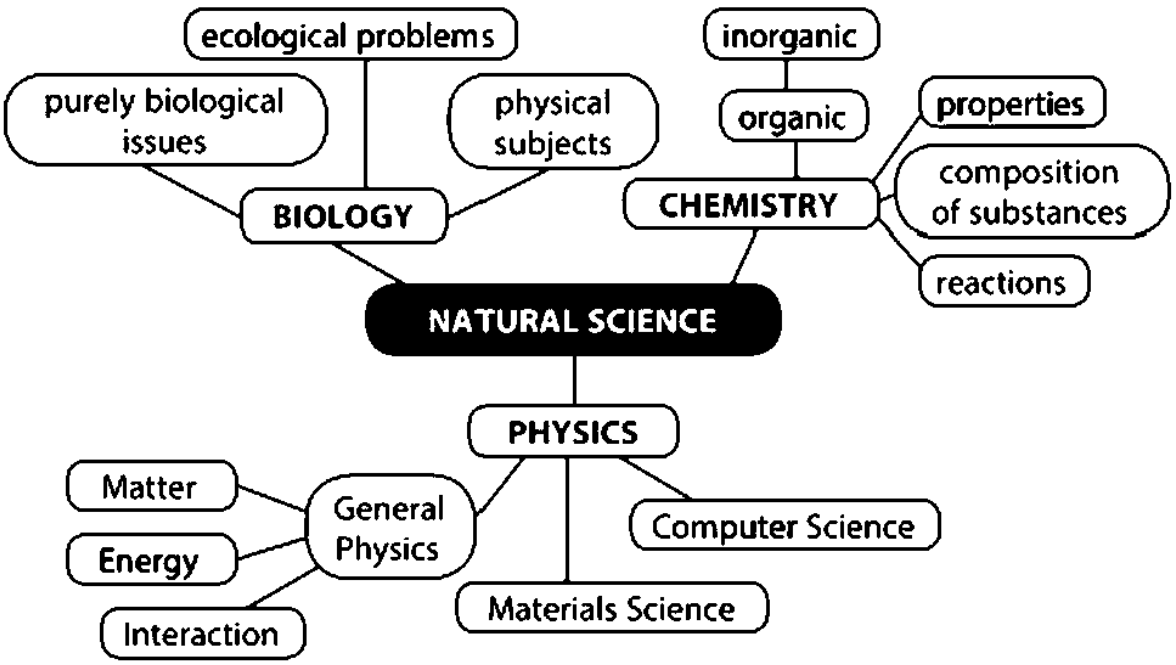
Exercise 2. Запомните следующие модели, необходимые для пересказа текста.

Speaking about the composition of something:

1. It consists of... — Наука состоит из..., включает...
2. This science handles... — Эта наука решает проблемы...

3. This text describes... В этом тексте описывается...
4. It raises the problem of... Он поднимает проблему...
5. The science studies ... — Наука изучает...
6. It deals with ... — Она имеет отношение к...

Exercise 3. **Перескажите текст, используя концептуальную карту "Natural Science" и выражения из упр. 2.**



CONVERSATIONS

Exercise 1. **Прочтите и переведите диалог. Воспроизведите его в парах.**

A: Are you a student?

B: Yes, I am. I'm a first-year student at the Space Department. I'm a future space engineer.

A: What sciences do you study?

B: We major in exact sciences, of course. But natural sciences such as biology and chemistry are also very important for our future career.

A: Yes, I know that space exploration relies on new construction materials and IT technologies which are based on discoveries in biology and chemistry.

B: I agree. By the way, what department are you at?

A: I'm at the Forestry Department. We study soil sciences, forest management and sylviculture that help to grow sustainable forests. In this we depend on space monitoring and space mapping.

B: What you say proves that modern researchers must know the basics of various sciences to do their work well.

Exercise 2. **Переведите реплики своего собеседника и разыграйте диалог в парах.**

A: Tell me something about yourself.

B: Хорошо. Я — студент первого курса технического университета, в котором много общетехнических и отраслевых кафедр, например, кафедры материаловедения, органической химии, сопротивления материалов, информационных технологий и общественных наук.

A: What department are you assigned to?

B: Наша кафедра дает глубокие знания по дисциплине «Инженерное дело». Это — очень широкая сфера. Она включает изучение фундаментальных наук и прикладную деятельность.

A: What are basic sciences?

B: Это физика, химия, биология, математика, а также науки, которые взаимодействуют с инженерными знаниями. Отличительной чертой фундаментальных наук является исследование и выявление новых фактов, которые помогают понять существующие явления.

A: What branch sciences do you focus on in your final years?

B: Мы изучаем физику и робототехнику, энергетические системы в зависимости от профиля подготовки.

Exercise 3. **Попросите своего коллегу ответить на следующие вопросы. Воспроизведите диалог в парах.**

A: Where do you study?

You: .....

A: Are you a first- or a second-year student?

You: .....

A: What subjects do you major in?

You: .....

A: What do these subjects deal with?

You: .....

ДОПОЛНИТЕЛЬНЫЕ ТЕКСТЫ ДЛЯ ВНЕАУДИТОРНОГО ЧТЕНИЯ

TEXT 1

Task. **Прочтите текст и определите, какие из предложений (1–6) соответствуют тексту. Употребляйте следующие выражения:**

That's right.
That's not quite right.
That's false.

1. Engineering careers embrace many areas.
2. The scope of engineering professions is unlimited.
3. Aerospace engineers focus on spacecraft only.
4. Aerospace engineers don't deal in acoustics.
5. Chemical engineers analyze how the manufacturing process affects the environment and the safety of workers.
6. Electrical engineers supervise electrical and electronic systems and power generation equipment.

ENGINNERING CAREERS

There is perhaps no other career that embraces so many areas as engineering — healthcare, medicine, education, agriculture, forestry, entertainment, business, etc. Future engineering specialists can choose one of the following engineering careers: aerospace engineering, bioengineering, chemical and civil engineering, computer and electrical engineering, environmental engineering, mechanical engineering and others.

Aerospace engineers design aircraft, spacecraft, satellites, and missiles. They develop new technologies for use in aviation, defense systems, and spacecraft. Aerospace engineers often become experts in one or more related fields: aerodynamics, thermodynamics, materials, celestial mechanics, flight mechanics, propulsion, acoustics, and guidance and control systems.

Chemical engineers apply the principles of chemistry, biology, physics, and maths to solve problems that involve the production or use of chemicals, fuel, drugs, food, and some other products. Chemical

engineers work in the production of energy, electronics, food, clothing, and paper. They must understand how the manufacturing process affects the environment and guarantee the safety of workers and consumers.

Electrical engineers design, develop, test, and supervise the manufacturing of electrical equipment, such as electric motors, radar and navigation systems, communications systems, or power generation equipment. They also inspect electronic equipment, instruments, and systems to make sure they meet safety standards and applicable regulations.

TEXT 2

Task. **Прочтите текст и найдите информацию о том, какой специалист занимается проектированием, установкой и обслуживанием двигателей, котлов и шахт, которые обеспечивают энергией морской флот. Подкрепите свой вывод фактами из текста.**

MECANICAL ENGINEERING

Mechanical engineers deal in the development and use of new materials and technologies. The scope of tasks they perform is wide. They can develop medical products (such as mechanical hearts), improve production processes in large oil refineries or design services within buildings.

Mechanical engineers can work in many different industries like construction, marine, materials and metals, as well as oil companies.

Mechanical engineers in the construction sector design the heating, ventilation, air conditioning and smoke ventilation systems that make up buildings.

Mechanical engineers in the marine industry design, install or maintain the engines, boilers, shafts and propellers that power the world fleet.

A mechanical engineer in the materials and metals industry works on the maintenance lifecycle of the mechanical plant items such as steam turbines, gas turbines, pumps, valves, pipes, coal mills, fans, etc.

A mechanical engineer at an oil company makes sure that gas turbines, compressors, heaters, vessels and pipes are reliable, efficient and safe to use.

TEXT 3

Task. Прочтите текст и переведите его письменно.

WHO ARE MATERIALS ENGINEERS?

Materials engineers develop, process, and test many different materials such as ceramics, composites, steel and alloys, plastics and semiconductors to create a range of products from computer chips and aircraft wings to golf clubs and biomedical devices. They also use their expertise to produce specifications to apply materials effectively and provide technical advice about the suitability of materials.

Their expertise lies in understanding the properties and behaviours of different substances, from raw materials to finished products. That's why they can determine causes of product failure and try to overcome such failures.

Materials engineers create and study materials at the atomic level. They use computers to understand and model the characteristics of materials and their components.

Materials engineers need sound scientific and technical knowledge as well as commercial awareness.

VOCABULARY

NAMES OF SCIENCES AND DEPARTMENTS

applied research — прикладная деятельность
applied sciences — прикладные науки
atmospheric science — наука об атмосфере
basic sciences — фундаментальные науки
branch department — отраслевая кафедра
celestial mechanics — небесная механика
computer science — информатика
Earth science наука о планете Земля
environmental science — наука об окружающей среде
general-engineering department — кафедра общеинженерной подготовки
geophysics — геофизика
life science — наука о жизни
materials science — материаловедение

natural science — естественные науки
organic chemistry — органическая химия
physical science — физика, физические науки
polymer chemistry — химия полимеров
resistance of materials — сопротивление материалов
social studies — общественные науки, обществоведение
soil science — почвоведение
space science — космическая наука

GENERAL SCIENTIFIC TERMS

application — применение
cell — клетка
composition — состав
compound — соединение
console — консоль, терминал
engineering — техника, инженерное дело
fertility — плодородие; рождаемость
graphene — графен
hydrocarbons — углеводороды
interaction — взаимодействие
mapping — составление карт, картографирование
matter — материя
phenomenon — явление, феномен
property — свойство
substance — вещество

UNIT 2
BIOLOGICAL SCIENCES

GRAMMAR

PARTICIPLE I. THE PRESENT CONTINUOUS TENSE (ПРИЧАСТИЕ I. НАСТОЯЩЕЕ ПРОДОЛЖЕННОЕ ВРЕМЯ)

Exercise 1. **Запомните, как образуются причастие настоящего времени (Participle I) и настоящее длительное (продолженное) время (The Present Continuous Tense). Обратите внимание на то, что Participle I входит в состав The Present Continuous Tense.**

Глагольная форма	Participle I (Причастие I, причастие настоящего времени)	The Present Continuous Tense (Настоящее продолженное время)
Образование формы	*Основа глагола* + *-ing*	am/is/are + *Participle I*
	ask + *-ing* → asking (спрашивающий) translate + *-ing* → translating (переводящий)	I am asking. You are asking. He/she/it is asking. We/they are asking.
Пример	The engineer working in our department is my brother. — Инженер, работающий в нашем отделе, мой брат.	I am asking. — Я спрашиваю (сейчас). He is translating. — Он сейчас переводит.

PRESENT SIMPLE AND PRESENT CONTINUOUS COMPARED (НАСТОЯЩЕЕ ПРОСТОЕ И НАСТОЯЩЕЕ ПРОДОЛЖЕННОЕ В СРАВНЕНИИ)

Exercise 2. **Сравните употребление настоящего неопределенного (простого) времени (Present Simple) и настоящего длительного (продолженного) времени (Present**

Continuous). Обратите внимание на наречия времени и частотности, которые помогают определить характер передаваемого действия. Запомните различия в образовании утвердительной, вопросительной и отрицательной формы.

Время	Present Simple	Present Continuous
Характер действия	Регулярное, повторяющееся действие	Действие происходит в момент речи
Наречия времени и частотности	always (всегда), usually (обычно), often (часто), sometimes (иногда), seldom (редко), never (никогда)	now (сейчас), at the moment (в данный момент), at present (в настоящее время), currently (в текущий момент), today (сегодня)
Утвердительная форма	I always tell the truth. You usually sleep well. We often ask for help. He sometimes makes mistakes. They never break laws.	Believe me. I am telling the truth. You are sleeping well today. We are asking for help at the moment. He is making a mistake now. They are breaking the law.
Вопросительная форма	Do I always tell the truth? Do you usually sleep well? Do we often ask for help? Does he sometimes make mistakes? Do they ever break laws?	Am I telling the truth? Are you sleeping now? Are we asking for help? Is he making a mistake? Are they breaking the law?
Отрицательная форма	I don't always tell the truth. You don't usually sleep well. We don't often ask for help. He doesn't often make mistakes.	I'm not telling the truth. You aren't sleeping now. We aren't asking for help. He isn't making a mistake.

Окончание таблицы

Время	Present Simple	Present Continuous
Отрица-тельная форма	They don't often break laws. They never break laws.	They aren't breaking the law.

PRACTICE

Exercise 1. Прочтите и переведите следующие предложения, обращая внимание на сказуемые в Present Continuous.

1. We are attending a course in biology, biochemistry, and genetics.
2. They are studying the evolution, natural history, and conservation of plants and animals; the interactions of living organisms with light, and the environment.
3. Students are doing a course in environmental degradation; they are discussing threats to human health, and how to maintain viable and abundant food supplies.
4. I am learning teamwork and social skills which make me stand out not only as a future biologist but also as an individual.
5. Students are exploring the properties, structure and function of tissues from complex organisms, as well as differentiation of cells to produce those tissues.
6. We are comparing nerves and hormones as methods of communication in living systems.
7. The researcher is demonstrating the role of microbes in nutrient cycling.
8. High-school students are making an experiment to prove that fizzy drinks are fizzy because they undergo a steady chemical reaction that releases carbon dioxide.
9. Scientists are looking at the properties of carbon, the structures of hydrocarbons, and different types of isomerism.
10. Do you know that cells are continually "talking" to one another and that this molecular conversation allows the cells in your body to coordinate their activities?

Exercise 2. **Познакомьтесь с интересными фактами, приведенными ниже, и найдите предложения, содержащие The Present Continuous Tense.**

1. Your brain never stops working even when you are sleeping, it works towards dreams.
2. Our eyes can identify 10 million colors and nose can remember 50,000 scents.
3. No, we are not lying! If you rub onion on your feet, you can taste it in 30-60 minutes. It is because it travels through blood streams.
4. Your body reacts with panic when somebody is tickling you, as it's your brain's way of telling you that a bug is crawling on you. So your laugh is fear!
5. There are more organisms living on the skin of one human than there are humans living on planet Earth.
6. People sometimes get a fever as a side effect of a vaccine. They are not catching the disease. The body is simply practicing how to kill that virus if it ever comes into the body (and fever is an important part of that).
7. When we sleep and dream, our brains carry out important functions that they cannot perform while they are focusing on movement and conscious thought.
8. A human's ears and nose are constantly growing.
9. The observation that our organisms are behaving more like ant-colonies than mechanical clocks is fascinating many.
10. Human saliva contains a painkiller called opiorphin that is six times more powerful than morphine.

Exercise 3. **Задайте вопросы к следующим предложениям, употребляя вопросительные слова, данные в скобках.**

1. The book of Wilson and Holdober *Journey to the Ants* is opening a completely unknown world of mathematics of complex systems. (*What?*)
2. If you're heading to a concert or a musical after a big meal you are doing yourself a disservice. Try eating a smaller meal if you need to keep your hearing pitch perfect. (*When?*)
3. Researchers are cloning a wide range of biological materials, such as genes, cells, tissues and even entire organisms, such as a sheep. (*What kind of...?*)

4. You have no sense of smell when you are sleeping. (*When?*)
5. While some bacteria can make you sick, others are helping you digest food or even make yoghurt. (*What?*)
6. Most of us are unaware of the fact that mechanics and physics of the 17th and 18th centuries are still dominating our thinking. (*What sciences?*)
7. You aren't mentally lacking if you can't recall your dreams. (*What?*)
8. You're shedding 60-100 strands of hair on a daily basis. (*How many?*)
9. You're trimming your fingernails much more frequently than your toenails. It's a fact; you're not just imagining it. (*How often?*)
10. Sneeze is rocketing out of your body at close to 100 mph. (*How fast?*)

Exercise 4. Сравните предложения в Present Simple и Present Continuous. Переведите их на русский язык.

1. Today, biophysics is seeking to answer diverse biological questions.
2. More and more colleges and universities are offering undergraduate and graduate degrees in biophysics.
3. Biophysics applies the theories and methods of physics to questions of biology.
4. Biophysical research significantly overlaps with biochemistry, nanotechnology, bioengineering, computational biology, biomechanics, and systems biology.
5. Scientists are conducting research to understand the interactions between various systems of a cell, as well as the interactions between DNA, RNA, and protein biosynthesis.
6. Researchers use fluorescent imaging techniques as well as electron microscopy, X-ray crystallography, NMR spectroscopy, atomic force microscopy (AFM), and small-angle scattering (SAS) both with X-rays and neutrons (SAXS/SANS) to visualize structures of biological significance.
7. Biophysicists draw knowledge and experimental techniques from a wide variety of disciplines, to directly observe, model or even manipulate the structures and interactions of individual molecules or complexes of molecules.
8. It is becoming increasingly common for biophysicists to apply the models and experimental techniques from physics as well as mathematics and statistics to larger systems such as tissues, organs, populations, and ecosystems.

9. If you are considering MCB (School of Molecular and Cellular Biology) as a major, the MCB Advising Program offers tours of laboratories and classrooms, and opportunities to meet one-on-one with MCB faculty and instructors.
10. Diatom populations (the most beautiful of the algae) often bloom in lakes in the spring. They are providing a major food for zooplankton, forming the base of the aquatic food chain.

READING

Exercise 1. Прочтите и озаглавьте текст.

There are many different areas of study under the umbrella of biological sciences. They include anatomy, physiology, cell biology, molecular biology, conservation, ecology, genetics, microbiology, and electrophysiology.

Within biological sciences there is a range of disciplines including biochemistry, biophysics, biomedicine, microscopy, pathobiology, evolutionary biology, and management of biological resources.

Their aim is to study all organisms from microorganisms, animals to plants as well as biological structure and function at various levels, from molecules to cells, and to beyond into communities and ecosystems. Besides, biologists are looking into the ethical priorities for neurotechnology and artificial intelligence.

Nowadays, cell biology, developmental biology, evolutionary biology, genetics, energy, homeostasis, and ecology are advancing rapidly.

The careers that biology opens for young people vary from health care to management and education.

Biologists in the health care are developing public health campaigns to defeat illnesses such as tuberculosis, AIDS, cancer, and heart disease. They are working to prevent the spread of rare, deadly diseases such as the now infamous Ebola virus.

Biologists in management and conservation careers are trying to solve environmental problems and conserve the natural world for future generations.

Biology education professionals are encouraging people to learn new things about biology whether in a classroom, a research lab, the field, or a museum.

Exercise 2. **Найдите в тексте английские эквиваленты следующих слов и словосочетаний.**

под эгидой биологических наук, в рамках биологических наук, и далее выходить на уровень сообществ и экосистем, приоритетные задачи в области этики, искусственный интеллект, глубоко изучать, быстро развиваться, здравоохранение, распространение, небезызвестный/пресловутый вирус, сфера/область

Exercise 3. **Заполните пропуски в предложениях, употребляя слова, данные в рамочке.**

cell biology; electrophysiology; artificial intelligence; pathobiology; developmental biology; genetics; neurotechnology; microscopy; molecular biology

1. ... examines the life cycle of a cell, cell division, the formation of cells, types of cells, the structure of cells, and/or the function of a cell.
2. Modern ... studies the genetic control of cell growth and deals with the processes of growth and change that transform an organism to its full structure.
3. ... is the study of electric activity in the body.
4. ... is about how people understand the brain and various aspects of consciousness, thought, and higher order activities in the brain.
5. ... describes how living things pass on characteristics (or traits) and their variations in their cell make-up from one generation to the other.
6. ... is the study of the causes of diseases with greater emphasis on biological aspects than on medical aspects.
7. ... is the technical field of using microscopes to view objects and areas of objects that cannot be seen with the naked eye.
8. ... is the simulation of human intelligence by machines.
9. ... deals with the structure and function of the macromolecules (e.g. proteins and nucleic acids) which are essential to life.

RETELLING

Exercise 1. **Ответьте на вопросы к тексту. Используйте эти вопросы для того, чтобы выделить в тексте основную мысль и наиболее важные детали.**

1. What sciences are grouped under the umbrella of biological sciences?
2. What is the aim of these sciences?
3. Which biological sciences are advancing rapidly nowadays?
4. What careers do biological sciences train students for?
5. What do biologists in the health care deal with?
6. What are biologists in management and conservation careers working on?
7. What are biology education professionals trying to prove?
8. How do future biologist specialists gain experience and knowledge?

Exercise 2. **Выучите модели, которые потребуются вам для пересказа текста.**

Speaking about the aims of the text:

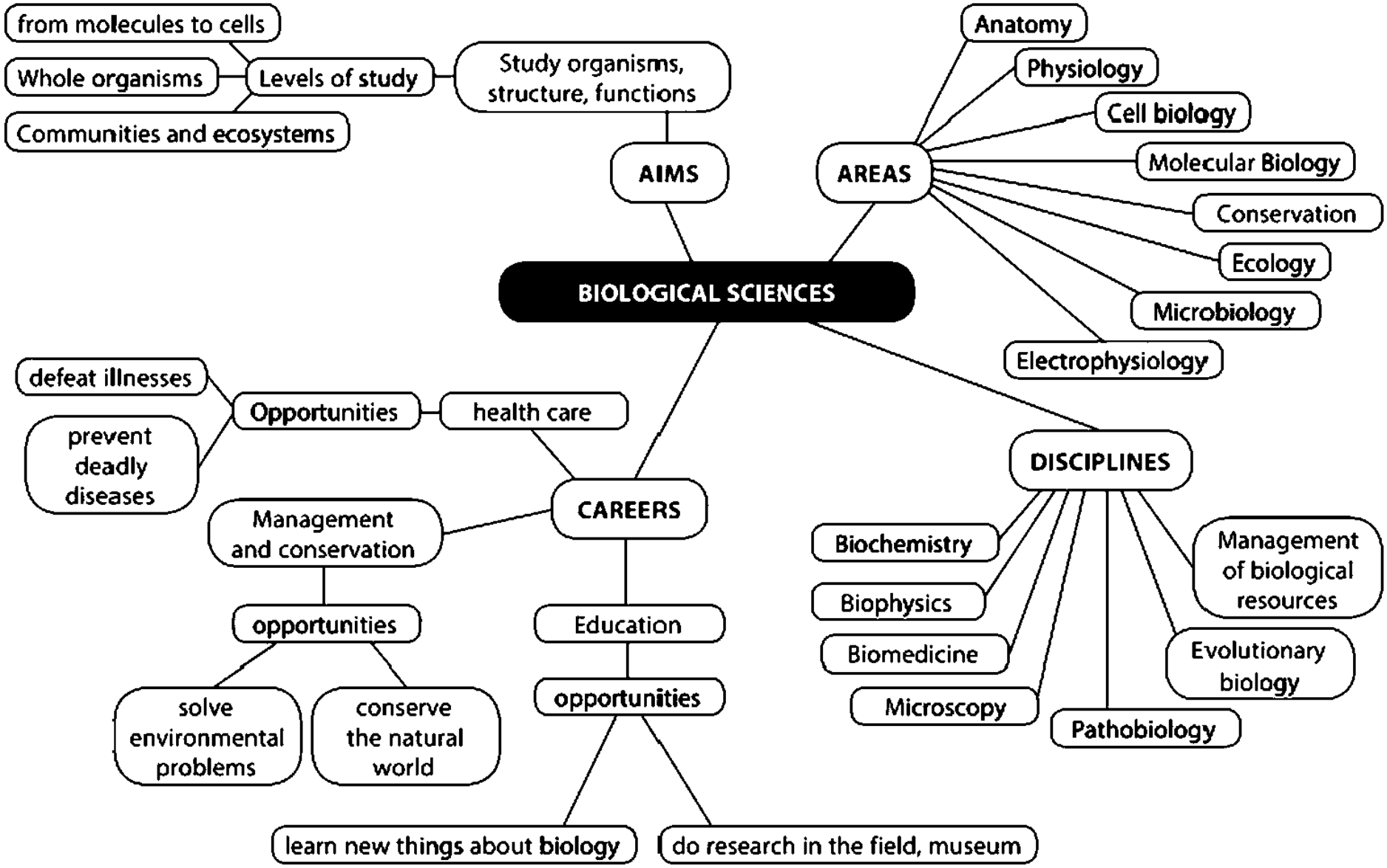
The text describes (considers, systematizes)... — В тексте описывается (рассматривается, систематизируется)...

The author (researcher) enumerates... — Автор (исследователь) перечисляет...

The text specifies... — В тексте уточняется (приводятся детали)...

The text highlights... — В тексте подчеркивается (указывается)...

Exercise 3. **Перескажите текст, используя концептуальную карту "Biological Sciences" (с. 30) и выражения из упр. 2.**


BIOLOGICAL SCIENCES
AIMS
Study organisms, structure, functions
Levels of study
from molecules to cells
Whole organisms
Communities and ecosystems
AREAS
Anatomy
Physiology
Cell biology
Molecular Biology
Conservation
Ecology
Microbiology
Electrophysiology
CAREERS
Opportunities
health care
defeat illnesses
prevent deadly diseases
Management and conservation
opportunities
solve environmental problems
conserve the natural world
Education
opportunities
learn new things about biology
do research in the field, museum
DISCIPLINES
Biochemistry
Biophysics
Biomedicine
Microscopy
Pathobiology
Evolutionary biology
Management of biological resources

CONVERSATIONS

Exercise 1. Прочтите и переведите диалог. Воспроизведите его в парах.

A: You know what? We are studying the biology of cells this semester. It's a very interesting subject.

B: What is it about?

A: In a nutshell, it is about the structure and formation of cells. By the way, do you know who the discoverer of a cell is?

B: As far as I know it's the English scientist Robert Hooke.

A: You are right. In his landmark book *Micrographia*, Hooke compares tiny spaces, which he can see through the microscope, with a honeycomb and calls these spaces "cells" because they resemble the small rooms monks live in (*cella* in Latin). There are more than a million cells in a square inch. By the way, scientists estimate that our bodies contain from 75 to 100 trillion cells.

B: Really? It's amazing.

A: Yes. We learn a lot of interesting facts about cells at our lectures and seminars. Can you imagine that cells range in size from 1 to 100 micrometres, and about 95% of all the cells in a human body are bacteria which live within the digestive tract or on the skin?

B: I can't believe that.

A: At the moment we are studying how cells behave when they undergo some type of infection. You know they self-destruct by a process called apoptosis. If a cell's unable to undergo apoptosis, it can result in the development of cancer.

B: The mind boggles.

Notes

in a nutshell — если говорить кратко; короче говоря
the mind boggles — уму непостижимо; в голове не укладывается

Exercise 2. Переведите реплики своего собеседника и разыграйте диалог в парах.

A: Расскажите мне о проведении биологических экспериментов на Международной космической станции (МКС). Я никак не могу

понять, что заставляет космические агентства тратить столько денег на них. Мне кажется, это неразумно.

B: You see, there are special conditions in space which are the result of microgravity. In microgravity, cosmonauts or astronauts can grow plants and cells, study bacterial virulence, the resistance of microbiological specimens to radiation environment and the formation of cell structures like roots, stems, etc.

A: Это всё биологические опыты, не так ли?

B: Yes, they are. The science that studies these issues is called Space Biology. Space biologists grow plants to provide cosmonauts with food such as zucchini, maize, rye, wild carrot, lettuce, radish, rice, and onions. Space biology also studies weightless environment, how it affects cosmonauts' bones and develops new therapies for osteoporosis and other bone diseases.

A: Эти эксперименты очень дорогостоящие. Сколько стран участвует в их проведении на МКС?

B: Some 15 countries and space agencies from the United States, Russia, Europe, Canada, and Japan are building the outposts to take part in the experiments.

A: Спасибо за информацию.

Exercise 3. **Попросите своего коллегу ответить на следующие вопросы. Воспроизведите диалог в парах.**

A: What are the most promising biological spheres at the moment?

You: .....

A: Is climate change the major threat facing the planet? Are you pessimistic or optimistic about the planet future?

You: .....

A: Who is the author of *On the Origin of Species*? What is the influence of this treatise on the development of biological science?

You: .....

A: What results of space biological experiments do we use on Earth?

You: .....

ДОПОЛНИТЕЛЬНЫЕ ТЕКСТЫ ДЛЯ ВНЕАУДИТОРНОГО ЧТЕНИЯ

TEXT 1

Task. **Прочтите текст и определите, какие из предложений (1–4) соответствуют тексту. Употребляйте следующие выражения:**

That's right. That's not quite right. That's false.

1. Biological research helps people with health problems improve the quality of life.
2. AvioCor artificial heart has many advantages over its predecessors.
3. Dr. Kenneth Matsumura's invention uses only artificial components.
4. The bionic eye looks after the biological conditions of the whole organism.

Today, people are witnessing the appearance of numerous inventions based on biological research some of which are already helping patients worldwide.

AvioCor is a company that is more technically advanced than all of its predecessors. It offers artificial hearts that help patients who have heart failures. The advantage of a new-generation artificial heart is that it doesn't tie a patient to a bed. Patients don't have to lie in bed all the time. They can move and perform simple operations.

Another breakthrough in medicine is Dr. Kenneth Matsumura's artificial liver. Matsumura's device makes use of animal liver cells instead of an apparatus with many tools to carry out each of the liver's functions. The device is called "bio-artificial" due to the fact that it has both biological and artificial component parts. The blood of the user circulates through the device and a unique synthetic membrane. The membrane plays an important role in the device — it prevents the rejection of the cells, the cells detoxify the user's blood just like a natural liver.

Researchers from the University of Washington in Seattle are working on the improvement of the bionic eye which is the combination of an elastic contact lens with an imprinted electronic circuit. Drivers and pilots are the primary users of the invention because new bionic lens

provide them with routes and information on weather or the vehicle. Besides, the lens help monitor a person's biological conditions such as cholesterol level or the presence of viruses and bacteria. The collected data can then be sent wirelessly to a computer for analysis.

TEXT 2

Task. **Прочтите текст и найдите информацию о том, как биомеханика — наука о механических свойствах живых тканей и отдельных органов и систем в организме — выявляет новые возможности проведения исследований в области нейрологии, биохимии и робототехники.**

WHAT DOES BIOMECHANICS DEAL WITH?

Neuroscientist Greg Gage takes sophisticated equipment to study the brain. He hooks up the *Mimosa pudica*, a plant whose leaves close when you touch them, and the Venus flytrap to an EKG to show us how plants use electrical signals to convey information, prompt movement and even count.

Chemical biologist Carolyn Bertozzi researches how sugars on cancerous cells interact with (and sometimes trick) a patient's immune system. She observes that if a researcher coats cells with sugars that store information and speak a secret language, they tell a patient blood type and, potentially, that the patient has cancer. The scientist proves that a person's body detects cancer and describes how the latest cancer-fighting medicines can help an immune system beat the disease.

Roboticist Jonathan Rossiter demonstrates a special swimming machine "Row-bot", which uses a microbial fuel cell to neutralize algae blooms and oil slicks to clean up pollution and generate the electricity needed to power itself by swallowing dirty water. He declares that the machine can be a precursor to biodegradable, autonomous pollution-fighting robots.

TEXT 3

Task. **Прочтите текст и переведите его письменно.**

Plants are integral to human well-being, and many species are over ten thousand years old. We can find evidence of plant scientific

investigation and classification in ancient texts from cultures around the world (Chinese, Indian, Greco-Roman, Muslim, etc.), while early modern botany comes from the late 15th and early 16th centuries in Europe. Molecular biology and the genomic era contribute to plant biology. The model organism *Arabidopsis thaliana* is an invaluable tool for investigation into fundamental processes in plant biology, many of which have common features with animal biology. Plant-specific processes from reproduction to immunity give rise to extensive investigation. Scientists know the genomes of more than thirty plant species, and they are planning to come out with new ones in the near future. Needless to say, the impact of this information on our understanding of plant evolution and biology is continuing to grow.

Our increased ability to engineer plant species may provide novel solutions to ensure adequate and reliable food production and renewable energy even as climate change makes an impact on our environment. The importance of plant science reflects the enormous research progress of recent years and is also a launch pad for future discoveries and application.

VOCABULARY

AREAS OF BIOLOGICAL RESEARCH

bioengineering биоинженерия
computational biology вычислительная биология
conservation — сохранение природных ресурсов
crystallography — кристаллография
developmental biology — биология развития
electrophysiology — электрофизиология
nanotechnology — нанотехнология
NMR spectroscopy спектроскопия ЯРМ
neurotechnology — нейротехнология
pathobiology — патобиология
systems biology — биология систем

BIOLOGICAL AND GENERAL SCIENTIFIC TERMS

apoptosis апоптоз, клеточное отмирание
artificial liver — искусственная печень
biodegradable — биоразлагаемый

bionic eye — бионический глаз
breakthrough — прорыв
cholesterol level — уровень холестерина
consciousness — сознание
diatom population — диатомовые водоросли
disease — болезнь
diverse — разнообразный
flytrap — мухоловка
issue — вопрос, проблема
homeostasis — гомеостаз (*поддержание постоянства внутренней среды организма*)
hydrocarbons — углеводороды
microbial fuel cell — микробиологический топливный элемент
nucleic acid — нуклеиновая кислота
nutrient cycling — круговорот питательных веществ
osteoporosis — остеопороз (*заболевание костной ткани, вызывающее повышенную ломкость костей*)
precursor — предшественник
rejection — отторжение
small-angle scattering — малоугловое рассеяние
sophisticated equipment — передовое оборудование
specimen — образец
tissue — ткань
trait — черта, особенность
virulence — вирулентность, ядовитость

UNIT 3
PHYSICAL SCIENCES

GRAMMAR

THE PAST SIMPLE TENSE
(ПРОСТОЕ ПРОШЕДШЕЕ ВРЕМЯ)

Exercise 1. **Запомните формы прошедшего неопределенного (простого) времени (The Past Simple Tense) глаголов *to be*, *to have*, правильных глаголов (на примере глагола *to ask*) и неправильных глаголов (на примере глагола *to break*).**

Глагол	Утвердительная форма	Вопросительная форма	Отрицательная форма
to be	*Единственное число*: was I was He/she/it was *Множественное число*: were You were We were They were	*Единственное число* Was I? Was he? Was she? Was it? *Множественное число* Were you? Were we? Were they?	*Единственное число* I was not (wasn't) He was not (wasn't) She was not (wasn't) It was not (wasn't) *Множественное число* You were not (weren't) We were not (weren't) They were not (weren't)
to have	I had You had He/she/it had We had They had	Did I have? Did you have? Did he/she/it have? Did we have? Did they have?	I did not (didn't) have You did not (didn't) have He/she/it did not (didn't) have We/they did not (didn't) have

Окончание таблицы

Глагол	Утвердительная форма	Вопросительная форма	Отрицательная форма
Правильные глаголы: **to ask**	Verb + ***-ed*** I asked You asked He/she/it asked We/they asked	Did I ask? Did you ask? Did he/she/it ask? Did we ask? Did they ask?	I did not (didn't) ask You did not (didn't) ask He/she/it did not (didn't) ask We/they did not (didn't) ask
Неправильные глаголы: **to break** (broke, broken)	Verb 2 I broke You broke He/she/it broke We/they broke	Did I break? Did you break? Did he/she/it break? Did we/they break?	I did not (didn't) break You did not (didn't) break He/she/it did not (didn't) break We/they did not (didn't) break

COMPARISON OF PAST SIMPLE AND PAST CONTINUOUS (ПРОСТОЕ ПРОШЕДШЕЕ И ПРОШЕДШЕЕ ПРОДОЛЖЕННОЕ ВРЕМЯ В СРАВНЕНИИ)

Exercise 2. **Сравните формы глаголов в Past Simple и Past Continuous. Обратите внимание на образование вопросительной и отрицательной формы.**

Время	Past Simple	Past Continuous
Характер действия	Однократное действие в прошлом	Действие длилось в определенный момент или во время другого действия в прошлом
Образование формы	*Для правильных глаголов*: Verb + ***-ed***	*Единственное число*: **was** + V + ***-ing*** *Множественное число*: **were** + V + ***-ing***

Окончание таблицы

Время	**Past Simple**	**Past Continuous**
Образование формы	*Для неправильных глаголов*: Verb 2	
Наречия времени	2 days/weeks/years ago; last week/month/year; in 2016	at 2 o'clock yesterday; from 5 to 6 yesterday; the whole day yesterday; when the CEO came in; when he was making an experiment
Утвердительная форма	I/you/he/she/it/we/they worked	I/he/she/it was working You/we/they were working
Вопросительная форма	Did I/you/he/she/it/we/they work?	Was I/he/she/it working? Were you/we/they working?
Отрицательная форма	I/you/he/she/it/we/they did not (didn't) work	I/he/she/it was not (wasn't) working You/we/they were not (weren't) working
Примеры и перевод	A. Popov invented the radio in 1895. А. Попов изобрел радио в 1895 г. He took part in an International conference last year. — Он принял участие в международной конференции в прошлом году.	He was writing a report the whole evening yesterday. Он писал отчет весь вечер вчера. He was having dinner when the light went off. — Он ужинал, когда погас свет. They weren't listening to him when he was explaining the rule. — Они не слушали, когда он объяснял правило.

PRACTICE

Exercise 1. **Прочтите и переведите следующие предложения, обращая внимание на сказуемые в Past Simple. Подчеркните глаголы в Past Simple.**

1. The move towards a rational understanding of nature began at least since the Archaic period in Greece (650-480 B.C.) with the Pre-Socratic philosophers.
2. Heraclitus proposed that the only basic law which governs the Universe was the principle of change and that nothing remains in the same state indefinitely.
3. Aristotle founded the system known as Aristotelian physics. He attempted to explain ideas such as motion (and gravity) with the theory of four elements.
4. Important physical and mathematical traditions existed in ancient Chinese and Indian sciences.
5. Maharishi Kanada, an Indian philosopher, systematically developed a theory of atomism around 200 B.C.
6. The study of magnetism began in Ancient China in the 4th century B.C.
7. Ibn Sīnā (Avicenna), from Bukhara (in present-day Uzbekistan), contributed to physics, optics, philosophy, and medicine.
8. There was a breakthrough in astronomy when a Polish astronomer Nicolaus Copernicus (1473-1543) gave strong arguments for the heliocentric model of the Solar system in 1543.
9. The Italian mathematician, astronomer, and physicist Galileo Galilei (1564-1642) described a hydrostatic balance, and his treatise on the centre of gravity of solid bodies made him famous.
10. Sir Isaac Newton (1642-1727), the greatest and most influential scientist of all times, formulated an empirical law of cooling, studied the speed of sound, investigated power series, demonstrated the generalized binomial theorem and developed a method for approximating the roots of a function. He effectively established the foundation for modern society in mathematics and science.

Exercise 2. **Познакомьтесь с интересными фактами, приведенными ниже, и найдите предложения, содержащие Past Continuous Tense.**

1. The story goes that the young Isaac Newton was sitting in his garden when an apple fell on his head, and he suddenly came up with his theory of gravity.
2. In the 1650s, while Blaise Pascal was trying to create a perpetual motion machine, he stumbled upon an accidental invention, and in 1655 Pascal's roulette machine was born.
3. Albert Einstein found proof of the existence of atoms, while he was analyzing the phenomenon of Brownian motion, in which tiny particles were suspended in water.
4. The Michelson-Morley experiment set out to measure different speeds of light depending on whether or not the light was "swimming" with or against the ether's current (ether is the hypothetical medium, even the vacuum of space, that light moved through).
5. Alexander Graham Bell got interested in acoustics when he was helping his mother to fight with her deftness.
6. While Alexander Graham Bell was working with his father who was explaining his methods of how to instruct deaf-mutes (as they were then known) to articulate words and read other people's lip movements, he learnt to decipher Visible Speech and represented virtually every language, including Latin, Scottish, Gaelic, and even Sanskrit.
7. While Zhores Alferov was creating the heterotransistor, he revolutionized semiconductor design in LEDs, barcodes readers, and CDs and improved the mobile phone and satellite communications which made it possible to transfer all the information from satellites down to Earth or to have so many telephone lines between cities.
8. When Victor Amazaspovich Ambartsumian, a Soviet Armenian scientist, was researching the inter-stellar matter in the Galaxy, he developed the fluctuation theory and elegantly described the fluctuations in brightness in the Milky Way, which became a new direction in astronomy.
9. When Niels Henrik David Bohr was giving lectures on thermodynamics at the University of Copenhagen, he adapted Rutherford's nuclear structure to Max Plank's quantum theory and so created his Bohr model of the atom.

10. When a physicist Ernest Rutherford shot a beam of alpha particles at a sheet of gold foil, a few of the particles were deflected. He concluded that a tiny, dense nucleus was causing the deflections.

Exercise 3. Задайте вопросы к следующим предложениям, употребляя вопросительные слова, данные в скобках.

1. Before the mid-1950s scientists believed that nature was mirror symmetric. In other words, they believed that if you were viewing an elementary particle interaction in a darkened room, it wasn't clear whether you were viewing the real process or the image of the real process in a mirror. (*What?*)
2. Among the natural philosophers who developed and practiced experimentation, some of the most eminent were Francis Bacon (1561-1626), Galileo Galilei (1564-1642), Robert Boyle (1627-1691), and Isaac Newton (1642-1727). (*Who?*)
3. Francis Bacon was one of the most eloquent advocates of the new experimental method. (*What?*)
4. Isaac Newton concluded that light was a composite entity which consisted of distinct rays whose refractive properties depended on their colour. (*What kind of rays?*)
5. After the World War II laboratories in certain areas of physics resembled huge factories where hundreds or even thousands of scientists collaborated to design and carry out extremely expensive and time-consuming experimental projects. (*When?*)
6. Hans Christian Ørsted first proposed the connection between electricity and magnetism when he was observing the deflection of a compass needle by a nearby electric current. (*What?*)
7. Einstein's discoveries in physics were truly revolutionary, that certainly earned him the title of "genius" by any reasonable standard. (*What title?*)
8. At the age of 14, when Michael Faraday was delivering newspapers to a bookbinder, he read an article on electricity in the *Encyclopaedia Britannica*, and then he built a weak voltaic pile with which he performed experiments in electrochemistry. (*Where?*)
9. When scientists were analyzing neutron stars, they realized that a large fraction of the Universe's heavier metals, like gold, platinum, and uranium originated from cataclysmic events. (*How?*)

10. In 1998, astronomers learned that galaxies are moving away from each other much faster now, than billions of years ago, and therefore the rate of expansion is accelerating. (*Why?*)

Exercise 4. Прочтите текст и поставьте глаголы, данные в скобках, в Past Simple или Past Continuous. Переведите текст на русский язык.

Graphene is the thinnest and the strongest substance which is in use at the nanotechnology level. It has a honeycomb structure. A million sheets of the substance are as thick as the thickness of a human hair. It is 200 times stronger than steel and the most conductive material in the world.

Two researchers at the University of Manchester (produce) it in 2004. It was like this.

Andre Geim and Konstantin Novoselov (take) part in "Friday night experiments" during which they (carry out) investigations not directly linked to their professional research. One Friday, the two scientists (remove) flakes from a lump of bulk graphite with a sticky tape. They (notice) some flakes were thinner than others. While they (separate) the graphite fragments, they managed to create flakes which were just one atom thick. It was how they (isolate) graphene for the first time.

Its properties include incredible density, transparency, efficient heat and electrical conduction, and high flexibility. Its applications include electrodynamics, physical and organic chemistry, thermodynamics, semiconductor design, and flat screen technologies.

READING

Exercise 1. Прочтите и озаглавьте текст.

The laws of motion eluded the best minds in the world for millennia until Isaac Newton discovered them in the seventeenth century.

Russian cosmonaut Yuri Gagarin during his pioneering orbit flight around Earth in 1961 was the first to experience their practical effects. While he was writing his log, he put down his pencil. Obeying Newton's first law (every object remains at rest or in uniform motion in a straight line unless the action of an external force compels it to change its state), the pencil floated out of reach. As a result, Gagarin had to speak into a tape recorder to complete his log.

According to Newton's second law (as the force acting upon an object is bigger, the acceleration of the object is bigger), cosmonauts needed to accelerate or decelerate their bodies during subsequent space flights. In fact, they had to learn how to push themselves carefully through the spacecraft, because if they didn't, they could float around helplessly or hit each other.

The consequences of Newton's third law of motion were as follows. Once when a cosmonaut was typing at a computer keyboard, he noticed that he was floating away because for every action there was an equal and opposite reaction. That's why workstations on the ISS were generously provided with restraining loops where the crew could anchor their feet.

Exercise 2. **Найдите в тексте английские эквиваленты следующих слов и словосочетаний.**

не приходить на ум, первый полет, заполнить вахтенный журнал, вне досягаемости, космический корабль, ускорять движение тела, замедлять скорость, парить / находиться в свободном движении, противодействие, удерживающие петли, стопорить

Exercise 3. **Заполните пропуски в предложениях, употребляя слова, данные в рамочке, в соответствующей форме.**

to anchor; to restrain; to obey; to compel; to elude; to decelerate; to float

1. The idea how to explain the results of the experiment ... him.
2. He felt that he was floating away but he could do nothing ... his feet.
3. It took less force to push a bike than a motorcycle because it ... Newton's first law.
4. An astronaut ... in space.
5. As the speedometer reached 100 miles per hour, the passenger begged the driver ... .
6. I wanted a new laptop, but I ... myself.
7. The boss ... the employee to do the work alone.

RETELLING

Exercise 1. **Ответьте на вопросы к тексту. Используйте эти вопросы для того, чтобы выделить в тексте основную мысль и наиболее важные детали.**

1. What laws did Isaac Newton formulate?
2. How many laws of motion are there?
3. What happened to the pencil when Yuri Gagarin put it down during his first space flight? Which of Newton's laws of motion did this incident illustrate?
4. What did Newton's second law enable cosmonauts to do to accelerate or decelerate their motion on board the spacecraft?
5. What were the consequences of Newton's third law of motion?

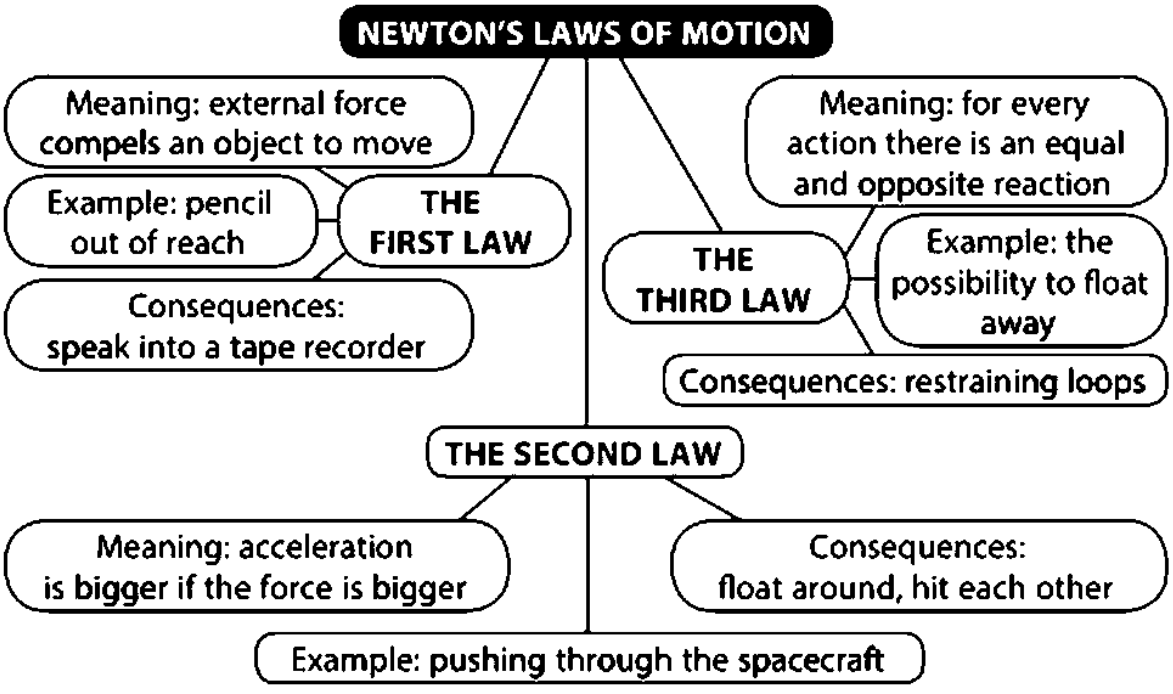
Exercise 2. **Выучите модели, которые вам потребуются для пересказа текста.**

Declaring ideas:
the law states — закон гласит...
the law says — в законе говорится...
the law stipulates — в законе утверждается...

Exemplification:
for example — например
for instance — так, в частности
specifically — а именно, в частности

Concluding:
as a result — в результате
consequently — следовательно
for that reason — по этой причине

Exercise 3. **Перескажите текст с помощью концептуальной карты "Newton's Laws of Motion". Употребляйте выражения из упр. 2.**



CONVERSATIONS

Exercise 1. **Прочтите и переведите диалог. Воспроизведите его в парах.**

A: Do you know that nothing explains nature better than physics? In fact, every other field is just a branch of physics.

B: You are kidding.

A: No. I'm serious. When Thomas Edison invented the phonograph, people thought he was using black magic. Many even called him "The Wizard of Menlopark".

B: I agree this invention was a breakthrough at that time.

A: Nobody believed it was possible. But physicists did.

B: People speak about physicists' fascination. Do you know what it means?

A: Of course, I do. It is when an experimental physicist spots something unusual, for instance, the unheard-of rules of the world like anomalous expansion of water, the non-stop microscopic jiggling in Brownian motion, Hubble's unusual redshift, the unusual amplification of sound in acoustic resonance, the butterfly effect, compass deflection under a current wire, etc.

B: I can understand physicists. What you are saying is really fascinating.

Exercise 2. **Переведите реплики своего собеседника и разыграйте диалог в парах.**

A: To kindle your interest in physics, I want to describe some interesting physical experiments.

B: Это не поможет. Я физику не люблю.

A: Don't object. Just listen. Do you know that before the mid-1950s scientists believed that nature was "mirror symmetric"?

B: Что ты имеешь в виду?

A: Don't interrupt me. They believed that if you were viewing an elementary particle interaction in a darkened room, you couldn't tell whether you were viewing the real process, or the image of the real process in a mirror.

B: Физики нашли хоть какое-то подтверждение этому факту?

A: Well, in 1958 one female physicist Chien-Shiung Wu confirmed this suspicion.

B: Ты знаешь, все-таки в физике что-то есть. Ты открыл мне глаза. Спасибо.

Exercise 3. **Ответьте на вопросы (1–5), используя подсказки (A–E). Составьте диалог о том, какие вопросы волнуют физиков, и воспроизведите его в парах.**

1. What role do physics play in everyday life?
2. Why do boomerangs come back?
3. When does the sky become space?
4. What is the string theory?
5. Can computers keep getting faster?

A. Mobile phones, Wi-Fi, electricity, jet engines, gravity, and magnetism all fall into the eclectic realm that is physics.
B. The Kármán line lies 100km above sea level and is named after aeronautical scientist Theodore von Kármán.
C. Scientists are considering new materials, such as atomically thin carbon — graphene — as well as new systems, such as quantum computing.
D. They work on the same principles of aerodynamics as any other flying object; the key to how they work is the airfoil.

E. It unites all of the four forces of nature: electromagnetism, gravity, and the strong and weak nuclear forces. It requires us to accept the existence of 7 extra dimensions in the Universe apart from the usual ones: up-down, forwards-backwards, left-right, and time.

ДОПОЛНИТЕЛЬНЫЕ ТЕКСТЫ ДЛЯ ВНЕАУДИТОРНОГО ЧТЕНИЯ

TEXT 1

Task. **Прочтите текст и определите, какие из предложений (1–4) соответствуют тексту. Употребляйте следующие выражения:**

That's right. That's not quite right. That's false.

1. Many things we use in our everyday life stem from physics.
2. Modern technologies are the result of collaboration of physicists and specialists in other fields.
3. Physical research leads to immediate applications.
4. Everybody understood the importance of GPS for civil life at once.

Did you know that many things you use today are due to physics? For example, quantum physics gave rise to transistors which resulted in computer microchips. Sensitive to nanosecond calculations stemmed from Einstein's general theory of relativity and particle physics created 3D body-imaging. Even the World Wide Web, whose original aim was to transfer large physics data files, was the creation of physics.

Our today's life depends on technologies which have the roots in physics. They are holographic techniques, the application of lasers, optical fibre technology, to name just a few. To be more precise, modern communication technologies rely on an understanding of the two main theories of modern physics: quantum theory and general relativity. Laser technologies illustrate the synergistic relationship between developments in physics and in other fields.

The problem is that the connection between physics research and technology is often obvious in hindsight. Many discoveries defy immediate practical applications and sometimes it takes a lot of time to turn pure research into recognizable technologies like GPS.

TEXT 2

Task. **Прочтите текст и найдите информацию о том, как была изобретена микроволновая печь, какие эксперименты предшествовали ее созданию и где она впервые была протестирована.**

During World War II in Great Britain, J. Randall and H. Boots were working on ways to improve radar. They needed a highly accurate radar for aircraft to help pilots detect and destroy enemy planes and submarines at night. While they were experimenting, they invented an electron tube (they called it a "magnetron") which generated microwaves. After the war, another scientist, Dr. Percy Spencer, noticed that the magnetron warmed things around. To check his observation, he placed some food near it. To his surprise he found out that kernels of popcorn popped and eggs exploded. He continued his experiment to fine-tune his invention. With the help of magnetron he created microwaves in a crude metal box and in 1946 he tested the first commercial microwave in a restaurant in Boston. A year later, the first microwaves appeared on the market. They cost $5,000 and weighed 750 pounds.

Today people can't imagine their life without a microwave.

TEXT 3

Task. **Прочтите тексты и переведите их письменно.**

(1) Albert Einstein (1879-1955), a German-born physicist, who fancied himself as a violinist, was rehearsing a Haydn string quarter. When he failed for the fourth time to get his entry in the second movement, the cellist looked up and said, "The problem with you, Albert, is that you simply can't count."

(2) It happened when Dr. Henry Eyring was lecturing at the University of Utah many years before he and Dr. Einstein were colleagues. As they were walking together in the garden, they noted an unusual

plant. Dr. Eyring asked Dr. Einstein if he knew what the plant was. Einstein did not, and together they consulted a gardener. The gardener explained the plant was green beans, and forever afterwards Eyring said Einstein didn't know beans. (not know beans — ничего или почти ничего не знать о чем-л.)

(3) In his later days, Niels Bohr designed a remarkable way to avoid difficult questions. When somebody was driving him into a corner during a lecture, he took a matchbox, apparently to light his cooled pipe but in fact to drop the matches on the floor. Afterwards, he took his time to gather the sticks and continued the talk. Nobody, and least of all the questioner, remembered what his talk had to do with the question. (to do with... — иметь отношение к...)

VOCABULARY

AREAS OF PHYSICAL RESEARCH

Aristotelian physics — аристотелевская физика
fibre technology волокошная технология
fluctuation theory — теория флуктуаций
particle physics — физика элементарных частиц
quantum theory/physics — квантовая теория/физика
theory of atomism — атомистическая теория
theory of relativity — теория относительности
thermodynamics — термодинамика

GENERAL ENGINEERING TERMS

airfoil — аэродинамическая поверхность
amplification — увеличение, усиление
binomial theorem — теорема бинома
breakthrough — крупное достижение, открытие
conduction — проводимость
deflection — отклонение
defy — игнорировать
density — плотность
detect — обнаруживать
dimension — размеры; измерение
empirical — эмпирический, основанный на опыте
ether — эфир

expansion — расширение
external force — внешняя сила
flexibility — гибкость, пластичность
fraction — частица, доля, крупица
gravity — гравитация, сила тяготения
heliocentric model — гелиоцентрическая модель
jiggling — сдвиг, смещение
measure — измерять
medium — среда; средство
perpetual motion — вечное движение
redshift — красное смещение
semiconductor — полупроводник
substance — вещество
suspend — приостанавливать, подвешивать
transparency — прозрачность
treatise — научный труд, научное исследование
voltaic pile — вольтов столб

UNIT 4
COMPUTER SCIENCE

GRAMMAR

THE PAST PARTICIPLE (ПРИЧАСТИЕ II)

Exercise 1. **Запомните, как образуется причастие прошедшего времени, или причастие II (Past Participle, or Participle II) правильных глаголов (на примере глагола *to ask*) и неправильных глаголов (на примере глагола *to break*).**

Правильные глаголы	Неправильные глаголы	Примеры и перевод
Verb + *-ed* ask + *-ed* → asked (спрошенный, заданный)	Verb 3 break — broke — broken (сломанный, разбитый)	The experiment *made* by the team gave *unexpected* results. Эксперимент, проведенный группой, дал неожиданные результаты.

THE PRESENT PERFECT TENSE (НАСТОЯЩЕЕ СОВЕРШЕННОЕ ВРЕМЯ)

Exercise 2. **Выучите формы образования настоящего совершенного времени (The Present Perfect Tense), обращая внимание на наречия времени, которые указывают на завершенность действия. Запомните, что в образовании Present Perfect участвует причастие II (Participle II), т.е. третья форма глагола (V3).**

Образование	have/has + Participle II
Значение	Действие, которое завершилось к настоящему моменту

Окончание таблицы

Наречия времени	already (уже), just (только что), yet (уже — *в вопросительном предложении*; еще нет — *в отрицательном предложении*), so far (до сих пор), by now (вплоть до настоящего момента), today (сегодня, если день еще не завершен), this week/month/year (на этой неделе / в этом месяце / в этом году), recently/lately (недавно / в последнее время)	
Утвердительная форма	I/you/we/they have bought He/she/it has bought	I have already scored 100 points. Я уже набрал 100 баллов.
Вопросительная форма	Have I/you/we/they bought? Has he/she/it bought?	Have you completed the form yet? — Вы уже заполнили бланк?
Отрицательная форма	I/you/we/they have not (haven't) bought He/she/it has not (hasn't) bought	She hasn't installed the programme so far. — Она пока не установила программу.

PRACTICE

Exercise 1. **Найдите в следующих предложениях Participle II и переведите предложения с английского языка на русский.**

1. The computer is one of the most useful machines ever created by humans.
2. Doug Engelbart invented the first computer mouse made of wood in the year 1964.
3. Amongst the most interesting computer facts is that the first Apple computer built by Steve Jobs and Steve Wozniak used parts they got for free from their employers.
4. Amazon is a printed book seller company that now sells more eBooks than printed books.
5. The Apollo 11 Lunar Lander, used to travel to the Moon, has less processing power than the processor of a cell phone.
6. The first 1GB hard disk, announced in 1980, weighed about 550 pounds and cost $40,000.

7. "Mosaic" was the first popular web browser released in the year 1993.
8. The game Tetris, created in the early eighties, has sold more than 40 million copies worldwide and has made its creator richer by $8m.
9. 80% of the emails sent daily are spam.
10. "ShenMue", developed by Sega Dreamcast and priced at $20 million, is the most expensive game ever made.

Exercise 2. Прочтите и переведите следующие предложения, обращая внимание на сказуемые в Present Perfect.

1. Computers have become a very important part of our daily life.
2. Researchers have recently discovered a new two-dimensional material, derived from the rare element tellurium. They are planning to make transistors that carry a current better throughout a computer chip.
3. Other two-dimensional materials, such as graphene, black phosphorus and silicon, have lacked stability at room temperature to nanomanufacture effective transistors for higher speed devices.
4. Researchers have designed 3D-printed, driverless boats that can provide transport and self-assemble into other floating structures.
5. The company has brought together neuroscientists and computer engineers in an effort to use technology and medical research to help machines to mimic the brain's ability to improve performance.
6. The advent of the microprocessor and then the PC has already changed experimental chemistry, while the availability of two classes of computer, the superminicomputer and supercomputer, has greatly influenced computational chemistry.
7. The Facebook data breach social media fiasco has already become the story of the decade as the damage has been highly impactful.
8. So far, nanoscientists have lacked clear methods for fabricating heterostructures and have not yet been able to develop the library of nanostructures with new properties.
9. Each wave of new computational technology has led to new kinds of systems, new tools, new forms of data, and so on, which have often overturned their predecessors.
10. Baltimore-based nonprofit Digit All Systems Inc. has trained more than 10,000 students in cybersecurity certifications and computer

programming through partnerships with 60 schools in the Baltimore/Washington metropolitan area and has donated more than 3,500 computers to churches, schools, community groups, and other organizations in need.

Exercise 3. Познакомьтесь с новостями, приведенными ниже, и найдите предложения, содержащие the Present Perfect Tense.

1. Despite a serious cooling problem, the newest U.S. weather satellite has produced a sharp snapshot of Earth.
2. Scientists have discovered dunes on Pluto which are tiny frozen grains of methane.
3. Scientists have already come up with the machines which can use image recognition technologies to better recognize hand and body motions, even when we're not physically in contact with a screen.
4. Researchers at Carnegie Mellon have found the ways to turn just any surface you can think of — from desks to entire walls of your home — into smart touch surfaces.
5. The programmers have shown off their algorithm's artistic abilities. They have transformed scenes from movies and television shows like Ice Age and Miss Marple into painting-like animations with the click of a mouse.
6. The need for new health monitoring technology that exploits crosscutting interactions has inspired a community of over 60 researchers at UCLA (University of California, Los Angeles) to explore in the disciplines of medicine, engineering, science, and other fields.
7. The computing industry has entered an "era of parallelization" in order to meet the ever-increasing computing needs in various fields.
8. Soatto, Fulkerson, and Vedaldi have developed software that actually "learns" a number of common image categories — such as people, cars, bicycles, chairs, trains, dogs and cats — from images taken from flickr, and uses what it has learned to label new images.
9. ILOVEYOU is the most dangerous virus ever created in the form of a worm.
10. In 1936, the Russians made a computer that ran on water.

Exercise 4. **Задайте вопросы к следующим предложениям, употребляя вопросительные слова, данные в скобках.**

1. Nanoscientists have developed a blueprint to fabricate new heterostructures from different types of 2D materials. (*What?*)
2. The Internet of Things (IoT) has seen explosive growth in everything from healthcare and banking to retail, manufacturing, consumer goods, and more. (*Where?*)
3. Due to breakthroughs in artificial intelligence, smart speakers like Google Home and Amazon Echo not only understand what we are saying, but can make sense of it, too. The sci-fi dream has finally come true. (*What dream?*)
4. Innovations have significantly changed the world we live in. (*What?*)
5. Dial-up connections have become a relic of the past due to high-speed downloads, super-fast browsing, high-resolution streaming and a great deal more. (*Due to what?*)
6. The 21st century has seen the mass adoption of broadband Internet across the developed world. (*What kind of Internet?*)
7. Dial-up connections have become a relic of the past because now users have access to high-speed downloads, super-fast browsing, high-resolution streaming, and a great deal more. (*Why?*)
8. The National Science Foundation's Expeditions in Computing program have awarded a $10 million grant The Computer Science Department, University of California, Los Angeles, to develop high-performance, energy-efficient, customizable computing that can revolutionize the way we use computers in health care and other important applications. (*How much?*)
9. Since 1965, our department has been an academic leader in the study and science of computing. Cornell has made groundbreaking achievements in distributed computing systems, information retrieval, computational theory, trustworthy computing, artificial intelligence, social networking, and computer graphics. (*How long?*)
10. Though some critics love to knock PCs as dinosaurs, laptops and desktops have changed greatly and have become faster and even smarter. (*How?*)

Exercise 5. **Сравните употребление Past Simple и Present Perfect в следующих предложениях. Переведите предложения на русский язык.**

1. Reaching the computation of gravitational waves on supercomputers with very high accuracy and speed, which has been the goal of many groups worldwide for many years, was not easy.
2. The iPhone has long been Apple's chief moneymaker, but smartphone demand isn't what it used to be.
3. The bank's technical problems frustrated TSB customers in the U.K., but now the situation has got worse as criminals take advantage of the chaos.
4. Amazon has confirmed that one of its Echo devices recorded a family's conversation and then messaged it to a random person on the family's contact list. The implications are terrifying.
5. While the PlayStation has outlasted the Saturn through multiple iterations, including today's PlayStation 4, both consoles had a significant impact and influence on home entertainment.
6. The Z1 was the first fully operational digital computer developed by Konrad Zuse in 1936. In 1939, he created the Z2 as the first electro-mechanical computer in the world.
7. Intel has been the unchallenged king of PCs for more than a decade.
8. The first attempt at ARM PCs, which ran on Windows RT, was a disaster, and it left many users skeptical of the idea. But Microsoft hasn't given up.
9. The invention of microprocessor chip marked the beginning of the fourth generation computers.
10. Fifth generation computer relied on Artificial Intelligence (AI), and that is still a developing process, but not yet a reality, i.e. this computer is incomplete.

READING

Exercise 1. **Прочтите и озаглавьте текст.**

Have you heard about the Internet of Things (IoT)? The fact is that even if you haven't you are using it when you display a song played on a computer on a 72-inch TV just with a click of a button. It has become

possible due to the connection of devices (other than typical fare such as computers and smartphones) to the Internet.

The IoT, as a giant network of connected "things" (which also includes people), has evolved due to convergence of multiple technologies, including wireless communication, real-time analytics, machine learning, commodity sensors, and embedded systems.

One popular example is the smart fridge which can tell you that it is out of milk, text you when its internal cameras see there is none left, or that the carton is past its use-by date.

In fact, the Internet of Things includes any device with an on and off switch to the Internet (and/or to each other). For example, cellphones, coffee makers, washing machines, headphones, lamps, wearable devices, and almost anything else you can think of.

As devices become more connected thanks to the IoT, security and privacy have become the primary concern among consumers and businesses. But it's not slowing IoT adoption; in fact, US smart speaker adoption has grown 54% from December 2017 to February 2018 according to a 2018 comScore survey.

Exercise 2. **Найдите в тексте английские эквиваленты следующих слов и словосочетаний.**

по щелчку мыши; обычный список/перечень; взаимодействие многочисленных технологий; машинное (компьютерное) обучение; встроенные системы; электронное «умное» устройство, носимое в качестве одежды или украшения; первоочередная задача; внедрение Интернета вещей; «умная» колонка

Exercise 3. **Заполните пропуски в предложениях, употребляя слова, данные в рамочке.**

fare; network; wireless; wearable; embedded; smart

1. A ... is a list of options or a range of things presented to the user.
2. She maintained no Facebook or Twitter account, it was impossible to locate her on any social ... sites.
3. They received ... messages printed on the ordinary Morse tape at a distance of 1557m.
4. Modern ... systems are often based on microcontrollers (i.e. CPUs with integrated memory or peripheral interfaces).

5. A ... device has become a more common part of the tech world. It is small enough to wear and includes powerful sensor technologies that can collect and deliver information about its surroundings.
6. A ... speaker is an electronic product like Google Home and Amazon Echo which includes Wi-Fi and Bluetooth connectivity. It is sometimes referred to as *смарт-динамик* or *умная колонка* in Russian.

RETELLING

Exercise 1. **Ответьте на вопросы к тексту. Используйте эти вопросы для того, чтобы выделить в тексте основную мысль и наиболее важные детали.**

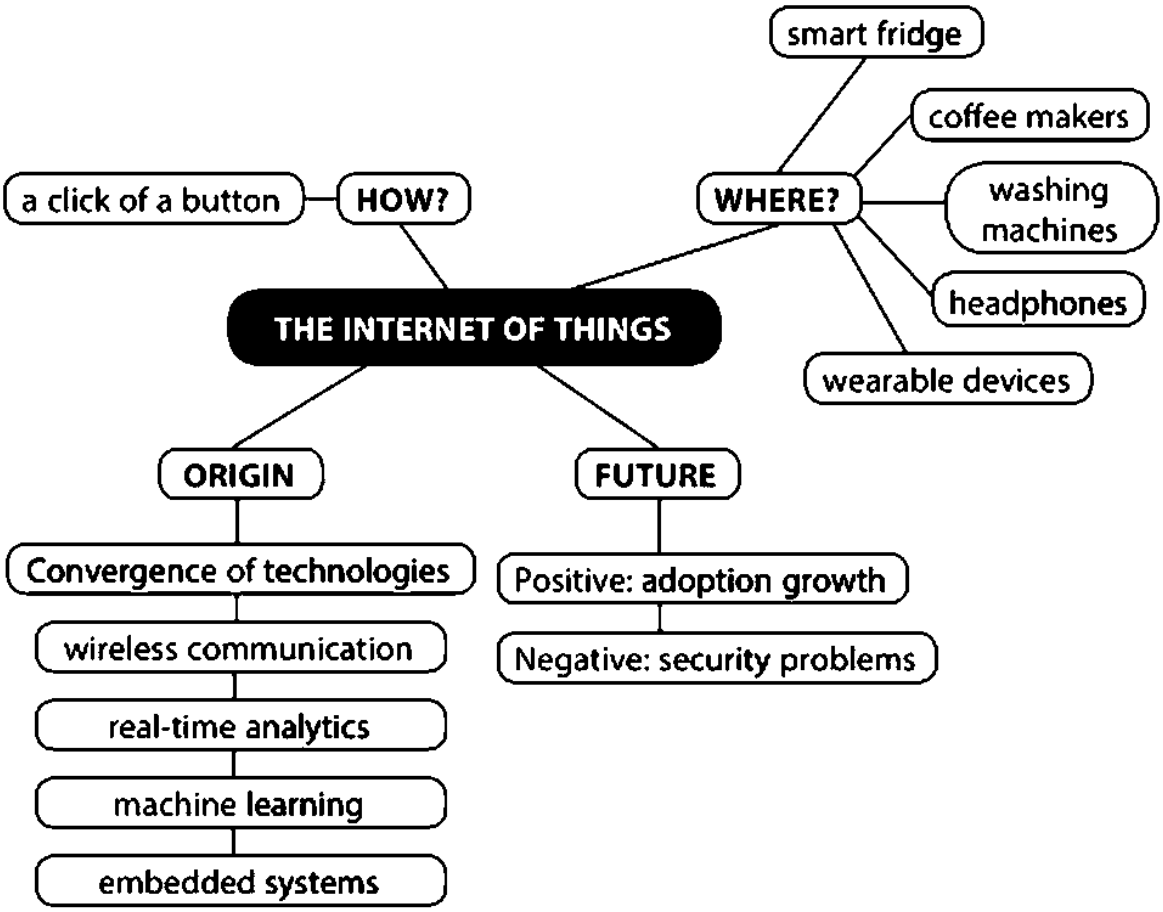
1. What is the Internet of Things?
2. Is it easy to use?
3. What makes it possible?
4. Where is it used?
5. What is its future?

Exercise 2. **Выучите модели, которые потребуются вам для пересказа текста.**

Ways of expressing enumeration

firstly — во-первых secondly — во-вторых thirdly — в-третьих lastly — наконец	on the one hand — с одной стороны... on the other hand — с другой стороны...	besides — кроме того moreover — более того furthermore — помимо этого

Exercise 3. **Перескажите текст с помощью концептуальной карты "The Internet of Things". Употребляйте выражения из упр. 2.**



CONVERSATIONS

Exercise 1. **Прочтите и переведите диалог. Воспроизведите его в парах.**

A: Can you explain to me what a cloud computing is?

B: Of course. In simple terms, it is the delivery of computing services — servers, storage, databases, networking, software, analytics and more — over the Internet ("the cloud"). In other words, it is a kind of computer programme outsourcing.

A: I still can't understand how it works. By the way, what is outsourcing?

B: It's very simple. You outsource when you obtain (goods or a service) by contract from an outside supplier. You are probably using cloud computing right now even if you don't realize it. You use it when you send emails, edit documents, watch movies or TV, listen to music, play games or store pictures and other files.

A: Who are the suppliers of services?

B: You mean cloud service providers? Well, a cloud service provider, or CSP, is a company that offers cloud computing services of three types — infrastructure as a service (IaaS), software as a service (SaaS) or platform as a service (PaaS) — to individuals or businesses.

A: Do I have to pay for the services?

B: Yes, you do. But you don't have to worry about such things as storage and power. Just enjoy the end result.

Exercise 2. **Переведите реплики своего собеседника и разыграйте диалог в парах.**

A: The subject of our today's discussion is a Virtual Reality, a type of reality technology based on total immersion. It is this technology that makes it possible to experience anything, anywhere, anytime.

B: Что означает «полное погружение»?

A: Well, total immersion means that your brain feels it is somewhere you are really not. A person forgets that he/she is in artificial environment and begins to interact with it as if he/she is in a real world.

B: Приведите, пожалуйста, примеры искусственно созданной среды.

A: There are a lot of examples. Virtual reality can simulate everyday situations like walking around the streets of London or situations beyond the bounds of physical reality like shooting space aliens on a foreign planet with zero gravity.

B: Я думаю, технологии виртуальной реальности играют огромную роль в образовании.

A: You are right. Virtual reality technologies simplify students' understanding of difficult problems, enable them to interact actively with each other and what's more, they allow students to live the reality or feel the content of their studies rather than just learn it.

Exercise 3. **Попросите своего коллегу ответить на вопросы о цифровой экономике. Воспроизведите диалог в парах.**

A: The global economy is undergoing a digital transformation, and it's happening at breakneck speed. The economic activity today relies on billions of everyday online connections among people, businesses, devices, data, and processes. The latest technology to enhance this activity is called digital economy. What is it?

B: .....

A: Uber, the world's largest taxi company, owns no vehicles. Facebook, the world's most popular media owner, creates no content. Alibaba, the most valuable retailer, has no inventory and Airbnb, the world's largest accommodation provider, owns no real estate... What makes these things possible?

B: .....

A: What are four fundamental areas of digital transformation which explain business success in the digital economy?

B: .....

A: What is the role of the Internet of Things in digital transformation?

B: .....

ДОПОЛНИТЕЛЬНЫЕ ТЕКСТЫ ДЛЯ ВНЕАУДИТОРНОГО ЧТЕНИЯ

TEXT 1

Task. **Прочтите текст и определите, какие из предложений (1–4) соответствуют тексту. Употребляйте следующие выражения:**

That's right. That's not quite right. That's false.

1. Microsoft is helping parents control their children.
2. The company has already launched their app on the market.
3. The kids have got access to a new MSK Kids site.
4. Microsoft has already teamed up with Apple to make their services available to the disabled.

Microsoft has brought location tracking and app usage monitoring to its Android Launcher.

The app, which is currently available in preview, allows parents to see their children's last known locations as well as which apps they are accessing and how much time they spend on each.

Besides, Microsoft has announced that MSN Kids, a news site for children of elementary and middle school age, is in preview. The site

uses curated news and features from Microsoft partners like Time for Kids, Popular Science, and National Geographic.

Microsoft is working to make technology accessible to the disabled. They have already teamed up with Apple to integrate Braille displays into more computers and developed the Xbox Adaptive Controller to help the disabled play video games.

TEXT 2

Task. **Прочтите текст и найдите информацию о встроенных электронных системах и приборах, в которых они устанавливаются. Каковы функции и преимущества встроенных электронных систем?**

Computer systems are everywhere. They fall into essentially two main categories. The first and most obvious one is the desktop computer while the second type is the embedded computer (or embedded system).

If you ask someone how many computers he/she has got at home, they will probably count a desktop computer and a laptop. In fact, they may have over 20 computers, hidden or embedded inside washing machines and dish washers, TVs, digital cameras, cell phones, ovens, air conditioners, DVD players, battery chargers, digital watches, dryers, fax machines, printers, modems, portable video games, photocopiers, home security systems, mp3 players, iPods, anti-lock brakes, fuel injection control, answering machines, digital recorders to name just a few.

An embedded system is a computer hardware system which has software embedded in it. It is a microcontroller or microprocessor based system designed to perform a specific Task. For example, a fire alarm has the embedded system which senses only smoke while the embedded system in a programmable digital thermostat monitors and controls the surrounding temperature.

The embedded system has three components, namely:

- hardware;
- application software;
- (in large scale systems) Real Time Operating system (RTOS) that sets the rules during the execution of application programs.

The embedded system must compute certain tasks in real time without any delay. For example, a car cruise controller continually

monitors and reacts to speed and brake sensors. In case of a delayed computation there is a car accident.

The embedded system has a lot of advantages. Among them are easy customization, low power consumption, low cost, enhanced performance, and safety.

TEXT 3

Task. **Прочтите текст и переведите его письменно.**

With the evolution of display technology, the industry has come to demand lifelike experiences and saturated colors. This trend has caused color space standards to evolve as well. With the introduction of BT2020 protocol, display manufacturers are looking to cover about 76% of color space comprehended by the human eye. It means covering 100% of NTSC, sRGB, Adobe RGB, and DCI-P3 color spaces.

Quantum dots (QDs), also known as QDs or fluorescent semiconductor nanocrystals, are tiny single crystals ranging from 2-10 nm in diameter, which is equivalent to 15-150 atoms. A quantum dot only emits one color determined by its size.

The advantages of this technology are numerous. They include color saturation and the widest color gamut possible, lower energy consumption, improved color accuracy.

One of the challenges of the technology is the need of fine-tuning before QDs become mainstream because of the vulnerability of quantum dots. Water, heat, and humidity may affect quantum dot particles and as a result they require isolation.

Notes

NTSC — стандартная система цветного телевидения, принятая в США, Канаде, Мексике, Японии, Южной Корее, Тайване, на Филиппинах и в ряде стран Южной Америки

sRGB — стандарт, разработанный в 1990-е годы, чтобы обуздать разнообразие цветных дисплеев и сделать профессиональную обработку изображений на компьютере более прогнозируемой. В стандарте sRGB описано, какой именно чистоты должны быть основные цвета и какие именно оттенки достижимы при их смешивании

RGB — аббревиатура, образованная от названий трех основных цветов (Red, Green, Blue)

colour space — цветовое пространство, т.е. множество цветов, которые мы можем наблюдать или отображать

DCI-P3, или DCI/P3, — цветовое пространство, используемое в цифровых кинотеатрах

VOCABULARY

COMPUTER TERMINOLOGY

Amazon Echo device — смарт-динамик разработки корпорации Amazon.com

app usage monitoring — мониторинг использования приложений

broadband Internet — широкополосный Интернет

click of a mouse — щелчок мышью

cloud computing — облачная обработка компьютерных данных

commodity sensor — товарный датчик

customizable computing — специализированное (заказное) программное обеспечение

cybersecurity — информационная безопасность

data breach — утечка данных

desktop — настольный компьютер

dial-up connection — модемное соединение

digital economy — цифровая экономика

digital transformation — цифровое преобразование

display technology — технология отображения, техника цифровой индикации

distributed computing system — распределенная вычислительная система

download — скачать; загрузка

eBook — электронная книга

embedded system — встроенная система

era of parallelization — эпоха распараллеливания

Facebook account — учетная запись Facebook

fine-tuning — точная настройка, корректировка

flickr — фотообменный сервис

hard disk — жесткий диск

high-resolution streaming потоковое воспроизведение высокой четкости
information retrieval — информационный поиск, получение информации
laptop — портативный компьютер
location tracking — отслеживание местоположения
networking — сетевое взаимодействие
operational digital computer — операционный цифровой компьютер
peripheral interface — периферийный интерфейс
processing power — вычислительная мощность
quantum dots technology — технология квантовых точек
reality technology — технология виртуальной реальности
real-time analytics аналитика в реальном времени
sensor technology — сенсорная технология
smart speaker — умный динамик
The Internet of Things «Интернет вещей» концепция вычислительной сети физических предметов («вещей»), оснащенных встроенными технологиями для взаимодействия друг с другом или с внешней средой
wearable device — портативное устройство (мобильное устройство, удобное для ношения)
wireless communication — беспроводная связь

GENERAL SCIENTIFIC WORDS AND EXPRESSIONS

accuracy — точность
adoption — одобрение; внедрение
availability — доступность, наличие
blueprint план, программа, проект
colour saturation — цветовая насыщенность
crosscutting interaction перекрестное взаимодействие
convergence — конвергенция, слияние, объединение
engineering — техника; технология; машиностроение
explore исследовать
fare — фиксация; список, перечень
gamut — диапазон, спектр
grain — зерно, крупица
groundbreaking achievement — новаторское достижение
humidity — влажность

immersion — погружение
inventory — инвентарный учет
iteration — повторение, итерация
vulnerability — уязвимость

UNIT 5
ECOLOGICAL SCIENCES

GRAMMAR

WAYS OF EXPRESSING FUTURE ACTIONS (СПОСОБЫ ВЫРАЖЕНИЯ БУДУЩИХ ДЕЙСТВИЙ)

Exercise 1. **Познакомьтесь с различными способами выражения будущего действия в английском языке.**

Способ выражения	Наречия времени	Образование	Примеры и перевод
The Future Simple Tense (действие произойдет в неопределенный момент в будущем)	tomorrow (завтра), next week/year (на следующей неделе, в следующем году), soon (скоро)	will + Infinitive I/you/he/she/it/we/they will work	He will send them a fax tomorrow. — Он отправит им факс завтра.
The Future Continuous Tense (действие будет происходить или длиться в конкретный момент/период в будущем)	at 2 o'clock tomorrow (завтра в два часа); from 5 to 6 tomorrow (с пяти до шести часов завтра); the whole day tomorrow (завтра весь день); when he comes (когда он придет)	will + be + V-*ing* I/you/he/she/it/we/they will be working	They will be interviewing new candidates from 5 to 6 tomorrow. — Они будут проводить собеседование с кандидатами с пяти до шести часов завтра.

Окончание таблицы

Способ выражения	**Наречия времени**	**Образование**	**Примеры и перевод**
Future Time Expressions	tomorrow (завтра); next time/ week/year (в следующий раз, на следующей неделе, в следующем году); soon (скоро)	be likely (unlikely) to do — вероятно, произойдет (не произойдет); be sure/certain/ bound to do — обязательно (наверняка) случится; **be** + Infinitive — должно произойти; **may** + Infinitive — может произойти; **going** + Infinitive — по всем признакам, произойдет	It is likely (unlikely) to happen. — Это, вероятно, произойдет (не произойдет). The temperature is bound to rise. — Температура наверняка повысится. The carbon emissions are to fall. — Уровень углерода должен упасть. There may be a natural disaster. — Может произойти стихийное бедствие. It is going to stop soon. — Это скоро закончится.

QUESTIONS REFERRING TO THE FUTURE (ВОПРОСИТЕЛЬНЫЕ ПРЕДЛОЖЕНИЯ, ОТНОСЯЩИЕСЯ К БУДУЩЕМУ)

Exercise 2. **Запомните порядок слов в вопросительном предложении, относящемся к будущему времени. Обратите внимание на образование общих (начинаются со вспомогательного глагола) и специальных (начинаются с вопросительного слова) вопросов.**

Вопросительное слово	Вспомогательный глагол	Подлежащее	Сказуемое (группа сказуемого)
When	will	you	come?
How long	will	he	be reading?
When	is	it	bound to begin?
What	are	they	going to renew?
What	may	it	lead to?

PRACTICE

Exercise 1. **Прочтите и переведите следующие предложения, обращая внимание на сказуемые в Future Simple.**

1. Biologists in North Carolina are trying to get a glimpse of the future through a project designed to shed light on how rising temperatures will affect the insects and microbial life that play critical roles in the environment.
2. Teachers will develop a project-based science lesson plan to engage middle school students in ecological research.
3. If our ecological awareness continues to deepen, new technologies will foster environmental sustainability.
4. As our technology and ecological awareness evolve in tandem, technology and ecology will integrate with one another in increasingly deeper ways.
5. The practice of biomimicry — using nature as model and a teacher for our innovations — will allow us to develop new technologies that will draw on the intelligence of nature.

6. We can imagine a future in which our technology will align and assimilate into the natural world – a meshing of technology and ecology.
7. A humanity that understands its true place in nature will organically harmonize with it.
8. Ecological engineering is an idea and field whose time has already come, but what will it be in the future?
9. Our future will not be like our recent past.
10. Plant communities are diverse and the interactions among plants, herbivores, microbes, and the abiotic environment are complex; changes in species composition will affect the structure and functioning of ecosystems.

Exercise 2. **Познакомьтесь с интересными фактами, приведенными ниже, и найдите предложения, содержащие The Future Simple Tense and The Future Continuous Tense.**

1. Recycling aluminum will be saving enough energy to run our TVs for at least 3 hours.
2. If we throw plastic bags and other plastic materials in the ocean, we will be killing as many as 1 million sea creatures annually.
3. A glass bottle made in our time will take more than 4,000 years to decompose.
4. The amount of wood and paper we throw away will be enough to heat 50 million homes for 20 years.
5. Bamboo will be utilizing carbon dioxide at a rate astronomically higher than other trees and will be doing it year around because it is an evergreen.
6. Fifty-eight developed and developing countries have set carbon reduction pledges for 2020; however, it's projected that those pledges will still result in the planet becoming 3°C warmer.
7. If we continue to pump greenhouse gasses into the atmosphere at the current rate, the majority of the Arctic basin will be ice-free by 2040.
8. We used to get through 500 million plastic bags every week in the UK – amounting to billions of bags and thousands of tonnes of plastic. Sadly, each bag will take between 500 and 1,000 years to decompose in landfill.

9. At Christmas, as much as 83 square kilometres of wrapping paper will end up in UK bins.
10. Humans now buy a million plastic bottles a minute. Most of this plastic ends up in the ocean. By 2050, the ocean will contain more plastic by weight than fish.

Exercise 3. **Задайте вопросы к следующим предложениям, употребляя вопросительные слова, данные в скобках.**

1. If we all fix our dripping taps, we will supply 120,000 people with a day's worth of water. (*How much?*)
2. The WWF (the World Wide Fund for Nature) claims that we will need between 1.8 and 2.2 Earth-sized planets to meet our needs by 2050. (*How many?*)
3. New "artificial leaf" technologies will use sunlight to split water into hydrogen and oxygen. (*What for?*)
4. Many scientists and farmers believe the emerging understanding of soil's role in climate stability and resilient agriculture will prompt a paradigm shift in how we feed the planet. (*What?*)
5. If we use new technologies, we'll be at the front end of a new "nature-tech" revolution and nature will win big from it. (*Where?*)
6. Scientists will be using lithium-air batteries, which hold 10 times as much energy per volume as their conventional lithium-ion counterparts, to revolutionize renewable energy markets. (*Why?*)
7. Researchers will be trapping carbon dioxide produced in fossil-fuel burning or other industrial processes and burying it underground. (*Where?*)
8. We will be stimulating new ecological research foci, policy developments, and business innovations. (*What?*)
9. Robots will be investigating how to dispatch invading species with poisons or electric shock on the seafloor as a potential tool for combating them. (*What for?*)
10. Companies will be incorporating biodiversity conservation and ecosystem services into their sustainability strategies as an important move that will position them better in the future. (*What kind of...*)

Exercise 4. **Переведите предложения на русский язык, обращая внимание на выделенные курсивом формы выражения будущего действия.**

will do — действие произойдет в будущем при определенных условиях

be likely (unlikely) to do — вероятно (вряд ли), действие произойдет в будущем

may do — есть вероятность того, что действие произойдет в будущем

be certain/sure/bound to do действие наверняка (непременно) произойдет в будущем

be to do — действие должно произойти в будущем

be going to do — действие произойдет в будущем, так как сейчас уже налицо признаки этого действия

1. Resource scarcity *will* primarily hit developing nations.
2. Climate change signals a shift in priorities that *is* most *likely* to occur due to the economic and financial crisis.
3. Climate change / natural disasters are regional and global, they *are to* effect several businesses and communities simultaneously.
4. The disparity in incomes between the rich and poor *is bound* to rise and the population of the developing countries *is to* experience economic decline and falling per capita incomes.
5. Global food production is generally adequate to meet human nutritional needs, but problems with distribution mean that some 800 million people *are going to* remain undernourished. World food production is still rising, but several trends *will make* it more challenging to feed an additional 3 billion people over the next 30 years.
6. Soil degradation from erosion and poor irrigation practices *is certain* to harm agricultural lands and jeopardize production in some regions.
7. Increased global energy use *is sure* to bring more energy services such as refrigeration and transportation to people but *will* raise greenhouse gas emissions about 50 per cent higher than current levels unless a concerted effort takes place to increase energy efficiency and move away from today's heavy reliance on fossil fuels.
8. The amount of biologically available ("fixed") nitrogen *is likely* to double over the next 25 years increasing the current excess.

9. Acid rain is a growing problem in Asia. Sulfur dioxide emissions *are going to* triple there by 2019 if current trends continue.
10. Risks to the world's ecosystems are nowhere greater than in aquatic environments such as coral reefs and freshwater habitats in rivers, lakes, and wetlands. Some 58 per cent of the world's reefs and 34 per cent of all fish species *may be* at risk from human activities.

READING

Exercise 1. **Прочтите и озаглавьте текст.**

What will happen if we, people, don't take steps to stop the environment pollution immediately? The ecological balance is going to be upset. We see the signs of this catastrophe even today.

We can't take a deep breath in a city because there are too many cars, factories, power plants, and exhaust fumes. The ozone depletion, which is the result of air pollution, is going to increase about 1% yearly. It will lead to skin cancer, intoxication, ocular diseases. The EPA (Environment Protection Agency) estimates that one million people will die of skin cancer by 2075. Ozone depletion will lead to the destruction of forests and desertification.

If we do nothing today, we will see how the world will move to an apocalyptic nightmare. Ecologists predict that by 2100 we'll face wildlife extinction, a dramatic increase in wildfires, dead fish, and limited fresh water to drink.

Even by 2030, crop yields will drop in many places including North America. By 2040, flooding and drought are bound to sweep the world. Malnutrition and disease will increase in places like Africa. Most coral reefs will disappear.

Invasive species will spread in Europe while lack of snow is to affect the Alps. Coastal communities in New Zealand and Australia will begin to flood from rising seas by the 2080s. By 2090, average temperatures in Africa are likely to be as much as six degrees hotter.

Of course, it doesn't have to be quite that bad. There is a scenario where we'll mitigate climate change; we'll adjust things like global energy use and renewable energy production. We will save electricity, water, paper. We will think about how much trash we make in a year. If we reduce the amount of solid waste we produce in a year, we will take up less space in landfills. We will be planting trees and recycling.

Exercise 2. **Найдите в тексте английские эквиваленты следующих слов и словосочетаний.**

загрязнение окружающей среды, нарушать экологический баланс, выхлопные газы, уничтожение лесов, истончение озонового слоя, вымирание дикой природы, наводнение и засуха, недоедание, вселенцы (инвазивные виды), производство возобновляемых источников энергии, мусор, твердые отходы, свалка мусора / захоронение отходов, опустынивание

Exercise 3. **Заполните пропуски в предложениях, употребляя слова, данные в рамочке.**

climate change; renewable energy; solid waste; malnutrition; drought; landfill

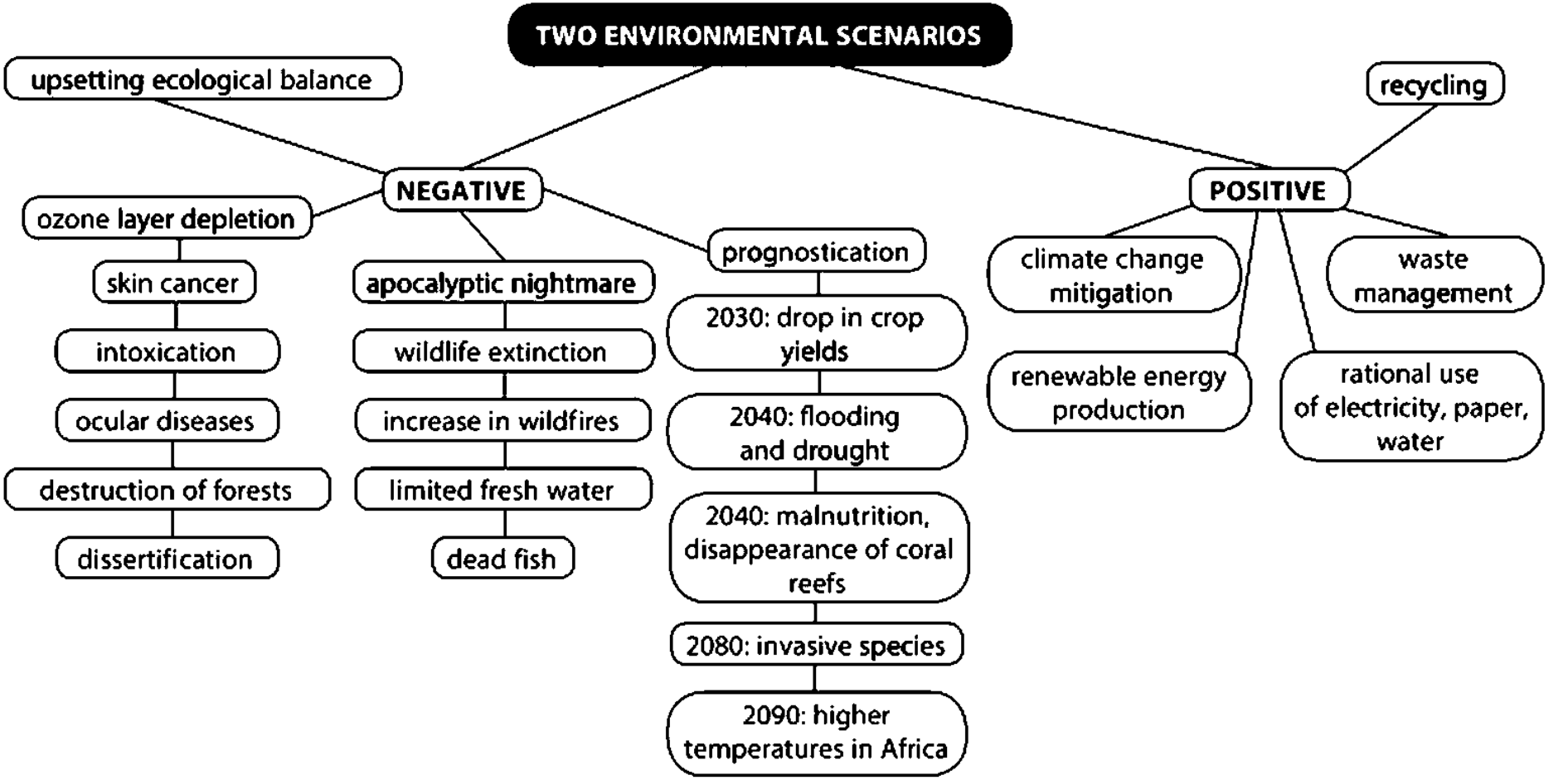
1. Most ... are toxic.
2. The disastrous ... this year has caused a spectacular famine.
3. ... remains a serious problem in many African countries.
4. We need a great shift from fossil fuels to ... .
5. No challenge is more global than ... .
6. A few countries report downward trends in the amount of ... generated.

RETELLING

Exercise 1. **Ответьте на вопросы к тексту. Используйте эти вопросы для того, чтобы выделить в тексте основную мысль и наиболее важные детали.**

1. How many environmental scenarios does the text describe?
2. What are the consequences of the ozone depletion?
3. What do ecologists predict will happen by 2030/2040/2080/2090?
4. Are these projections positive?
5. What are the features of a positive environmental scenario?

Exercise 2. **Познакомьтесь с выражениями, которые помогут вам ввести новую тему при пересказе текста. Выучите их. Приведенные ниже предложения-примеры помогут вам правильно употреблять их.**


TWO ENVIRONMENTAL SCENARIOS
upsetting ecological balance
recycling
NEGATIVE
POSITIVE
ozone layer depletion
skin cancer
intoxication
ocular diseases
destruction of forests
dissertification
apocalyptic nightmare
wildlife extinction
increase in wildfires
limited fresh water
dead fish
prognostication
2030: drop in crop yields
2040: flooding and drought
2040: malnutrition, disappearance of coral reefs
2080: invasive species
2090: higher temperatures in Africa
climate change mitigation
renewable energy production
waste management
rational use of electricity, paper, water

Introducing a new topic

as far as ... is concerned — что касается...
as for / as to... к вопросу о...
regarding... — относительно..., в отношении..., что касается...
speaking... — говоря о...

1. *As far as* ozone depletion *is concerned*, the easiest technique to minimize it is to limit the number of vehicles on the road.
2. *As for* desertification, it is a significant global ecological and environmental problem.
3. *Regarding* fish death, it is the result of human activities that can impact water quality.
4. *Speaking about* the solutions to environmental problems, we must stress that environmental problems are complex and multidisciplinary.

Exercise 3. **Перескажите текст с помощью концептуальной карты "Two Environmental Scenarios" (с. 76). Употребляйте выражения из упр. 2.**

CONVERSATIONS

Exercise 1. **Прочтите и переведите диалог. Воспроизведите его в парах.**

A: Why do we have to preserve deserts? Are they so important for people? We can't live there because of the harsh climate.

B: You are mistaken. Deserts account for up to 25 per cent of the Earth's land surface, they are home to half a billion people. Besides, they are unique habitats for rare species.

A: Is it true that deserts are dying out?

B: Yes, it is. And the rate is accelerating. What alarms me is that now deserts are under more threat than they have ever been before because of climate change, over-exploitation of groundwater, salinization and the extinction of wildlife. Deserts are likely to disappear.

A: I have always thought that deserts are useless.

B: Well, deserts contain a fragile ecosystem of plants and animals specially adapted to thrive under these conditions. For example, the desert biome is home to insects and spiders that frogs and birds eat.

A: If the spiders and insects disappear, nobody will notice it.

B: You are not right. The toads and turtles will have nothing to eat and die. The animals that feed on toads and turtles will suffer too. It's a vicious circle. By the way, ancient civilization started in the desert. The civilizations such as Mesopotamia, Egypt, and Israel originated from the Sahara Desert in Africa.

A: Really?

Exercise 2. Переведите реплики своего собеседника и разыграйте диалог в парах.

A: Do you know the origin of the word "ecology"?

B: Нет, но я всегда хотел это знать.

A: Well, the word "ecology" is the combination of two Greek words: "oikos" which means *home* and "logos" which means *knowledge* or *study*.

B: Это означает, что экология изучает дом, в котором мы живем?

A: Exactly. Ecology explores facts on the interdependence between the natural world and people. It gives us a better understanding of ecological systems and helps us to understand the global and regional consequences of competition among humans for the scarce natural resources that support us.

B: Я знаю, что многие люди употребляют слово «экология», как хотят. Например, «плохая экология» или «в нашем районе хорошая экология». Я думаю, это неправильно.

A: Of course, we'd better speak about ecological problems, ecological conditions, ecological science, etc. By the way, do you know how many different groups of problems the ecological science includes?

B: Сколько?

A: Behavioural ecology, population ecology, community ecology, ecosystem ecology, autecology, synecology, mathematical ecology, ecology of recreation, landscape ecology, to name just a few.

B: Я никогда не слышал об аутэкологии или синэкологии. Что это такое?

A: Well, autecology studies the relationship of an organism to its environment while synecology describes the connection of different classes of animals and plants to their common environment.

B: Теперь я понимаю, что экология — это сложная и нужная наука.

Exercise 3. **Попросите своего коллегу ответить на следующие вопросы. Воспроизведите диалог в парах.**

A: What are the five world's biggest ecological problems?
B: .....
A: What are the roots of these problems?
B: .....
A: What do you know about the system of ecological security?
B: .....
A: What are the most prominent environmental organizations in the world?
B: .....
A: What is the role of Greenpeace in solving ecological problems?
B: .....

ДОПОЛНИТЕЛЬНЫЕ ТЕКСТЫ ДЛЯ ВНЕАУДИТОРНОГО ЧТЕНИЯ

TEXT 1

Task. **Прочтите текст и определите, какие из предложений (1–4) соответствуют тексту. Употребляйте следующие выражения:**

That's right. That's not quite right. That's false.

1. Ecologists can't predict how populations will change in the future.
2. The first contribution to the Population Theory was Charles Darwin's book "The Origin of Species" where he described the increase in competition for means of subsistence between species.
3. The population size is a major concern for population ecology.
4. Ecologists can control the population growth.

It is very important to predict the population size of a group of individuals (flora/fauna or people) and estimate the internal and external factors that impact the population — for example, availability of food, spread of disease, interactions with other species, and climate change.

When ecologists see how populations have changed, they can predict how they're likely to change in the future.

Three important measures of a population are population size, the number of individuals, population density, the number of individuals per area or volume of habitat, and population distribution or population dispersion. For example, New York City has a population of 8.6 million, while Monowi, Nebraska has a population of one.

The first significant contributor to the theory of population ecology was Thomas Malthus, an English clergyman, who in 1798 published his *Essay on the Principle of Population.* Malthus wrote that at some point in time an expanding population must exceed the supply of required natural resources and came to the conclusion that the population increase will lead to the increase in competition for means of subsistence, food, shelter, etc. He called this concept "the Struggle for Existence".

The population size is a major issue of concern and study. The United Nations makes a range of projections for future population growth. These projections are about how long people will live, what the birth rate will be in different countries and how many people of childbearing age there will be. The main population prediction is 9.8bn in 2050 and 11.2bn in 2100.

The most effective step we can take to reduce the impact of the growing population on our planet is to minimize individuals' environmental impact (footprint) and end population growth.

TEXT 2

Task. **Прочтите текст и найдите информацию о городских экосистемах, темпах их распространения, влиянии городских экосистем на другие экосистемы и о способах улучшения их состояния.**

As the world rapidly urbanizes, there emerges a new type of ecosystems called urban ecosystems.

An urban ecosystem is a community of plants, animals, and humans that inhabit the urban environment.

The largest urban ecosystems are in Europe, India, Japan, eastern China, South America, and the United States, primarily on coasts with harbours, along rivers, and at intersections of transportation routes.

Urban areas are constantly growing in size. Their proportion will reach 66% in 2050. Megacities with 10 million people will change natural areas like forests, grasslands, and farms into urban and suburban environments.

Like all other ecosystems, urban ecosystems are not isolated islands; they are part of a larger web of life. But they are fundamentally different from their natural counterparts.

Plants in urban ecosystems are subject to high levels of air pollution, runoff, poor soil quality, frequent drought, and reduced sunlight. Animal and bird populations suffer from the loss of habitat and food sources, toxic substances, and vehicles. Heavy metals, calcium dust, particulates, and human-made organic compounds (e.g., fertilizers, pesticides, and contaminants from pharmaceutical and personal care products) will affect the natural environment in cities.

To improve the condition of urban ecosystems, we need better planning and ecologically conscious urban design. An increase in "green spaces" and their more effective distribution through the urban landscape is also a key to solution. Urban green space, including desert and wetland habitats, will provide opportunities to improve the ecological processing of pollution and to moderate the local climate.

TEXT 3

Task. **Прочтите текст и переведите его письменно.**

Wasteful energy policies, overuse of resources, water supply shortages, global climate change, and deforestation are just some of the issues humans have to address to achieve sustainable living on our planet. By the year 2025, an additional 2.9 billion people will make greater demands on limited water supplies. By 2030, the world's energy needs will go up 60 per cent, according to the United Nations.

Can we remedy the problem of water supply shortages? One way is desalination (i.e. removing the salt and minerals out of seawater). This technology will provide potable water in parts of the world with limited supplies. The problem with this technology is that it is expensive and uses a lot of energy. If we want to increase the efficiency of the technology, we need to use inexpensive fuels to heat and evaporate the water before we run it through membranes with microscopic pores.

Carbon dioxide is the most prominent greenhouse gas that contributes to global warming. According to the Energy Information Administration, by the year 2030 we will be emitting close to 8,000 million metric tons of CO_2. Some experts say, it's impossible to curb the emission of CO_2 into the atmosphere and that we just have to find ways

to dispose of the gas. One method is to inject it into the ground before it gets a chance to reach the atmosphere.

The technology works as follows. We separate CO_2 from other emission gases and bury it in abandoned oil wells, saline reservoirs, and rocks. Meanwhile scientists are not sure whether the injected gas will stay underground and what the long-term effects are. Besides, the costs of separation and burying are still far too high to consider this technology as a practical short-term solution.

VOCABULARY

ECOLOGICAL TERMS

abiotic environment — абиотическая (небиологическая) среда
acid rain — кислотный дождь
aquatic environment — водная среда
behavioural ecology — поведенческая экология, этоэкология
biodiversity conservation — сохранение биологического разнообразия
biomimicry — биомимикрия (*область инженерии, в которой специалисты черпают вдохновение из окружающей среды*)
carbon reduction — снижение выбросов углерода
community ecology — экология сообществ, ассоциативная экология
curb emissions — сократить уровень выбросов
decompose — разлагаться
deforestation — обезлесение; вырубка лесов
desertification — опустынивание
drought — засуха
ecological awareness — экологическая грамотность, экологическая культура
ecological engineering — инженерные средства и методы защиты окружающей среды
ecological research — экологическое исследование
environment — окружающая среда
environmental footprint — экологический след
environmental impact — воздействие на окружающую среду
environmental sustainability — экологическая устойчивость; рациональное природопользование

environmentally conscious — экологически сознательный; экологически безопасный
exhaust fumes — выхлопные газы
flooding — наводнение; затопление
fossil fuel — ископаемое топливо
greenhouse gas emission — выброс парниковых газов
habitat — среда, место обитания
herbivore — травоядные
insect — насекомое
invasive species — вселенцы, инвазивные виды
landfill — свалка; место захоронения отходов
landscape ecology — экология ландшафта
malnutrition — недоедание
microbial life — жизнь микробов
natural disaster — стихийное бедствие
nutritional needs — потребности в питании
nourishment — питание; питательные вещества; обеспечение продовольствием
ozone depletion — истощение озонового слоя
plant community — растительное сообщество
population dispersion — разбросанность населения; расселение
population ecology — экология популяций, демографическая экология
renewable energy — возобновляемая энергия
resource scarcity — недостаток ресурсов
runoff — сток воды
saline reservoir — соляное водохранилище
salinization — засоление
soil degradation — ухудшение состояния почв
solid waste — твердые отходы
species — вид (*в биологии*); разновидность
subsistence — пропитание
urban environment — городская среда
urban landscape — городской ландшафт
wetland — заболоченные земли
wildlife extinction — вымирание дикой природы

GENERAL SCIENTIFIC TERMS

align — выравнивать, согласовывать
availability — доступность, наличие
contaminant — загрязняющее вещество
decline — снижение, спад
density — плотность
disparity — несоразмерность, несоответствие, дисбаланс
dispose of — избавляться; утилизировать; удалять
distribution — распределение
diverse — разнообразный
energy storing — энергосбережение
evaporate — испаряться
fertilizer — удобрение
inject (into) — вставлять, вводить, привносить
intersection — пересечение
measure мера; измерять
oil well — нефтяная скважина
particulate — твердая частица
pump into the atmosphere — выбрасывать в атмосферу
resilient — устойчивый, жизнеспособный
sulphur/sulfur dioxide — диоксид (двуокись) серы
vehicle — средство передвижения

UNIT 6
INNOVATIONS

GRAMMAR

THE PASSIVE VOICE
(СТРАДАТЕЛЬНЫЙ ЗАЛОГ)

Exercise 1. **Изучите формы глаголов в страдательном залоге (Passive Voice) в настоящем (Present), прошедшем (Past) и будущем (Future) времени. Обратите внимание на образование утвердительной (affirmative), вопросительной (interrogative) и отрицательной (negative) формы.**

Время	Present	Past	Future
Схема образования	**am/is/are** + Participle II	**was/were** + Participle II	**will be** + Participle II
Simple	*Affirmative:* Questions are asked. *Interrogative:* Are questions asked? *Negative:* Questions aren't asked.	*Affirmative:* Questions were asked. *Interrogative:* Were questions asked? *Negative:* Questions weren't asked.	*Affirmative:* Questions will be asked. *Interrogative:* Will questions be asked? *Negative:* Questions will not (won't) be asked.
Continuous	*Affirmative:* The questions are being asked. *Interrogative:* Are the questions being asked? *Negative:* The questions aren't being asked.	*Affirmative:* The questions were being asked. *Interrogative:* Were the questions being asked? *Negative:* The questions were not (weren't) being asked.	–

Окончание таблицы

Время	**Present**	**Past**	**Future**
Perfect	*Affirmative:* The questions have been asked. *Interrogative:* Have the questions been asked? *Negative:* The questions haven't been asked.	*Affirmative:* The questions had been asked. *Interrogative:* Had the questions been asked? *Negative:* The questions hadn't been asked.	*Affirmative:* Questions will have been asked. *Interrogative:* Will questions have been asked? *Negative:* Questions won't have been asked.
Способы перевода	*Конструкция с возвратным глаголом:* Вопросы задаются. *Неопределенно-личное предложение:* Вопросы задают.	*Конструкция с возвратным глаголом:* Вопросы задавались. *Неопределенно-личное предложение:* Вопросы задавали. *Конструкция с кратким страдательным причастием:* Вопросы заданы. Вопросы были заданы.	*Конструкция с возвратным глаголом:* Вопросы будут задаваться. *Неопределенно-личное предложение:* Вопросы будут задавать. *Конструкция с кратким страдательным причастием:* Вопросы будут заданы.

SPECIAL CASES
(ОСОБЫЕ СЛУЧАИ УПОТРЕБЛЕНИЯ СТРАДАТЕЛЬНОГО ЗАЛОГА)

Exercise 2. **Познакомьтесь с некоторыми особенностями употребления страдательного залога. Обратите внимание на перевод предложений-примеров.**

Модальный глагол + страдательный инфинитив	**Глаголы с предлогами в страдательном залоге**	**Конструкция Complex Subject**
can (иметь физическую возможность); **may** (разрешать) The work can (may) be done. — Работу можно сделать.	**speak about** (говорить о...) The method is spoken about. — Об этом методе говорят.	it is/was said (known, reported, considered) + *простой инфинитив* Students *are said to write* a lot of tests. — Говорят, студенты пишут много контрольных работ.
must (должен, необходимо); **ought to** (должно) The work must (ought to) be done. — Работу необходимо сделать.	**listen to** — слушать, прислушиваться His opinion is listened to. — К его мнению прислушиваются.	is/was said (known, reported, considered) + *продолженный инфинитив* Students *are reported to be writing* a test. — Сообщают, что студенты пишут контрольную работу.
should (следует) The work should be done. Работу следует сделать.	**approve of** — одобрять The financing of the experiment has been approved of. — Финансирование эксперимента было одобрено.	is/was said (known, reported, considered) + *перфектный инфинитив* Students *were said to have written* the test. Сказали, что студенты уже написали контрольную работу.

PRACTICE

Exercise 1. Прочтите и переведите следующие предложения, обращая внимание на сказуемые в Passive Voice.

1. The term "Disruptive innovation" is used in business and technology literature to describe innovations that improve a product or service in ways that the market does not expect.
2. The process of creation was historically reserved for deities creating "from nothing" in creation myths.
3. The idea of a real-life hoverboard is still in its infancy, however, various prototypes have been unveiled, in all of their gimmicky glory.
4. Google's Self Driving Car project was started in 2008.
5. Currently, Google's self-driving cars have clocked over 2 million miles and are being tested on the streets of major cities across the US.
6. The Tesla Roadster was released in 2008 and is a unique advancement in electric cars because it can go up to 300 miles on a single charge.
7. Interestingly, a bunch of the crazy forward-thinking tech that has been announced in the past couple of years actually came to life this year.
8. As science and technology develop so quickly, medical breakthroughs continue to be made every day around the world.
9. Carbon nanotube transistors have the potential to power electronics with longer battery life and faster processing speeds — and now that's finally being realized.
10. This new technological invention will be marketed soon.

Exercise 2. Познакомьтесь с интересными фактами, приведенными ниже, и найдите предложения, содержащие the Passive Voice. Переведите предложения с английского языка на русский. Определите форму сказуемого в страдательном залоге, используя таблицу.

1. The Buffalo SolarCity facility (the biggest producer of solar panels) and the Gigafactory 1 (lithium-ion batteries and Tesla motors producer) are powered by renewable energy sources to achieve net-zero energy.

2. 5D-digital data recording and retrieval technology is being advanced now.
3. The Google Assistant, a conversational, machine learning-powered computer can do things beyond what it was explicitly programmed to do.
4. Farmers are being given relatively cheap drones with advanced sensors and imaging capabilities to increase yields and reduce crop damage.
5. Amazon created the first e-reader Kindle in November of 2007. This invention, that has caused a huge change in the publishing industry, is now used by millions of people all around the world.
6. Curiosity, the space vehicle that was sent to discover Mars, landed in 2011. In 2014, it even found water under the surface!
7. The Large Hadron Collider (LHC) became known in 2008, and it is currently used to prove many theories in physics. The LHC is the biggest and the strongest accelerator we have today!
8. We have already 3D-printed a thyroid gland and used it on a mouse, and a trachea that was used on a person.
9. While carbon nanotube transistors have always been seen as the next major step in computational technology, until now they have always significantly underperformed compared to their silicon semiconductor competitors.
10. 3D printing is widely regarded as an industry-changing technology when it comes to consumer goods and manufacturing. But what's not widely known is that scientists have successfully created human body parts using 3D printers.

Exercise 3. **Задайте вопросы к следующим предложениям, употребляя вопросительные слова, данные в скобках.**

1. A San Diego company called Organovo has committed itself to printing human livers, and a 3D-printer partial liver transplant is expected by 2020. (*When?*)
2. When Nintendo launched the Wii and Wii Sports in 2006, it changed the way video games were played. (*What?*)
3. The Wii system has been used to teach school children music and help people lose weight. (*Who?*)
4. The world's most famous video-sharing site YouTube was acquired for $1.65 billion by Google. (*How many dollars?*)

5. The driverless car is powered by an electric motor. (*What kind of?*)
6. In 2008, Tesla Motors, a company that was started in 2003 and based in California, unveiled the Tesla Roadster. (*Where?*)
7. As a tablet computer, the iPad can be used to perform a myriad of activities such as playing games, surfing the web, reading, and watching movies. (*What?*)
8. The technology world is developing rapidly, and every time new devices and systems are introduced in the market. (*Where?*)
9. New 5G technologies, weather satellites, and drones will be used to help farmers know when and how much to water, fertilize and apply pesticides in more effective and environmentally friendly ways. (*What for?*)
10. Courses training Management Information Systems (MIS) managers, customer support engineers, computer sales representatives, or educators in the field of computer applications are run by our University. (*What courses?*)

Exercise 4. Переведите предложения на русский язык. Обратите особое внимание на перевод конструкции The Complex Subject.

Model: The Internet of Things *is said to have revolutionized* the way we communicate with each other. Говорят, что Интернет вещей произвел революцию в способах общения.

1. The service, which *is* now *said to be* the most widely *used* data application in the world, lets subscribers send and receive short text messages from their cell phones and smart phones.
2. YouTube and other social media sites *are reported to give* the average person unprecedented influence over the media.
3. Harvard student Mark Zuckerberg *is known to have launched* Facebook, a social networking site intended for college students in 2004.
4. Millions of people all over the world *are considered to use* social networking sites like LinkedIn, Bebo, and Orkut to communicate with friends or family, play games or mobilize for civic action and more.
5. The 13-year international project *is thought to be set out* to identify the 20,000 to 25,000 genes in human DNA.

6. The Wii *is known to have been touted* as more than a game.
7. Apple's App Store alone *is reported to hold* more than 100,000 applications that let users play games, track stocks, and find public rest rooms.
8. The driverless Toyota Prius *is known to have* no brake pedal, accelerator or a steering wheel.
9. A complete history of computing *is believed to include* a multitude of diverse devices such as the ancient Chinese abacus, the Jacquard loom (1805) and Charles Babbage's "analytical engine" (1834).
10. The book *is known to show* how computers evolved from their humble beginnings to the machines of today that surf the Internet, play games, and stream multimedia in addition to crunching numbers.

READING

Exercise 1. **Прочтите и озаглавьте текст.**

Innovation is said to have been with humanity since fire was figured out and the first drawings were scratched on caves.

Innovations have always been regarded as the major catalysts behind humankind's success. The most obvious milestones before the 20th century are the Wheel, Gigantic Pyramids and Cathedrals, The Printing Press, Electric Light, the Steam Engine to name just a few. Some of these breakthroughs brought about immediate changes while others opened doors to further developments.

The most important inventions were made in the 20th century. The automobile, the plane, the rocket and interplanetary probes, atomic power, Penicillin, insecticides, and a host of new materials have all been invented and developed to create unparalleled opportunities and dangers which had been unimaginable before.

Nuclear power is said to be to the twentieth century what steam power had been to the nineteenth: a game changer. Suddenly humanity had a power source that didn't pollute, was efficient and practically unlimited, and so had the potential to change the planet overnight. Unfortunately, it posed great dangers in that this same energy source could be used to create the most destructive weapons in history and threaten human survival with its very presence.

Another example of a dangerous invention is the submarine. Invented in the 1880s and modernized in the 20th century, it grew into a monstrosity in the World War II. It is reported to have sunk more ships than any other type of weapon.

The 21st century has witnessed so many great inventions in science and technology that have been as revolutionary as some of the best inventions of the previous centuries that it is sometimes hard to believe that it is barely 19 years since the century began.

The radio, television, computers, electric cars, driverless cars, cell phones and the wireless Internet, GPS, social networking, touch screen, mobile operating systems (Android and iOS), YouTube, The Internet of Things — all these innovations of the 21st century are being taken for granted now.

Technological gains are believed to be at their best when they affect everyday lives of people. In fact, their role in bettering people's lives cannot be overestimated. They lessen our worries of environmental pollution, stimulate energy conservation and reduce climate change. They open new opportunities for businesses of all sizes to market their products and services and, of course, they ease interactions of different people from different parts of the world.

Exercise 2. Найдите в тексте английские эквиваленты следующих слов и словосочетаний.

основные катализаторы, знаменательные вехи, печатный станок, паровой двигатель, эпохальное достижение / прорыв, межпланетные зонды, инсектициды, ядерная энергия, паровая энергия, источник энергии, представлять опасность, разрушительное оружие, чудовищность/уродство, самоуправляемый автомобиль, беспроводной Интернет, сенсорный экран, технический прогресс, рассматривать как само собой разумеющееся, нельзя переоценить

Exercise 3. Заполните пропуски в предложениях, употребляя слова, данные в рамочке.

milestone; catalyst; breakthrough; invention; game-changer; technology; gains

1. The invention of the railroad was a ... in the history of transportation.

2. The crucial ... came almost by accident.
3. Every chain of events starts with one push, a ..., the perfect mix of different elements that craft a path and make an outcome more likely.
4. The invention of the tank was a major ... for the face of war, which had relied on cavalry before troops were mechanized.
5. In 1847, Morse was compelled to defend his ... of the electromagnetic recording telegraph in the courts.
6. Technological ... have increased the speed at which financial transactions take place.
7. We are entering a point where ... will change at extreme speeds.

RETELLING

Exercise 1. **Ответьте на вопросы к тексту. Используйте эти вопросы для того, чтобы выделить в тексте основную мысль и наиболее важные детали.**

1. When was the first innovation recorded?
2. What were the main milestones of the 20th century?
3. What was the role of those inventions? Was it always positive?
4. What inventions in science and technology has the 21st century witnessed?
5. How do technological gains better people's lives?

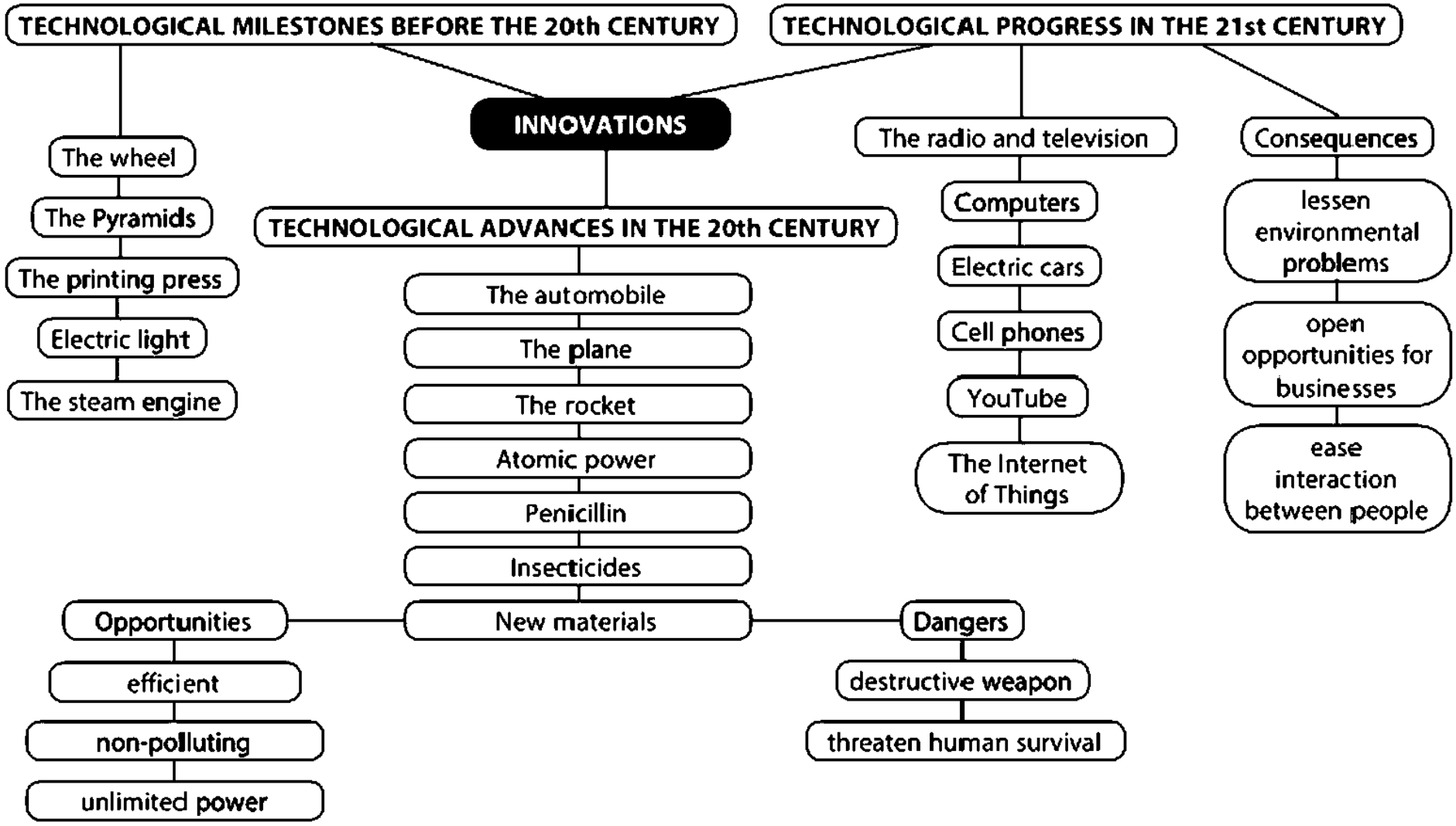
Exercise 2. **Выучите модели, которые потребуются вам для пересказа текста.**

Describing advantages and disadvantages

The invention has both pros and cons (good and bad points, pluses and minuses). — Изобретение имеет как достоинства, так и недостатки (сильные и слабые стороны, плюсы и минусы).

The invention has a lot of advantages (benefits, merits, strengths). — Изобретение имеет много достоинств (преимуществ).

There are some disadvantages (drawbacks, demerits, negative consequences). — Имеются отдельные недостатки (отрицательные стороны).


TECHNOLOGICAL MILESTONES BEFORE THE 20th CENTURY
TECHNOLOGICAL PROGRESS IN THE 21st CENTURY
INNOVATIONS
The wheel
The Pyramids
The printing press
Electric light
The steam engine
TECHNOLOGICAL ADVANCES IN THE 20th CENTURY
The automobile
The plane
The rocket
Atomic power
Penicillin
Insecticides
New materials
Opportunities
efficient
non-polluting
unlimited power
Dangers
destructive weapon
threaten human survival
The radio and television
Computers
Electric cars
Cell phones
YouTube
The Internet of Things
Consequences
lessen environmental problems
open opportunities for businesses
ease interaction between people

The only downside of the invention is that... Единственным недостатком изобретения является...

Another advantage (a further advantage, an additional advantage) is that... Еще одним преимуществом является...

The advantages outweigh disadvantages (There are more benefits than demerits). — Достоинства превосходят недостатки.

Exercise 3. **Перескажите текст с помощью концептуальной карты "Innovations". Употребляйте выражения из упр. 2.**

CONVERSATIONS

Exercise 1. **Прочтите и переведите диалог. Воспроизведите его в парах.**

A: I've bought a hoverboard recently. It is the latest tech craze.

B: Excuse my ignorance, but what is a hoverboard?

A: Oh, it's simple. It's a two-wheeled, electric, portable device that is commonly known as self-balancing scooter or e-board. It is powered by a lithium-ion battery that in turn powers a motor which gives a hoverboard the ability to move in all directions.

B: I've seen such scooters. They are a real breakthrough. If I'm not mistaken, its prototype was shown in the film "Back to the future" for the first time.

A: You are right. Hoverboards look very futuristic. My hoverboard is a bright-green transporter with Bluetooth speakers.

B: Is it easy to operate?

A: It is not really difficult to operate, but the first time you get on it you might find it somewhat difficult to maintain your balance.

B: Does it have any demerits?

A: The only downside is that people fall off it. In addition, it can overheat and even cause fires.

B: How much is it?

A: 1,500 pounds.

B: Oh, it's so expensive.

A: It's not surprising. It's one of the milestones of the 21st century. It is used by many celebrities.

Exercise 2. **Переведите реплики своего собеседника и разыграйте диалог в парах.**

A: I'm greatly impressed by digital technology of the last 5 years. Smartphones, cloud computing, multi-touch tablets are just incredible. But scientists say it is not the limit.

B: Да, это только начало. Впереди нас ждут инновации, которые мы видели в самых смелых научно-фантастических фильмах.

A: Have you heard about Google Glass?

B: Немного.

A: With Google Glass, you will be able to view social media feeds, text, Google Maps, as well as navigate with GPS and take photos.

B: Это, конечно, впечатляет, но я был просто поражен, когда узнал о персональных 3D-принтерах. Это просто революционная идея, на мой взгляд.

A: A personal 3D printer, you say?

B: Представляешь, ты можешь создать продукт по своему собственному проекту, а главное — тебе не нужно официального одобрения для его массового производства.

A: It sounds great!

B: Стоит он 2799 долларов. Но если принять во внимание, что ты можешь наладить массовое производство своей продукции с помощью этого принтера, это приемлемая цена.

Words for translation:

быть пораженным — be taken aback
продукт, созданный по собственному проекту — a product of your design
официальное одобрение — official approval
принимать во внимание — take into account
приемлемая цена — reasonable price

Exercise 3. **Попросите своего коллегу ответить на следующие вопросы. Используя ответы, придумайте диалог об инновациях будущего. Воспроизведите его в парах.**

A: What can *The Eye Tribe* do?

B: .....

A: What are the advantages of *The Flexwarm jacket*?

B: .....

A: How will *Pilot Wireless Headphone Translators* ease travelling around the world?

B: .....

A: How will *Aqua Treadmill* (Water Walker & Spa) help the injured people recover from their illnesses? What are the advantages of this innovation?

B: .....

ДОПОЛНИТЕЛЬНЫЕ ТЕКСТЫ ДЛЯ ВНЕАУДИТОРНОГО ЧТЕНИЯ

TEXT 1

Task. **Прочтите текст и определите, какие из предложений (1–5) соответствуют тексту. Употребляйте следующие выражения:**

That's right.
That's not quite right.
That's false.

1. A new gene therapy technology treats only blood cancers.
2. Gene therapy is bound to eliminate traditional treatments of cancer such as radiation or chemotherapy.
3. Gene therapy will slightly slow the aging process.
4. Serelaxin is a synthetic version of hormone relaxin.
5. Serelaxin has cured 37% of patients with heart failures.

The use of a new gene therapy technology to treat blood cancers such as leukemia is one of the most exciting medical breakthroughs in recent history. Recent experiments have revealed the potential for gene therapy to be used in reversing other types of cancers, for example, breast cancer. There's some promise that gene therapy will one day be used to eliminate traditional treatments such as radiation, chemotherapy, or surgery. Gene therapy is said to have been used to cure a teenage boy with sickle cell disease (серповидно-клеточная болезнь).

The gene therapy proved efficient in treating the symptoms of aging. There is hope that if muscle mass and stem cell depletion are

effectively treated with gene therapy, this technology has the potential to significantly slow the human aging process.

Another breakthrough in medicine is serelaxin, a synthetic version of hormone relaxin. It will be useful to patients who are at risk of heart failure. Now the situation is that around a quarter of patients who are hospitalized for serious heart diseases do not live beyond a year after their hospitalization. A new revolutionary drug is likely to improve this perspective dramatically.

Serelaxin is reported to boost survival rates in patients with heart problems by 37 per cent. The drug opens up the blood vessels and has an anti-inflammatory impact on the system.

TEXT 2

Task. **Прочтите текст и найдите информацию о *дополненной реальности* и ее отличиях от *виртуальной реальности*.**

Augmented Reality (AR) is the technology that expands our physical world, adding layers of digital information onto it. Unlike Virtual Reality (VR), AR does not create the whole artificial environments to replace the real one. AR appears in direct view of an existing environment and adds sounds, videos, graphics to it. This innovative technology blurs the line between what's real and what's computer-generated by enhancing what we see, hear, feel, and smell.

The AR device looks like a normal pair of glasses, but when you come closer to the object of your interest, informative graphics will appear in your field of view, and audio will coincide with whatever you see.

A new gadget will be used by everyone from tourists, to soldiers, or someone who is looking for the closest subway stop.

No doubt, various augmented reality apps will impact our habits, social life and entertainment.

TEXT 3

Task. **Прочтите текст и переведите его письменно.**

ED-TECH INNOVATIONS

It is becoming more and more evident that computerized education based on high-speed Internet and free online teaching resources has

been made available to even the most remote schools as technology and online learning are improving academic progress for most students.

The fact is that digital devices, software, and learning platforms that provide a once-unimaginable array of options for tailor-education can't be overestimated. This digital personalized learning which allows for students' personal strengths and weaknesses, their interests and their pace of learning can improve student progress or narrow achievement gaps.

Students' opportunities and concerns associated with classroom technology are certain to change too. The idea of tailor-education is to provide "24–7" learning at the time and location of a student's choice.

Tailor-education can be guaranteed if a teacher has access to learning management systems, student information systems, and other software to distribute assignments, manage schedules and communications, and track student progress.

Educational software and applications are being made more "adaptive" now as they rely on technology and algorithms which determine not only what a student knows or what his or her learning process is, but also his or her emotional state.

VOCABULARY

INNOVATION TERMS

advancement — прогресс, развитие, совершенствование
aqua Treadmill — беговая дорожка, тренажер
augmented reality — дополненная реальность
augmented reality apps — приложения дополненной реальности
breakthrough — прорыв, крупное достижение
carbon nanotube transistor — транзистор с углеродной нанотрубкой
classroom technology — современные технологии для обучения
cloud computing — облачные компьютерные технологии, облачные вычисления
collider — коллайдер
computational technology — вычислительная техника
data-retrieval technology — технология поиска данных
digital technology — цифровая технология
disruptive innovation — прорывная/революционная инновация

ed-tech innovation — инновация в области образовательных технологий
(the) Eye Tribe — технология управления компьютером с помощью взгляда
feed — канал связи
Flexwarm jacket — умная куртка с подогревом
forward-thinking tech — передовая технология
free online teaching resource — бесплатный онлайн-ресурс для обучения
gene therapy technology — технология генной терапии
Google Glass — высокотехнологичные (цифровые) очки
high-speed Internet — высокоскоростной Интернет
hoverboard — гравидоска, летающий скейт, скейт на воздушной подушке
imaging capability — возможность визуализации
interplanetary probe — межпланетный зонд
milestone — веха, важный этап, достижение, поворотный момент
multi-touch tablet — мультисенсорный планшет
net-zero energy — высокоэффективный; без энергозатрат
space vehicle — космический аппарат
tablet computer — планшет
tailor education — индивидуализированное образование, образование с учетом индивидуальных потребностей
tech craze — повальное увлечение техникой
technological gain — технический прогресс
technological innovation — технологическая инновация
video-sharing site — веб-сайт по обмену видеофайлами

GENERAL SCIENTIFIC WORDS AND EXPRESSIONS

achievement gap — пробелы в образовании
allow for — учитывать
array — ряд, совокупность
deity — божество; божественность
ease — облегчать, упрощать
enhance — усиливать, увеличивать
facility — объект, сооружение; средство
game-changer — величайшее достижение, поворотный момент
gimmicky — бесполезный

in infancy — в зачаточном состоянии
lessen — смягчать, ослаблять
monstrosity — чудовищность
roadster — автомобиль с открытым двухместным кузовом, складным верхом и откидным задним сиденьем; дорожный велосипед
take for granted — принимать как должное
unveil — раскрывать, обнаруживать

UNIT 7
NANOTECHNOLOGIES

GRAMMAR

ING-FORMS
(ФОРМЫ, ОКАНЧИВАЮЩИЕСЯ НА *-ING*)

Exercise 1. **Изучите формы с окончанием *-ing*. Обратите внимание на их функции в предложении (подлежащее, часть сказуемого, определение, обстоятельство) и способы перевода.**

Часть речи	**Participle I**	**Gerund**	**Verbal Noun**	**Adjective**
Образование формы	Verb + *-ing*	Verb + *-ing*	Verb + *-ing*	Verb/noun + *-ing*
Пример	interrogating (спрашивающий)	interrogating (допрос)	interrogating (опрашивание)	scare — scaring interest interesting
Функции	*1. Определение* A device (*какой?*) measuring temperature is a thermometer. *2. Часть сказуемого* This device is measuring temperature. *3. Обстоятельство* He stood at the table measuring temperature.	*1. Подлежащее* Scanning the text is necessary. *2. Часть сказуемого* Our aim is scanning. *3. Определение (после предлога)* The device for scanning is absent. *4. Обстоятельство* We can do this work by scanning the text.	*1. Подлежащее* The changing of the size is our aim. *2. Дополнение* We want to stress the changing of the size.	*1. Определение* It is an interesting subject. *2. Часть сказуемого* The subject is interesting.

Окончание таблицы

Часть речи	Participle I	Gerund	Verbal Noun	Adjective
		After scanning the text we finished the work.		
Перевод	*Причастие настоящего времени:* измеряющий *Придаточное определительное:* который измеряет *Личная форма глагола:* измеряет *Деепричастие:* измеряя	*Инфинитив:* сканировать *Существительное (с предлогом и без предлога):* сканирование; для сканирования *Деепричастие:* сканируя; отсканировав	*Существительное:* изменение	*Прилагательное:* интересный *В составе сказуемого — краткое прилагательное:* интересен

PRACTICE

Exercise 1. **Прочтите и переведите следующие предложения, обращая внимание на *ing*-формы. Определите, какой частью речи является *ing*-форма в каждом случае.**

Обозначения частей речи

VN — отглагольное существительное
P1A — причастие I в функции определения
P1P — причастие I в функции части сказуемого
P1AM — причастие I в функции обстоятельства образа действия
G — герундий
Adj — прилагательное

1. Nanotechnology encompasses the *understanding* of the fundamental physics, chemistry, biology, and technology of nanometre-scale objects.

2. Nanotechnology is naturally very broad *including* fields of science as diverse as surface science, organic chemistry, molecular biology, semiconductor physics, energy storage, microfabrication, molecular engineering, etc.
3. Energy storage involves *converting* energy from forms that are difficult to store to more conveniently or economically storable forms.
4. Materials reduced to the nanoscale can show different properties compared to what they exhibit on a macroscale, *enabling* unique applications.
5. Molecular nanotechnology, sometimes called molecular *manufacturing*, describes engineered nanosystems (nanoscale machines) *operating* on the molecular scale.
6. There are hopes for *applying* nanorobots in medicine.
7. Another group of nanotechnological techniques includes those used for fabrication of nanotubes and nanowires, those used in semiconductor fabrication such as deep ultraviolet lithography, electron beam lithography, focused ion beam *machining*, and nanoimprint lithography.
8. It wasn't until 1981, with the development of the *scanning tunneling* microscope which could "see" individual atoms that modern nanotechnology began.
9. Technics for *working* at a nanoscale have become essential to electronic *engineering*, and nanoengineered materials have begun to appear in consumer products.
10. Researchers have been able to make materials that are stronger and more durable by *taking* advantage of property changes that occur when substances are reduced to nanoscale dimensions.

Exercise 2. **Познакомьтесь с интересными фактами, приведенными ниже, и найдите предложения, содержащие *ing*-формы. Переведите предложения на русский язык.**

1. Hundreds of years ago the artists just didn't know that the process they used to create stained glass windows of medieval churches actually led to changes in the composition of the materials they were working with.
2. Embedding silver nanocrystals in bandages kills bacteria and prevents infection.
3. The colors in medieval stained glass windows result from nanocrystals created in the heating and cooling of the glass.

4. Scientists from San Diego have designed a fluorescent nanoparticle that glows inside the body making it easier to image tumors and organ damage.
5. Zhong Lin Wang envisions a shirt that charges your cell phone as you stroll, or an implanted device for measuring blood pressure that's powered by your own heartbeat.
6. Richard Feynman proposed using normal-sized robots to construct smaller replicas of themselves and then using the new set to manufacture an even smaller set, and so on, until the molecular scale is reached.
7. Bulletproof business suits made from carbon nanotubes are stab resistant and have to be cut into shapes using a saw.
8. Scientists are using nanotechnology to create an invisibility cloak. Nanotube sheets at extreme temperatures cause light to bend away from objects that "disappear".
9. Nanocrystals can be used to make the original metals much stronger by mixing with them.
10. Some clothing companies have introduced clothing items that are stain proof and that can even resist wrinkles.

Exercise 3. **Проанализируйте предложения, в которых употребляются *ing*-формы: герундий, отглагольное существительное, причастие I, прилагательное. Каковы их отличительные признаки? Переведите предложения на русский язык.**

Герундий может стоять после предлога (**of, for**), если употребляется в функции определения (отвечает на вопрос *какой?*) или косвенного дополнения (которое на русский язык иногда переводится прямым дополнением, т.е. отвечает на вопрос *что?*).

В функции подлежащего стоит в начале предложения перед сказуемым, выраженным личной формой глагола.

В функции обстоятельства образа действия часто употребляется с предлогом **by**.

Отглагольное существительное употребляется с артиклем, после него может стоять предлог.

Причастие I употребляется в функции определения (отвечает на вопрос *какой?*), обстоятельства (отвечает на вопросы *как?* и *каким образом?*) и части сказуемого.

В функции определения стоит перед существительным, а если имеет зависимые слова — после существительного.

Как часть глагольного сказуемого стоит после глагола **to be** и образует времена группы Continuous.

Прилагательное с суффиксом *-ing* ставится перед существительным. Если существительное исчисляемое, ему предшествует артикль.

1. Nanotechnologies are used for cleaning ocean water from toxic elements like (mercury, lead), etc. by using a tube with nanotech coating process which acts like a sponge.
2. One of the most ten surprising facts of nanotechnology is that nanoparticles are used to produce self-cleaning glass.
3. Predictions about the future of nanotechnology range from the ability to reproduce things like diamonds and food to the world being devoured by self-replicating nanorobots.
4. Nanotechnology is helping design the next generation of solar panels, and efficient low-energy lighting.
5. Nanotechnology was the work of changing materials by one atom or by one molecule.
6. *Engines of Creation: The Coming Era of Nanotechnology* (1986) is thought to be the first book on nanotechnology.
7. The classification of nanomaterials is based upon different properties it holds such as scattering of light, absorbing x-rays, transporting electric current or heat.
8. 322 companies in 20 countries are producing products that contain nanomaterials. About 20,000 researchers around the world are working in nanotechnology related jobs.
9. Manipulating matter at an atomic and sub-molecular level has paved the way for major breakthroughs in chemistry, biology, and medicine.
10. The astonishing potential of STM was demonstrated by researchers at IBM when they created *A Boy and His Atom*, which was the world's smallest animated film.

READING

TEXT 1

Exercise 1. **Прочтите и озаглавьте текст.**

Nanoscience and nanotechnologies cover six broad categories: nanomaterials, nanometrology, electronics, as well as information and communication technology, bio-nanotechnology, and nanomedicine.

At present materials scientists, physicists, and biology researchers are working at the nanoscale to produce new or enhanced materials from stretchy circuit boards and self-healing plastic to cancer medicines.

Nanofabrication has become one of the most prolific areas of research in nano-science. Scientists have already figured out new stretchable materials, self-healing materials and self-replicating materials.

Stretchable gold, for example, can be printed onto rubber circuit boards which will lead to a squeezy computer.

One of the most uncanny examples of a self-healing material is a plastic that "bleeds" when it rips, using the extruded "blood" to repair damage and become whole again. New bleeding healing plastic will be used on airplanes and in space industry.

3D printing has become commonplace. 3D printers can print out everything from toys to skin. And now researchers have begun building functional molecules piece-by-piece. This is an ideal way to create personalized medicine.

Some breakthroughs in nano-science have led to improvements in cancer treatment. One of the challenges is the delivery of medicines to the precise region of a patient's body where the cancer is active. It is using nanoscale drug capsules that makes it possible. The drugs are placed inside these nanoscopic capsules, which are attracted to the specific form of cancer the patient is suffering from. The capsules unleash their medicine leaving the cancer blighted, but the rest of the body unharmed. Eventually, scientists will even inject nanoscale machines into a patient's body that will act as tiny pharmaceutical labs using a body's natural resources (from enzymes to proteins) to manufacture and deliver drugs.

Exercise 2. **Найдите в тексте английские эквиваленты следующих слов и словосочетаний.**

наноматериалы, нанометрология, бионанотехнологии, наномедицина, на наноуровне, эластичные монтажные платы, самовосстанавливающийся материал, самовоспроизводящийся материал, компрессионный компьютер, повсеместный, персонализированная медицина, точный/конкретный, высвобождать/выпускать, поврежденный, вводить/впрыскивать.

Exercise 3. **Заполните пропуски в предложениях, употребляя слова, данные в рамочке.**

nanometrology; blighted; self-replicating; healing; squeezy

1. ... is a subfield of metrology, concerned with the science of measurement at the nanoscale level.
2. Quines are "...", "self-reproducing" programs. Quines are named after the American mathematician and logician Willard van Orman Quine (1908-2000) who introduced the concept.
3. By the 1930s, the area was no more ... than many parts of the city after the years of the Great Depression.
4. The ... abilities of this material were promising.
5. It was a flexible, ..., easy to use computer.

RETELLING

Exercise 1. **Ответьте на вопросы к тексту. Используйте эти вопросы для того, чтобы выделить в тексте основную мысль и наиболее важные детали.**

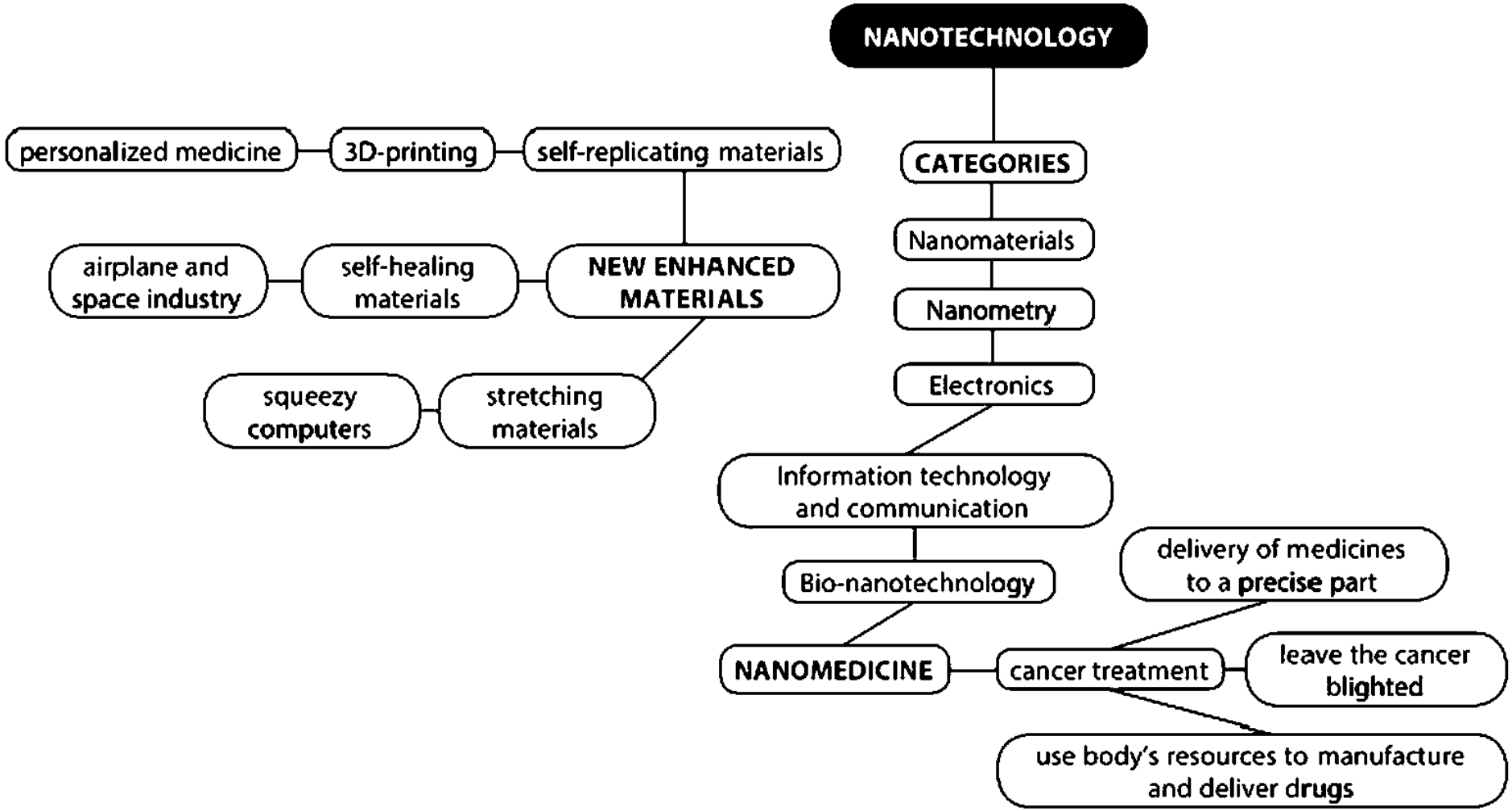
1. What are the six broad categories of nano-science?
2. Which of these categories is the most prolific?
3. What three kinds of nanofabrication are the most promising?
4. What are the spheres of their uses?

Exercise 2. **Выучите модели, которые потребуются вам для пересказа текста.**

Describing the composition of something

1. It is made up of... Это состоит из...
2. It includes... Это включает (в себя)...
3. It falls down into... Это распадается на...
4. It can be subdivided into... Это подразделяют на...

Exercise 3. **Перескажите текст с помощью концептуальной карты "Nanotechnology". Употребляйте выражения из упр. 2.**


NANOTECHNOLOGY
CATEGORIES
Nanomaterials
Nanometry
Electronics
Information technology and communication
Bio-nanotechnology
NANOMEDICINE
cancer treatment
delivery of medicines to a precise part
leave the cancer blighted
use body's resources to manufacture and deliver drugs
personalized medicine
3D-printing
self-replicating materials
NEW ENHANCED MATERIALS
airplane and space industry
self-healing materials
squeezy computers
stretching materials

CONVERSATIONS

Exercise 1. **Прочтите и переведите диалог. Воспроизведите его в парах.**

A: We all use the prefix "nano". But do we know what it means exactly?

B: I think I do. Firstly, it can be traced to the first release of the iPod nano and the incredible success it had. Besides, it can be associated with anything small.

A: Of course, you are right. But *nano* is not just a synonym for *small.* It has a very specific size associated with it. *Nano-* is a metric prefix that stands for *one billionth.* Can you imagine one nanometre?

B: I'm afraid, I can't.

A: Well, let's compare one nanometre with one metre. If the diameter of a thing represents one nanometre, the sphere that represents one metre will be the size of Earth.

B: Oh, it's hard to imagine. What can scientists do with nanometres?

A: Scientists can use them for measuring the size of small things. Traditionally, circuits have been etched onto chips by removing material in small regions. However, with nanotechnologies, it is possible to build chips up, one atom at a time, to produce smaller devices than those that can be manufactured by etching.

B: It's amazing what our science has come down to.

Note

etch выгравировать

Exercise 2. **Переведите реплики своего собеседника и разыграйте диалог в парах.**

A: Как можно создать наноприбор, диаметр которого в 10 000 раз меньше, чем диаметр человеческого волоса? Вы когда-нибудь думали об этом?

B: Well, I'm not a scientist yet. I'm only a student but I know that there are two main approaches to creating nano-structures: bottom up and top down.

A: В них трудно разобраться?

B: Well, in simple terms, a top-down approach refers to slicing or successive cutting of a bulk material to get nano-sized particles while bottom-up refers to methods where devices create "themselves" by self-assembly.

A: Это всё теория, а как на практике?

B: Imagine you need to build the tiniest computer chip possible. Using the *bottom-up* approach, you will assemble the chip atom by atom, placing each type of atom in a specific location to build the circuit. With the *top-down* approach, you will instead create the computer chip by carving away at bulk material much like a sculptor and his artwork.

Notes

bottom-up approach — подход «снизу-вверх»
top-down approach — подход «сверху-вниз»
carve away — убрать лишнее

Exercise 3. **Найдите ответы на следующие вопросы по теме «Нанотехнологии» в сети Интернет. Организуйте их обсуждение в группе.**

A: What progress has nanotechnology made in medicine?

B: .....

A: What is the most substantial contribution of nanotechnology to environmental protection?

B: .....

A: What are breakthroughs in information and communication technology due to nanotechnology?

B: .....

A: What is the impact of nanotechnology on the future of business and economy?

B: .....

ДОПОЛНИТЕЛЬНЫЕ ТЕКСТЫ ДЛЯ ВНЕАУДИТОРНОГО ЧТЕНИЯ

TEXT 1

Task. **Прочтите текст и определите, какие из предложений (1–4) соответствуют тексту. Употребляйте следующие выражения:**

That's right.
That's not quite right.
That's false.

1. The image quality depends on the size and shapes of pixels on the screen.
2. A pixel is 300 by 300 nanometres in size.
3. In existing displays pixels are regularly refreshed to get a good image.
4. The GST-layer-based displays save power by refreshing only a part of the display.

The images on computer screens are presented via tiny dots called pixels. Regardless of their sizes and shapes, the number of pixels on a screen is a determining factor of image quality. With traditional displays, however, more pixels meant larger and bulkier screens, which is an obvious limitation.

While companies were busy selling their huge screens to consumers, scientists from Oxford University created pixels that were just a few hundred nanometres across. This was achieved by exploiting the properties of a phase-change material called GST (a material found in thermal management products). In the experiment, the scientists used seven-nanometre-thick layers of GST sandwiched between transparent electrodes. Each layer — just 300 by 300 nanometres in size — acts as a pixel that can be electrically switched on and off. By passing electrical current through layers, the scientists were able to produce images with fair quality and contrast.

The nano-pixels can serve a variety of purposes where the conventional pixels have become impractical. For instance, their tiny size and thickness will make them useful for technologies such as smart glasses, foldable screens, and synthetic retinas. Another advantage of nano-pixel displays is their lower energy consumption. Unlike the existing displays that constantly refresh all pixels to form images, the GST-layer-based displays only refresh the part of the display that actually changes, saving power.

TEXT 2

Task. **Прочтите текст и найдите информацию об организациях, которые способствуют продвижению нанотехнологий в России. Каковы их цели и возможности?**

Russia has several organizations and networks promoting and exploring nanoscience.

One of them is the RUSNANO Corporation. RUSNANO and the Fund for Infrastructure and Educational Programs are state bodies which foster the growth of the nanotechnology industry in Russia.

RUSNANO co-invests in nanotechnology projects with substantial economic potential. Its mission is building a competitive nanotechnology industry based on the advances of Russian scientists and cutting-edge technologies from other countries.

The second most influential organization is the Russian society of scanning probe microscopy and nanotechnology. The society is known as a non-profit public organization which was founded in 1998 to facilitate information interchange, spread of researches and practical applications in the area of scanning probe microscopy and nanotechnology. Its activities are regulated by the charter.

The consortium NanoBRIDGE, which is the third nanoscience promoting organization, focuses on intensifying German-Russian collaboration in technology and science for biomedical and bio-analytical nanotechnology so as to increase international competitiveness.

TEXT 3

Task. **Прочтите текст и переведите его письменно.**

NANOMATERIALS

The ability to manipulate materials at a nanoscale (1-100 nanometres, one nanometre is a billionth of a metre) is completely changing the course of material science and engineering. This type of technology has great potential, enabling the configuration of specific characteristics of a material at a molecular level, in order to address particular needs.

We can witness the novel applications for wood-based nanomaterials, such as carbon nanotubes and cellulose nanofibres. Nanotubes and nanofibres are used in the textile industry to make waterproof and tear-resistant fabrics. Added to concrete, they can increase its tensile strength and halt the propagation of cracks.

Other uses include air filters and solar cells. These materials can enhance the strength and durability of products. Over the last three years the Forest Products Laboratory has come with a new wood-based nanomaterial composed of nanocrystals and nanofibres. This material is currently being developed to produce clear reinforced glass.

Nanocrystals research has been an area of significant interest lately due to a wide range of potential applications in semiconductor, optical and biomedical fields.

Nanocrystals can be used to make super-strong and long-lasting metal parts. The crystals also may be added to plastics and other metals to make new types of composite structures for everything from cars to electronics.

VOCABULARY

NANOTERMINOLOGY

blighted — поврежденный
bulk material — целый, монолитный; массив
carbon nanotube — углеродная нанотрубка
cellulose nanofibre — целлюлозное нановолокно
cutting-edge technology — современная/передовая нанотехнология
enhanced material — усовершенствованный материал; материал повышенной прочности
foldable screen — складной экран
ion beam machining (milling) — ионное фрезерование, ионно-лучевая обработка
lithography — литография
microfabrication — микрообработка
nanoengineered material — материал, созданный методами нанонженерии
nanoimprint lithography — нанопечатная литография (*вдавливание шаблона с наноразмерными элементами в слой материала*)
nanometre scale — нанометровое разрешение
nanoscale dimension — наноразмерный, мельчайший
nanotube — нанотрубка; трубка нанометрового диаметра
nanowire — нанопроволока; нанопроводник
phase-change material (GST) — материал с изменяемым фазовым состоянием
scanning probe microscopy — сканирующая зондовая микроскопия
scanning tunneling microscope — сканирующий туннельный микроскоп
self-healing material — самовосстанавливающийся материал
self-replicating material — самовоспроизводящийся материал

squeezy computer — компрессионный компьютер
stretchy circuit boards — эластичные монтажные платы

GENERAL SCIENTIFIC WORDS AND EXPRESSIONS

collaboration — сотрудничество, совместная работа
competitiveness — конкурентоспособность
configuration — конфигурация, очертание, форма
embed — вставлять, встраивать
encompass — окружать, заключать, содержать в себе
envision — представлять себе, предвидеть, рассчитывать
extruded — прессованный; выдавленный
foster — благоприятствовать, поощрять, культивировать
inject — вводить, впрыскивать
lead — свинец
light scattering — рассеяние света
mercury — ртуть
Quine — самовоспроизводящаяся программа
replica — репродукция, точная копия
retina — сетчатка (глаза), сетчатая оболочка
sponge — губка
stab-resistant — противоударный
stained glass — витражное стекло; цветное матовое стекло
stain-proof — стойкий к загрязнению, пятностойкий
surface science — химия поверхности
tear-resistant — прочный на разрыв
tensile strength — прочность на разрыв
unleash — высвободить, раскрыть потенциал

UNIT 8
MATERIALS SCIENCE

GRAMMAR

WAYS OF EXPRESSING THE ATTRIBUTE (СПОСОБЫ ВЫРАЖЕНИЯ ОПРЕДЕЛЕНИЯ)

1. The Adjective (Прилагательное)

Exercise 1. **Запомните способы образования прилагательных и их употребление в функции определения в предложении. Обратите внимание на три способа образования сравнительной и превосходной степеней сравнения.**

Положительная степень	Сравнительная степень	Превосходная степень
Без суффикса: small/little big/large far/close thin/thick new/old *С суффиксом:* -able: recyclable -ful: careful -al: mechanical -ive: expensive -ic: electronic -ate: appropriate -less: aimless -ing: boring -ed: educated	Способ 1 *основа* + ***-er*** small — smaller (маленький — меньше)	Способ 1 *основа* + ***-est*** small — the smallest (маленький — наименьший)
	Способ 2 **more** + *положительная степень* flexible — more flexible (гибкий — более гибкий)	Способ 2 **the most** + *положительная степень* flexible the most flexible (гибкий — самый гибкий)
	Способ 3 (супплетивный) good — better (хороший — лучше)	Способ 3 (супплетивный) good — the best (хороший — наилучший)

2. The Noun
(Существительное)

Exercise 2. **Познакомьтесь с номинативными конструкциями английского языка. Обратите внимание на то, что существительные в роли определения могут переводиться на русский язык существительным в родительном падеже, существительным с предлогом и прилагательным.**

Количество существительных в конструкции	Примеры и перевод
Двучленные конструкции	fuel consumption — потребление топлива space era — космическая эра
Трехчленные конструкции	aerospace materials market — рынок материалов для аэрокосмической промышленности
Многочленные конструкции	Russia's Space exploration successes — успехи России в освоении космоса

3. Participle I and Participle II
(Причастие I и причастие II)

Exercise 3. **Запомните, что причастия I и II могут употребляться в функции определения. Обратите внимание на то, что одиночные причастия употребляются перед существительным (в препозиции), а причастия с зависимыми словами — после существительного (в постпозиции).**

Тип причастия	Примеры и перевод
Participle I (Причастие настоящего времени)	1. Одиночное причастие I стоит перед существительным: emerging technologies — возникающие (появляющиеся, новые) технологии 2. Причастие I с зависимыми словами стоит после определяемого существительного: the plant producing spaceships — завод, выпускающий космические корабли

Окончание таблицы

Тип причастия	Примеры и перевод
Participle II (Причастие прошедшего времени)	1. Одиночное причастие II стоит перед существительным: finished product — законченный (конечный, готовый) продукт 2. Причастие II с зависимыми словами стоит после определяемого существительного: a product created by a famous designer — продукт, созданный известным конструктором

4. The Attribute Clause (Определительное придаточное предложение)

Exercise 4. Изучите структуру определительного придаточного предложения и его место в предложении (после существительного). Обратите внимание на слова, которые присоединяют придаточное предложение к существительному, и на его перевод.

Тип придаточного предложения	Примеры и перевод
Предложение с союзным словом (who, that, which, where)	Here are the materials *that* work wonders. — Вот материалы, которые творят чудеса. The houses *which* are being built in our street will stand for a long time. — Дома, которые строятся на нашей улице, простоят много лет. The University *where* we study is known all over the world. — Университет, в котором мы учимся, известен во всем мире.
Бессоюзное предложение	The materials *we use* are expensive. — Материалы, которые мы используем, дорогие. The company *we work in* is multinational. — Компания, в которой мы работаем, является многонациональной.

PRACTICE

Exercise 1. **Прочтите и переведите следующие предложения, обращая внимание на способы выражения определения.**

1. Materials science involves several subjects such as biomaterials, structural materials, chemical and electrochemical materials science, computational materials science, electrochemical materials.
2. Material scientists and engineers can develop new materials with enhanced performance by modifying the surface properties.
3. The list of currently emerging technologies contains some of the most prominent ongoing developments, advances, and materials science and nanotechnology innovations such as graphene, fullerene, conductive polymers, metamaterials, nanolithography nanomaterials: carbon nanotubes, soft lithography, superalloy, aerogel, aerographite, lithium-ion batteries, etc.
4. Materials science is a dynamic and exciting field with many remarkable new materials developments and discoveries.
5. A laboratory error, by a research chemist who missed a step when mixing some chemicals, has led to the discovery of a new family of strong and light-weight materials that show "self-healing" attributes and can be reformed to make recyclable products.
6. Our methods of communication, such as computers, smart phones, HD televisions, and other communication systems, rely heavily on advances that have sprung from materials research.
7. Composite materials are increasingly used in the aerospace and automotive industries, revolutionizing the way we travel.
8. With recent advances in scientific instrumentation and fabrication methods, we are now able to image individual atoms, detail the composition of complex mixtures, "see" how chemical transformations take place, and fabricate materials and devices on a scale that approaches the atomic level.
9. Replacing the magnetic fields in our existing magnetism-based technologies with electric fields offers tremendous opportunity for energy savings, miniaturization, and efficiency.
10. Brick, stone, and timber have been used in construction for at least 7,000 years. Kiln-fired bricks have been around for 4,000 years; concrete since Roman times. Even the most recent quantum leap — the advent of structural steel — occurred more than a century ago.

Exercise 2. **Познакомьтесь с интересными фактами, приведенными ниже, и найдите предложения, содержащие прилагательные в сравнительной и превосходной степени сравнения. Переведите предложения на русский язык. Составьте список найденных прилагательных и определите, каким способом они образованы.**

1. Scientists at the University of Portsmouth have discovered that the teeth of limpets (shelled aquatic snails) are the strongest biological material on earth.
2. Imagine a product 200 times stronger than steel, more conductive than copper, more flexible than rubber: graphene is, essentially, graphite that is just one atom thick.
3. Using a laboratory blender and a surfactant mixture, scientists at Trinity College, London, have discovered a way to make high quality graphene sheets in much greater quantities than previous methods allowed. This could lead to significantly higher production rates in the future.
4. The earliest tools made of materials such as bone, fibres, feathers, shells, animal skin, and clay were in the Paleolithic Age, called Oldowan. As history carried on into the Mesolithic age, tools became more complex and symmetrical in design with sharper edges.
5. In 2017, a number of designers explored the structural properties of new, environmentally friendly materials but mushroom mycelium was one of the most unusual. It was used to cover an arching pavilion in India and to create a tree-shaped self-supporting structure in South Korea.
6. One of this year's least orthodox material choices is Billie van Katwijk's sustainable alternative to leather. The designer transforms cow stomachs into a material that can be used to make accessories and bags.
7. A new form of aluminum bubble wrap invented by a team of engineers from North Carolina State University absorbs masses of energy, weighs 30 per cent less than regular sheet metal, and yet is nearly 50 times stronger.
8. The phrase graphene aerogel has the title of the world's lightest material with a density lower than that of helium and just twice that of hydrogen at 0.16 mg/cm^3. This stuff practically floats

9. Rhodium, a silvery white, hard platinum group metal, is one of the rarest naturally occurring metals on Earth, second only to osmium.
10. Gallium, a mainstay semiconductor in a wide variety of electronics, can be shattered like glass and caused to melt by holding it in your hand long enough, but more bizarre is that with just a bit of sulfuric acid and dichromate solution it acts like some form of extraterrestrial life form — and even beats like a heart!

Exercise 3. Найдите в следующих предложениях определения, выраженные существительным или цепочкой существительных. Переведите предложения с английского языка на русский.

1. Beryllium with its low density and atomic mass has found a most profound use in radiation windows and occupied a valued place in particle physics due to its use in all four detector experiments in the Large Hadron Collider.
2. Pinatex (using the waste fibre from pineapple production) has made big inroads in the fashion industry over the last couple of months.
3. All over the world, agro-waste such as sugarcane bagasse and rice husk is burned as fuel which adds to air pollution. But they can be used as a fibre.
4. 50% of the aerospace materials market is made up of exotic materials like carbon fibre reinforced polymers and beryllium that allow airplanes to travel faster, farther and longer without refueling.
5. Carbon fibre reinforced polymers have an amazing strength-to-density ratio, which explains why they are replacing aluminum for both structural and component applications in aerospace.
6. Toughness, as one of the most desirable qualities of aircraft metal, determines how much a metal can be stretched or deformed without breaking.
7. Topological materials known for the robustness of their electrical properties can improve the information-storage capacity of devices or help build powerful quantum computers.
8. Metamaterials are nanocomposite structures made up of materials — such as metals or plastics — which are engineered by Metamaterial Technologies Inc.'s scientists to exhibit properties not found in nature.

9. In early 2009, assistant professor of mechanical and science engineering Nicholas Fang led a group of scientists at the University of Illinois in constructing a metamaterial that can bend sound waves backward. Fang's group crafted an array of tiny thin aluminum cavities filled with water to focus ultrasound.
10. In the future, semiconducting devices made with metamaterials could move light instead of electrons through computer circuits.

Exercise 4. Переведите предложения на русский язык. Обратите особое внимание на перевод союзных и бессоюзных определительных придаточных предложений.

1. Similar to the development of classical electromagnetism, metamaterial developments are expected to fundamentally alter the way the world works today.
2. Researchers are currently exploring the possibilities which are associated with an artificial type of matter called metamaterials.
3. Naturally occurring matter exhibits behaviour based on the molecules that make it up the atomic material that composes the finished product determines what properties the product will have.
4. Wood, like all natural matter, reflects and refracts light. But just how much light it reflects and refracts depends on how the electromagnetic waves of the light interact with the particles — like electrons — that make up the wood.
5. Unlike natural matter, metamaterials behaviour depends on the properties of the materials that make it up and the way the materials are put together.
6. One thing that all metamaterials have in common is the ability to make waves behave strangely. This can lead to electromagnetic waves zigging when they should zag and sound waves curving in ways they don't normally do.
7. Metamaterial technology could actually create better smartphone camera lenses and lenses in general ones that can do things existing lenses can't.
8. One of the things scientists are trying to do is make materials that are better insulators than conventional materials.

9. Metamaterials can find an application for ship hulls and submarines that hides them from sonar detection.
10. Researchers are working on smart packaging that sniffs out and destroys the micro-organisms which make good food go bad.

READING

Exercise 1. **Прочтите и озаглавьте текст.**

It can't be denied that human civilization has been shaped by breakthroughs in materials science. There is a lot of evidence to prove this view.

Firstly, the discovery of composite materials such as fibre and resin allowed humans to attach blades to sticks to create knives and axes.

Secondly, the remarkable discovery of smelting techniques, probably in Stone Age pottery kilns, led to the bronze and iron ages when radical changes in agriculture led to the establishment of cities and even countries.

Metal technology also led to important changes in weapons technology and ultimately, around 4,000 years later, to the industrial revolution.

Later, the discovery of the electron triggered the development of the vacuum tube, the solid state transistor, and to microelectronics in general. The ultra-pure silicon required for modern electronics was initially developed for high-frequency radar receivers in the Second World War.

To sum up, each of these breakthroughs in materials science changed the world and the way we interact with it. But none of them were planned, and we can't say that the way of life that preceded them was lost when these changes occurred.

Exercise 2. **Найдите в тексте английские эквиваленты следующих слов и словосочетаний.**

материаловедение, композитные материалы, волокно, смола, технологии плавки, печь для обжига гончарных изделий, технологии металлообработки, вакуумная трубка, твердотельный транзистор, сверхчистый кремний, высокочастотные радиолокационные приемники

Exercise 3. **Заполните пропуски в предложениях, употребляя слова, данные в рамочке.**

composite materials; solid state; smelting; metal technology; vacuum tube; materials science

1. ... is a syncretic discipline hybridizing metallurgy, ceramics, solid-state physics, and chemistry.
2. ... is an electronic device used in many older model radios, television sets, and amplifiers.
3. The earliest man-made ... were straw and mud combined to form bricks for building construction.
4. ... is a form of extractive metallurgy. It is used to extract many metals from their ores, including silver, iron, copper, and other base metals.
5. The term "..." became popular at the beginning of the semiconductor era in the 1960s to distinguish this new technology based on the transistor, in which the electronic action of devices occurred in a solid state, from previous electronic equipment that used vacuum tubes, in which the electronic action occurred in a gaseous state.
6. ... is the processing of ores to extract the metal they contain and the mixture of metals, sometimes with other elements, to produce alloys.

RETELLING

Exercise 1. **Ответьте на вопросы к тексту. Используйте эти вопросы для того, чтобы выделить в тексте основную мысль и наиболее важные детали.**

1. How important are breakthroughs in Materials Science for human civilization?
2. What are the most significant discoveries that made these breakthroughs possible?
3. What objects were created due to the new technologies?

Exercise 2. **Выучите модели, которые потребуются вам для пересказа текста.**

Speaking about results and consequences

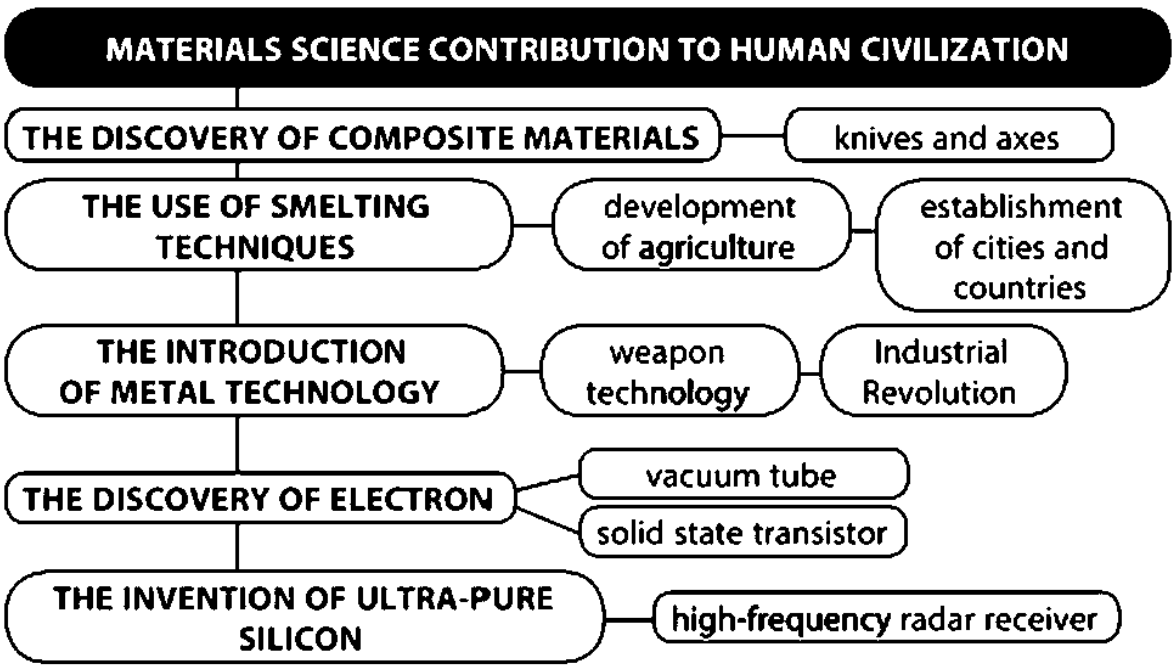
Ultimately, it led to... — В конечном счете это привело к...
Eventually, it resulted in... — В результате это породило...

In its turn, it triggered/sparked off... — В свою очередь, это вызвало... (привело к..., послужило толчком к...)

Finally, it gave rise to... — В итоге это обусловило... (привело к созданию...)

At length, it brought about/prompted... — В конце концов это стало причиной... (вызвало...)

Exercise 3. **Перескажите текст с помощью концептуальной карты "Materials Science Contribution to Human Civilization". Употребляйте выражения из упр. 2.**



CONVERSATIONS

Exercise 1. **Прочтите и переведите диалог. Воспроизведите его в парах.**

A: You know I've just read an article about graphene-enhanced materials and how they are used in the space industry and aeronautics. I am greatly impressed by the qualities of graphene.

B: Of course. This first 2D material is ultra-light and incredibly strong. And I've heard that it is being tested in the space environment by some British scientists now.

A: I know that British researchers got a grant to apply graphene in outer space instead of exploring it under laboratory conditions. The scientists want to prove that graphene has far better properties than other materials to meet enduring challenges in space and aerospace in

terms of mass savings, because the components made of graphene make things stronger and more robust.

B: That's true. Graphene also stands to reduce fuel consumption.

A: That's not all. Graphene has interesting thermal properties as well, and so work is under way to understand how the material acts as an insulator or conductor of heat.

B: Graphene is electrically conductive too. It has great potential to replace cabling, or antennas, on aircraft which has numerous computers on board and literally miles of cabling.

A: It's a pity that it is quite rare, because many more applications will be possible if mass production of this material is provided.

Exercise 2. Переведите реплики своего собеседника и разыграйте диалог в парах.

A: Doctors all over the world are thinking about how to mitigate their patients' sufferings and are looking into new materials that do not degrade in the body or carry a risk of having an adverse effect on the patient.

B: Я знаю, что какое-то время назад основным материалом, который использовался в медицине, была нержавеющая сталь, а сейчас врачи стали применять платиноиридиевые сплавы, титан и натуральный полимер PEEK-Optima.

A: Apart from new materials scientists are working on finding new applications for old materials.

B: Каких?

A: Wood, for example. You may have heard or read that around 500 B.C. Herodotus replaced his patient's foot with a wooden substitute. In the 21st century, scientists are subjecting wood to a variety of processes that turn it into a material more like bone.

B: Драгоценные камни и металлы, например алмазы, также используются в медицине для усиления контрастности рентгеновского изображения.

A: The application of polymers is a particular medical specialty as well. The coverage is broad. It encompasses orthopedics, ophthalmology, tissue engineering, surgery, dentistry, oncology, drug delivery, nephrology, wound dressing and healing, and cardiology.

B: And mind! These are just a few examples of how new materials can benefit medicine.

Exercise 3. **Попросите своего коллегу ответить на следующие вопросы. Воспроизведите диалог в парах.**

A: Are fuel-free spacecraft, ones that run by the light of the sun, possible?

B: .....

A: What is the future of thermoelectric materials? Is it feasible to absorb heat and turn it into electricity?

B: .....

A: How can machine learning be used to improve automated methods for predicting structures for new compositions?

B: .....

ДОПОЛНИТЕЛЬНЫЕ ТЕКСТЫ ДЛЯ ВНЕАУДИТОРНОГО ЧТЕНИЯ

TEXT 1

Task. **Прочтите текст и определите, какие из предложений (1–4) соответствуют тексту. Употребляйте следующие выражения:**

That's right.
That's not quite right.
That's false.

1. Ancient cement was the result of crushing and burning limestone.
2. Cement became mortar when sand and water were added to it.
3. In the Middle Ages, concrete was used as a building material.
4. The concrete characteristics depend on the forces that act upon it.

The time period during which concrete was first invented depends on how the term "concrete" is interpreted. Ancient materials were crude cements made by crushing and burning gypsum or limestone. When sand and water were added to these cements, they became mortar, which was a plaster-like material used to adhere stones to each other. Over thousands of years, these materials were improved upon, combined with other materials and, ultimately, turned into modern concrete.

The precursor to concrete was invented in about 1300 B.C. when Middle Eastern builders found that when they coated the outsides of

their pounded-clay fortresses and home walls with a thin, damp coating of burned limestone, it entered into a chemical reaction with gases in the air to form a hard, protective surface. It was the beginning of the development of cement.

Concrete is a composite building material and the ingredients, of which cement is just one, have changed over time and are changing even now. The performance characteristics can vary according to the different forces that the concrete will have to resist. These forces may come from above (gravity), below (soil heaving), the sides (lateral loads), or they may even take the form of erosion, abrasion or chemical attack.

TEXT 2

Task. **Прочтите текст и найдите информацию о том, каковы возможности и границы применения вычислительных методов для оптимизации открытия новых материалов и изучения их потенциальных свойств. Перескажите текст на русском языке.**

Computational methods are becoming increasingly important in all areas of science and engineering. Materials science is not an exception.

It is common knowledge that a computational method is a great way to quickly sift through all possible compositions of materials to identify potential new compositions that could be used for a variety of applications.

The method uses known chemical properties and relationships to predict reactions that can be used in new processes. Researchers can collect the data received about materials in real time and use it to compute the atomic and electronic structure of materials.

Further investigations will focus on optimization of materials with a wide range of applications including solar energy conversion, catalysis, structural, molecular electronics, energy storage, and corrosion resistance, to name just a few.

Computational methods already play a central role in many materials studies and hopefully will become more pervasive as computer power advances in the future decades. But mention must be taken that since computations are based on computer models there may be scientific uncertainty about bringing new materials from conception to reality.

TEXT 3

Task. Прочтите текст и переведите его письменно.

Black phosphorus (BP) discovered more than a century ago constitutes a new class of two-dimensional (2D) materials and is intensively studied as a 2D semiconductor.

Black phosphorus, which is a relatively rare allotrope of phosphorus, was first discovered and exfoliated by Bridgman in 1914. But in 2014 due to its unique qualities it reignited scientific attention. Now it is regarded as an alternative to graphene-based materials.

The excitement for black phosphorus, sometimes referred to as "phosphorene" in reference to its 2D cousin – graphene, stems mainly from the fact that it has an inherent band gap that graphene lacks naturally.

Black phosphorus has extraordinary electronic, optical, transport, thermal, and mechanical properties that can be exploited in the design of new devices.

It can be used in drug delivery and anti-tumour therapy as well as medical diagnosis owing to its high drug loading efficiency, good biocompatibility, and excellent photothermal and photodynamic properties.

VOCABULARY

MATERIALS SCIENCE TERMINOLOGY

aero graphite – аэрографит
aluminum bubble wrap алюминиевая пузырьковая пленка
biomaterial биоматериал
carbon fibre reinforced polymer – усиленный углеродным волокном полимер
composite material – композитный материал
conductive polymer – электропроводящий полимер
electrochemical material – материал для электрохимических устройств
electromechanical material – материал с улучшенными электромеханическими свойствами
graphene-enhanced material, обогащенный графеном

materials science — материаловедение
materials scientist — исследователь, разработчик новых материалов
metal technology — технология металлообработки
metamaterial — метаматериал
PEEK-Optima polymer — полимер PEEK-Optima
sheet metal — листовой металл
smelting technique — технология плавления
structural material — конструкционный материал
structural steel — конструкционная сталь
tissue engineering — тканевая инженерия
topological material — топологический материал

GENERAL SCIENTIFIC TERMS

abrasion — истирание, износ; абразивность
advance — достижение, продвижение, успех
adverse — неблагоприятный
alloy — сплав
attribute — отличительная черта, качество, свойство
curve — изгибаться, искривляться
density — плотность
drug delivery — доставка лекарства
emerging technology — новая технология
exfoliate — отслаивать
fabrication — производство
image contrast in X-raying — контрастность рентгеновского изображения
lithium-ion battery — ионно-литиевая батарея
ongoing technology — современная технология
property — свойство
quantity — количество
reflect — отражать
refract — преломлять
robustness — прочность
scientific instrumentation — научные приборы, научный инструментарий
soft lithography — мягкая литография
soil heaving — почвообразование
solution — раствор

sonar detection — обнаружение гидролокатором
subject — подвергать
substitute — замена
sulphuric (sulfuric) acid — серная кислота
surfactant — поверхностно-активное вещество (ПАВ)
toughness — прочность

NAMES OF MATERIALS

beryllium — бериллий
clay — глина
copper — медь
feather — перо
fibre — волокно
fullerene — фуллерен
gallium — галлий
graphene — графен
gypsum — гипс
iridium — иридий
limestone — известняк
limpet — ракушка
mortar — строительный раствор
mushroom mycelium — грибной мицелий
osmium — осмий
platinum — платина
rhodium — родий
rice husk — рисовая шелуха
rubber — каучук; резина
shell — скорлупа; панцирь
sugarcane bagasse — отходы сахарного тростника
titanium — титан

Part II
TESTS

UNIT 1 TEST

Task I. **Соотнесите выражения (1–8) с их переводом (A–H).**

1. applied science
2. basic science
3. computer science
4. earth science
5. life science
6. materials science
7. social studies
8. soil science

A. наука о планете Земля
B. прикладная наука
C. материаловедение
D. обществоведение
E. фундаментальная наука
F. почвоведение
G. информатика
H. наука о жизни

Task II. **Переведите слова, данные в скобках, с русского языка на английский.**

1. (Прикладная деятельность) is a methodology to solve a specific, practical problem.
2. The principles and methods used for (химия полимеров) are common to organic chemistry, analytical chemistry, and physical chemistry.
3. Meteorology is a branch of the (наука об атмосфере) which includes atmospheric chemistry and atmospheric physics, with a major focus on weather forecasting.
4. (Наука об окружающей среде) came alive as an active field of scientific investigation in the 1960s and 1970s to analyze complex environmental problems.
5. Some scholars trace the origins of (естественные науки) as far back as pre-literate human societies, where understanding the natural world was necessary for survival.

6. (Сопротивление материалов) helps to calculate the stresses and strains in structural members, such as beams, columns, and shafts.
7. (Космическая наука) encompasses all of the scientific disciplines that involve space exploration and study natural phenomena and physical bodies in outer space such as space medicine and astrobiology.
8. (Инженеры-биологи) attempt to create products or modify and control biological systems so that they can predict chemical and mechanical processes.

Task III. Выберите из предложенных в рамочке слов подходящее по смыслу и вставьте его в предложения (1–8).

fundamental; advances; properties; development; construction; expertise; interaction; empirical

1. Physics is a ... science because all other natural sciences use and obey the principles and laws which physics formulates.
2. The key ... in soil science arise from Isaac Newton's theory of universal gravitation and classical mechanics.
3. Cells are continually "talking" to one another and this molecular ... allows the cells in your body to coordinate their activities.
4. Mechanical engineers deal in the ... and use of new materials and technologies.
5. Mechanical engineers in the ... sector design the heating, ventilation, air conditioning, and smoke ventilation systems that make up buildings.
6. They use their ... to produce specifications to apply materials effectively.
7. Materials science applies the ... of matter to various areas of science and engineering.
8. Natural science uses ... evidence from observation and experimentation.

Task IV. Замените выделенные курсивом слова их синонимами, используя подсказки, данные ниже.

1. Mechanical engineers deal in the development and *use* of new materials and technologies.

2. Natural sciences *explore* the scientific concepts which explain the natural world.
3. Some *scholars* trace the origins of natural science as far back as pre-literate human societies.
4. Modern researchers must know the basics of *various* sciences to do their job well.
5. They must understand how the *manufacturing* process affects the environment and guarantees the safety of workers and consumers.
6. They use their *expertise* to produce specifications to apply materials effectively.
7. No other *career* embraces so many areas as engineering.
8. Mathematical chemistry deals with *novel* applications of mathematics to chemistry.

Clues: scientists, application, different, new, study, profession, knowledge, production.

Task V. Исправьте ошибки в следующих предложениях.

1. What sciences you study? 2. Pharmacology is a branch of medicine and biology which study drug action. 3. Geophysics are the physics of the planet Earth and its environment in space. 4. Outer space represent a challenging environment for human exploration. 5. Earth science, and all of its branches, is the branches of physical science. 6. Many of the most pressing scientific problem are due to the limitations of the existing materials. 7. Early experiments have not their roots in the system of Alchemy. 8. Earth science not relates to the study of soil.

UNIT 2 TEST

Task I. **Соотнесите выражения (1–8) с их переводом (A–H).**

1. conservation
2. systems biology
3. pathobiology
4. developmental biology
5. bioengineering
6. computational biology
7. nutrient cycling
8. rejection

A. патобиология
B. биоинженерия
C. вычислительная биология
D. биология систем
E. круговорот питательных веществ
F. биология развития
G. сохранение природных ресурсов
H. отторжение

Task II. **Переведите слова, данные в скобках, с русского языка на английский.**

1. The extraction of genetic information from preserved tissue samples or museum (образцы) is a fundamental component of many fields of research.
2. The ability of an organism to cause infection is (вирулентность).
3. (Остеопороз) currently affects over 53 million people in the United States.
4. We often use (углеводород) in our daily lives, for instance, in the form of propane gas.
5. Young people should measure their (уровень холестерина) every 5 years.
6. A (биоразлагаемый) product has the ability to break down, safely and relatively quickly, by biological means, into the raw materials of nature and disappear into the environment.

7. The (крупное достижение) of the Institute is a global research centre that identifies and promotes technological solutions to environmental and human development challenges.

8. (Гомеостаз) is the tendency of organisms to auto-regulate and maintain their internal environment in a stable state.

Task III. Выберите из предложенных в рамочке слов подходящее по смыслу и вставьте его в предложения (1–8).

disease; degradation; tissues; predecessor; interactions; ecosystems; computation; self-destruction

1. In ecology, biological ... can involve individuals of the same species or individuals of different species.
2. Environmental ... is the deterioration of the environment through depletion of resources such as air, water and soil. It's the destruction of ecosystems, the extinction of wildlife, and pollution.
3. Multi-functional biomaterials either replace or enable the regeneration of damaged ... .
4. The term *algae* includes both green algae and their evolutionary ..., cyanobacteria.
5. The mission of the ... and informatics in biology and medicine training program is to educate and mentor the next generation of leaders in biomedical informatics research.
6. ... occurs in cells that become a threat to the body.
7. Any person who knows he is suffering from an infectious ... must consult a doctor.
8. Biologists study all organisms from microorganisms to communities and ... .

Task IV. Замените выделенные курсивом слова их синонимами, используя подсказки, данные ниже.

1. Plants are integral to human well-being, and many *species* are over ten thousand years old.
2. In recent years, the enthusiasm in understanding the mechanical behavior of biological tissues and biomaterials has increased significantly due to the development of novel biomaterials for new *fields* of application.
3. The field of biology is a fascinating and *diverse* one.

4. We must learn to appreciate nature and objects of biological *significance*.
5. Technological development is *advancing* rapidly.
6. The *infamous* Ebola virus requires serious attention.
7. Other approaches of larger *scope* and deeper interest are discussed at the conference.
8. Water purity is a public health *issue*.

Clues: kinds/types, ill-famed, varied, problem, spheres, range, importance, progressing.

Task V. Исправьте ошибки в следующих предложениях.

1. Students do a course in environmental degradation now. 2. Are you explore the properties of complex organisms? 3. The researcher demonstrating the role of microbes in nutrient cycling. 4. People are sometimes getting a fever as a side effect of a vaccine. 5. Scientists are conduct a lot of research. 6. Biological sciences are including biochemistry, biophysics and evolutionary biology.

UNIT 3 TEST

Task I. **Соотнесите выражения (1–8) с их переводом (A–H).**

1. particle physics
2. quantum theory
3. theory of relativity
4. fluctuation theory
5. conduction
6. deflection
7. fraction
8. perpetual motion

A. вечное движение
B. частица/доля
C. отклонение
D. проводимость
E. теория флуктуаций
F. теория относительности
G. квантовая теория
H. физика элементарных частиц

Task II. **Переведите слова, данные в скобках, с русского языка на английский.**

1. A (химическое вещество) is a form of matter that has constant chemical composition and characteristic properties.
2. (Гибкость), or stretching, exercises give you more freedom of movement for your physical activities and for everyday activities.
3. The concept of (измерения) is not restricted to physical objects.
4. The (плотность) of something stays the same wherever you take it, on Earth, Mars, or anywhere in the Universe.
5. Sound (усиление) needs to not only make sounds louder but more intelligible.
6. We are going to learn about (внешние силы) and their effects on the body.
7. The force of (притяжение) causes a ball you throw in the air to come down again.

8. There is a distinct relationship between colour and (прозрачность) in the ocean.

Task III. Выберите из предложенных в рамочке слов подходящее по смыслу и вставьте его в предложения (1–8).

medium; entity; discoveries; fraction; foundation; properties; breakthrough; substance

1. In 1543, there was a ... in astronomy when a Polish astronomer Nicolaus Copernicus gave strong arguments for the heliocentric model of the Solar system.
2. Sir Isaac Newton established the ... for modern society in mathematics and science.
3. Ether is the hypothetical ... .
4. Isaac Newton concluded that light was a composite ..., which consisted of distinct rays, whose refractive properties depended on their colour.
5. Einstein's ... in physics were revolutionary, which certainly earned him the title of "genius".
6. A large ... of the Universe's heavier metals like gold, platinum, and uranium originated from cataclysmic events.
7. Graphene is the thinnest and the strongest ... which is in use at the nanotechnology level.
8. The ... of this substance include incredible density, transparency, efficient heat and electrical conduction, and high flexibility.

Task IV. Замените выделенные курсивом слова их синонимами, используя подсказки, данные ниже.

1. Galileo Galilei's *treatise* on the centre of gravity of solid bodies made him famous.
2. Einstein found *proof* of the existence of atoms.
3. While Zhores Alferov was creating the heterotransistor, he *revolutionized* semiconductor design in LEDs.
4. Faraday built a weak voltaic pile with which he *performed* experiments in electrochemistry.
5. The cosmonauts had to learn how to push themselves carefully through the *spacecraft*.

6. The invention of the phonograph was a *breakthrough* at that time.
7. Workstations on the ISS were generously *provided* with restraining loops where the crew could anchor their feet.
8. Quantum physics *gave rise to* transistors which resulted in computer microchips.

Clues: paper, spaceship, evidence, made, transformed, discovery, brought about, furnished.

Task V. Исправьте ошибки в следующих предложениях.

1. The researchers were work on ways to improve radar. 2. While they experimenting they invented an electron tube. 3. To his surprise he founded out that kernels of popcorn popped and eggs exploded. 4. The questioner wasn't remembering what his talk had to do with the question. 5. Was you writing the report when the electricity went off? 6. Where you were standing when the trouble started?

UNIT 4 TEST

Task I. **Соотнесите выражения (1–8) с их переводом (A–H).**

1. broadband Internet
2. cloud computing
3. customizable computing
4. data breach
5. dial-up connection
6. embedded system
7. information retrieval
8. account

A. облачная обработка компьютерных данных
B. утечка данных
C. модемное соединение
D. встроенная система
E. широкополосный Интернет
F. информационный поиск
G. учетная запись
H. специализированное (заказное) программное обеспечение

Task II. **Переведите слова, данные в скобках, с русского языка на английский.**

1. (Фотообменный сервис) is an image hosting and video hosting service.
2. One thing that can prevent (Интернет вещей) from transforming the way we live and work is a breakdown in security.
3. Students find (сетевое взаимодействие) useful when they want to find the right job.
4. (Технология квантовых точек) uses quantum dots, semiconductor nanocrystals which can produce pure monochromatic red, green, and blue light. It improves display brightness and color gamut.
5. (Сенсорная технология) relies on a device that detects and responds to some type of input from the physical environment. The specific input could be light, heat, motion, moisture, or pressure.

6. A (умный динамик) is a wireless and smart audio playback device that connects to multiple types of audio sources and provides additional functions.
7. You can find (мобильные устройства, удобные для ношения) in navigation systems, advanced textiles, and healthcare.
8. (Беспроводная связь) is the transfer of information or power between two or more points that are not connected by an electrical conductor.

Task III. Выберите из предложенных в рамочке слов подходящее по смыслу и вставьте его в предложения (1–8).

accuracy; retrieval; inventory; convergence; humidity; immersion; availability; vulnerability

1. Researchers tried to increase the speed and ... of the experiment.
2. We must take drastic measures to reduce the ... of our customers.
3. We made an ... of the laboratory specimens.
4. Because they lived in a small town with limited resources, there was little ... of exotic fruits or vegetables.
5. The ... of portable technology and the Internet makes it possible to communicate from almost any location.
6. ... of an object in a sulphur bath makes it stronger.
7. Excessive ... causes small dark spots to appear.
8. The system allows quick storage and ...of data.

Task IV. Замените выделенные курсивом слова их синонимами, используя подсказки, данные ниже.

1. The treatise contains *a gamut* of diverse experiments from scientists around the globe.
2. There is not *a grain* of truth in what he said.
3. *The fare* includes varied issues of great importance.
4. An ambitious young scientist had a remarkably detailed *blueprint* how to fund his project.
5. With the *adoption* of relays the signalling between the subscribers and the exchange became automatic.
6. The success of the plan results from *the convergence* of opinions.
7. Version 2.0 of a piece of computer software is an example of a new *iteration*.
8. We made two *groundbreaking* discoveries last week.

Clues: list/agenda, revolutionary, plan/programme, particle, use, repetition, scope, connection/similarity.

Task V. Исправьте ошибки в следующих предложениях.

1. Engelbart invented the first computer mouse and made of wood in 1964. 2. The first 1GB hard disk, announcing in 1980, weighed 550 pounds. 3. Researchers recently discovered a new two-dimensional material. 4. The Company have brought together neuroscientists and computer engineers. 5. The availability of superminicomputer and supercomputer have greatly influenced computational chemistry. 6. Have Digit All Systems Inc. trained more than 10,000 students in cybersecurity? 7. The new software recognizes the images which taken from flickr. 8. In 1936, the Russians made a computer ran on water.

UNIT 5 TEST

Task I. **Соотнесите выражения (1–8) с их переводом (A–H).**

1. behavioral ecology
2. community ecology
3. ecological engineering
4. ecological awareness
5. environmental footprint
6. environmental sustainability
7. landscape ecology
8. population ecology

A. демографическая экология
B. поведенческая экология
C. экологическая грамотность
D. экологический след
E. экологическая устойчивость
F. ассоциативная экология
G. инженерные средства и методы защиты окружающей среды
H. экология ландшафта

Task II. **Переведите слова, данные в скобках, с русского языка на английский.**

1. (Кислотный дождь) has caused serious damage to the pine forests of northern Europe.
2. A third of Africa is under the threat of (опустынивание).
3. The (воздействие на окружающую среду) of tourism can be grim.
4. The (засуха) damaged all the crops there.
5. (Выхлопные газы) from cars are poisoning the air of our cities.
6. Illegal felling reduces biodiversity, causes erosion, and contributes to 20% of (выброс парниковых газов).
7. Many tons of wastes go into the (свалки) each month.
8. Specific pollution threats include acid rain, radioactive contamination, debris in outer space, stratospheric (истощение озонового слоя) and toxic oil spills.

Task III. Выберите из предложенных в рамочке слов и словосочетаний подходящее по смыслу и вставьте его в предложения (1–8).

malnutrition; resource scarcity; natural disasters; deforestation; soil degradation; contamination; wildlife extinction; salinization

1. ... is the result of unbridled industrialization.
2. The destruction of trees by charcoal-burners has resulted in the almost complete ... of the island.
3. Earthquakes and tsunami are not the only ... that we must forecast.
4. The varying degrees of ... to which a water surface is subject are the cause of many unexpected phenomena.
5. ... and soil erosion are a serious threat to sustainable agriculture.
6. ... (species are disappearing at a greater rate than before) is the result of human activity and climate change.
7. Half a million children still face ... in Niger.
8. More recent significant effects of land use include urban sprawl, soil erosion, ..., and desertification.

Task IV. Замените выделенные курсивом слова их синонимами, используя подсказки, данные ниже.

1. The animal's numbers are *declining* rapidly.
2. They have no way *to dispose of* the hazardous waste they produce.
3. Factories and plants mustn't *pump* poisonous gases into the atmosphere.
4. Bacteria and fungi help *decompose* organic matter.
5. More than 160 nations signed the treaty which makes governments *curb* emissions of greenhouse gases.
6. When the water *evaporates* in the summer, it leaves a clay bed of remarkable hardness.
7. In many cases, however, the filtrate, when *injected*, produces comparatively little effect.
8. *Measure* twice, cut once!

Clues: send, decreasing, throw away, count, introduced, break up, dries out, control.

Task V. Исправьте ошибки в следующих предложениях.

1. Teachers will be develop science lessons plans to engage school children in ecological research. 2. What will be it in the future? 3. Researchers will be trap carbon dioxide produced in fossil-fuel burning. 4. The disparity in incomes between the rich and the poor is bounded to rise. 5. 800 mln people are going remain undernourished. 6. Are sulphur dioxide emissions are going to triple by 2020? 7. 58% of the world's reefs may to be at risk from human activities. 8. Lack of snow is affect the Alps.

UNIT 6 TEST

Task I. **Соотнесите выражения (1–8) с их переводом (A–H).**

1. computational technology
2. data-retrieval technology
3. disruptive innovation
4. forward-thinking tech
5. high-speed Internet
6. multi-touch tablet
7. tech craze
8. technological gain

A. технический прогресс
B. вычислительная техника
C. передовые технологии
D. высокоскоростной Интернет
E. технология поиска данных
F. мультисенсорный планшет
G. революционная инновация
H. повальное увлечение техникой

Task II. **Переведите слова, данные в скобках, с русского языка на английский.**

1. Real-time graphics is the basis for usable virtual and (дополненная реальность) software.
2. They can control precisely where the (нанотрубка) penetrates a cell, and even pinpoint smaller cell structures.
3. (Облачная компьютерная технология) has completely changed the way businesses — and their consumers — store and access their data.
4. The new (цифровая технология) will allow a rapid expansion in the number of TV channels.
5. The (технология управления компьютером с помощью взгляда) software enables eye control on mobile devices allowing handsfree navigation of websites and apps.

6. Athletes might adopt (технологии генной терапии) to improve their performance.
7. A (индивидуализированное образование) programme gives students a chance to practice in a guided and supervised environment, usually with equipment and resources students may not otherwise have access to on their own.
8. Youtube has become the most popular (сайт по обмену видеофайлами) on the Web.

Task III. Выберите из предложенных в рамочке слов и словосочетаний подходящее по смыслу и вставьте его в предложения (1–8).

imaging capacity; tablet computer; Flexwarm; game-changer; advancement; feed; cloud computing; disruptive innovation

1. The pace of ... in the field of robotics and nanotechnology roughly doubles every couple of years.
2. A special feature on a blog, news website, social networking website, etc. that allows you to see new information that has been added without having to visit the website is called ... .
3. The aim of tests of ... is confirming and generalizing the relation between mental imagery and artistic skills.
4. The form of the ... was conceptualized in the middle of the 20th century (Stanley Kubrick depicted fictional tablets in the 1968 science fiction films).
5. This invention could be a real ... for aviation as well as driving.
6. Dr. Bromwich has been widely hailed for "making health care faster and cheaper" through ... and mobile technology.
7. ... is Internet-based computing, whereby shared resources, software, and information are provided to computers and other devices on demand.
8. Innovative ... heating technology is to create a lightweight, stylish Jacket that perfectly fits the contours of the body and can be worn on any outdoor adventure.

Task IV. Замените выделенные курсивом слова их синонимами, используя подсказки, данные ниже.

1. Thousands of people research alternative energy because a *breakthrough* will change the world and make fortunes.

2. What do you think has been the biggest *milestone* in the 20th century?
3. If you go to the library, you will find books on an *array* of subjects.
4. While this sounds *gimmicky*, it actually works very well.
5. There are many things we *take for granted*.
6. The company will *unveil* its newest product today.
7. The new project will *lessen* the effects of car pollution.
8. Computer science was still *in infancy*.

Clues: emerging, important discovery, minimize, turning point, make public, useless, collection, take as read.

Task V. Исправьте ошибки в следующих предложениях.

1. The term "Disruptive innovation" be used in business and technology. 2. Google's Self Driving Car project was start in 2008. 3. A number of crazy forward thinking technologies was announced recently. 4. Medical breakthroughs continue be made every day around the world. 5. Curiosity, the space vehicle, that sent to discover Mars, landed in 2011. 6. Carbon nanotubes transistors have already seen as the next major step in computational technology. 7. 5D digital data recording and retrieval technology is advanced now. 8. How drones will be used in Agriculture?

UNIT 7 TEST

Task I. **Соотнесите выражения (1–8) с их переводом (A–H).**

1. carbon nanotube
2. cellulose nanofibre
3. nanoengineered material
4. nanometre scale
5. nanowire
6. scanning probe microscopy
7. squeezy computer
8. microfabrication

A. нанопроводник
B. нанометровое разрешение
C. целлюлозное нановолокно
D. микрообработка
E. компрессионный компьютер
F. углеродная нанотрубка
G. материал, созданный методами нанонженерии
H. сканирующая зондовая микроскопия

Task II. **Переведите слова, данные в скобках, с русского языка на английский.**

1. (Сотрудничество), communication, access to information, and other advantages that the Internet brings will all change our life.
2. New machinery has enhanced the company's productivity and (конкурентоспособность).
3. Developers want to construct a (копия) of the 19th century steam yacht.
4. (Витражное стекло) consists of pieces of glass of different colours which are fixed together to make decorative windows or other objects.
5. (Химия поверхности) deals with experimental and theoretical studies in physics, chemistry and pioneering applications of surfaces, interfaces, and nanostructures.

6. In general, the climate, which varies with the (очертание) of the surface, is moderate and healthy although subject to rapid changes of temperature.
7. As regards both (прочность на разрыв) and ductility not only the quantity, but the distribution of the graphite is of great importance.
8. (Самовоспроизводящиеся) machines are within reach.

Task III. Выберите из предложенных в рамочке слов подходящее по смыслу и вставьте его в предложения (1–8).

envision; embedded; encompass; foster; inject; unleash; stain-proof; tear-resistant

1. Hard doesn't mean ... .
2. The conference will ... seminars on the most popular programming languages today.
3. These crystals are then ... in a plastic, and the plastic is extruded as a wire.
4. The young man had an ability to ... and apply appropriate materials and graphics to footwear.
5. The professor hoped to ... a genuine interest in his students to pursue research.
6. The reform is intended to ... more sophisticated products in Japan.
7. They need to ... more money into nanotechnologies.
8. The ceramic tile is scratch and ... .

Task IV. Замените выделенные курсивом слова их синонимами, используя подсказки, данные ниже.

1. Scooters are small and exquisite in size, easy to operate, *foldable* and easy to carry.
2. His hopes, however, were *blighted* by long delay.
3. Polyester is *extruded* from polymers derived from natural gas and oil.
4. It can quickly penetrate into the skin, making it moist, smooth, and *stretchy*.
5. The company has designed *squeezy* toy animals for children.
6. Sustainability has become a major consideration in the selection of raw materials for the development of new *enhanced* materials.

7. *Self-healing* materials are artificial or synthetically-created substances that have the built-in ability to automatically repair damage to themselves.
8. The policemen will be provided with *stab-resistant* ballistic vests.

Clues: capable of being folded up and stored; protecting from outside injury; elastic; ejected; strengthened; regaining health; destroyed; designed to be squeezed, especially in order to extract something.

Task V. Исправьте ошибки в следующих предложениях.

1. Nanotechnology encompasses the understanding the fundamental physics, chemistry, biology and technology of nanometre-scale objects. 2. The scientist suggested use normal-sized robots to construct smaller replicas of themselves. 3. Nanotechnologies are used for cleaning of ocean water from toxic elements. 4. Nanotechnology is the work of the changing materials by one atom or one molecula. 5. 322 companies in 20 countries producing products that contain nanomaterials. 6. Now researchers have begun build functional molecules piece by piece. 7. Embedding of silver nanocrystals in bandages kills bacteria. 8. Stained glass windows result from nanocrystals created in heating and cooling of the glass.

UNIT 8 TEST

Task I. **Соотнесите выражения (1–8) с их переводом (A–H).**

1. composite material
2. graphene-enhanced material
3. materials science
4. materials specialist
5. structural material
6. topological material
7. electromechanical material
8. conductive polymer

A. материал, обогащенный графеном
B. разработчик новых материалов
C. конструкционный материал
D. материал с улучшенными электромеханическими свойствами
E. композиционный материал
F. электропроводящий полимер
G. топологический материал
H. материаловедение

Task II. **Переведите слова, данные в скобках, с русского языка на английский.**

1. New and advanced materials that are being developed include semiconductors, (биоматериалы), etc.
2. The group of (материал для электрохимических устройств) investigates metal oxide materials for applications in computer memories, logics, energy storage, and conversion.
3. So far researchers have only developed (метаматериалы) that divert radar and microwaves — rather than light waves, which are the key to invisibility.
4. (Листовой металл) is thicker than foil and thinner than plate.
5. The internal frameworks of (конструкционная сталь) meant that exterior walls no longer needed to support the majority of a building's weight.

6. The (сплав) with 12% of silicon is white, hard and brittle.
7. The (производство) of paper out of wood is rapidly growing.
8. Genes have other (черты) besides biological function, chemical properties, and cellular location.

Task III. Выберите из предложенных в рамочке слов и словосочетаний подходящее по смыслу и вставьте его в предложения (1–8).

abrasion; density; robustness; solution; toughness; attribute; refract; scientific instrumentation

1. For more than a century now, the Company has been known as a technological centre specializing in the development and production of ... .
2. In machinery, ... between moving surfaces has to be prevented as much as possible by the use of suitable materials.
3. The problem of odorous water was solved fairly simply, but it also demonstrated the basic simplicity and ... of the system.
4. The ..., lightness, strength, and elasticity of whalebone gave it a variety of uses.
5. Scientists measured the object, checking its ... to see how solid it is.
6. She made a ... of baking soda and water.
7. Although Jim is a slow worker, his obsession with perfection is an ideal ... for a pharmacist.
8. The simplest way of showing dispersion is to ... a narrow beam of sunlight through a prism of glass or prismatic vessel containing water or other clear liquid.

Task IV. Замените выделенные курсивом слова их синонимами, используя подсказки, данные ниже.

1. In spite of somewhat *adverse* climatic conditions, livestock is reared with a fair amount of success.
2. The firm boasts of diversity as its largest *attribute* since its workforce represents over sixty nationalities.
3. The two plants have similar physical *properties*.
4. Momentum (*quantity* of motion) is the product of mass and velocity.

5. Gas fires, as a *substitute* for the open coal fire, have many points in their favour for they are conducive to cleanliness, they need but little attention, and the heat is easily controlled.
6. Modern companies are gearing up for *emerging* technologies.
7. The study revealed the *robustness* of the designs.
8. The scientist reluctantly agreed to *subject* his work *to* scrutiny.

Clues: to put through something unpleasant, trait, amount, replacement, unfavourable, quality/characteristic, becoming prominent, strength.

Task V. Исправьте ошибки в следующих предложениях.

1. Materials Science is a dynamic and excited field with many remarkable discoveries. 2. Many communicative systems rely heavily on advances in materials research. 3. Replacing magnetive fields with electric fields offers tremendous opportunities. 4. The teeth of limpets are the most strong biological material. 5. Scientists from London have made graphene sheets in more greater quantities. 6. Components made of graphene make things stronger and robuster. 7. Herodotus replaced his patient's foot with a woody substitute. 8. Pulled out of its tube and drained of its colour, the worm is decidedly no-attractive.

REVISION TEST 1 (Units 1-3)

Task I. **Соотнесите выражения (1–8) с их переводом (A–H).**

1. earth science
2. life science
3. space science
4. fibre technology
5. fluctuation theory
6. systems biology
7. developmental biology
8. crystallography

A. наука о жизни
B. теория флуктуаций
C. волоконные технологии
D. биология развития
E. наука о планете Земля
F. космическая наука
G. биология систем
H. кристаллография

Task II. **Переведите слова, данные в скобках, с русского языка на английский.**

1. The (клетка) is the basic structural, functional, and biological unit of all living organisms.
2. The (состав) of a membrane can affect its fluidity.
3. Proteins are most complex chemical (соединения).
4. At present this (явление/феномен) exists on a very low scale.
5. We are entering an extremely new world of quite unbelievable (измерения), and it's only a few years away.
6. Aluminium is low in (плотность).
7. All we need is a (образец) of her DNA.
8. Eye colour is an inheritable (черта).

Task III. **Выберите из предложенных в рамочке слов подходящее по смыслу и вставьте его в предложения (1–8).**

deflect; conduction; osteoporosis; bioengineering; virulence; dimensions; biodegradable; diverse

1. A solid has length, breadth, and thickness and has three ... .
2. ... is the movement of something such as heat or electricity through a medium or passage.
3. ... packaging doesn't take a long time to decompose and there is less waste.
4. They were trying to ... attention from the failure.
5. The disease attained its maximum ... in 1883.
6. Smoking increases risk of ... and bone fractures in old age.
7. ... technology influenced agriculture and medical science greatly.
8. Beetles live and feed in almost all the ... ways possible for insects.

Task IV. Замените выделенные курсивом слова их синонимами, используя подсказки, данные ниже.

1. A cushion of air around the foot literally allows you to *defy* the laws of gravity.
2. Its purpose was to *detect* the real problem.
3. It was necessary to *measure* the performance of the team.
4. The Committee decided to *suspend* the experiment.
5. It is possible to eliminate pain, increase or decrease metabolism, accelerate or *decelerate* cardiac rhythm.
6. We need to *restrain* global energy consumption, especially in developing countries.
7. The cause of the disease continues to *elude* researchers.
8. Something in his tone *compelled* her to hurry.

Clues: ignore, slow down, made/forced, notice/identify, escape, control, stop/interrupt, calculate/assess.

Task V. Исправьте ошибки в следующих предложениях.

1. Are Materials Science a new interdisciplinary field? 2. Does physical science includes chemistry? 3. Have early experiments in biology their roots in the system of Alchemy? 4. Today biophysics are seeking to answer diverse biological questions. 5. Hook compare tiny spaces, which he can see through the microscope, with a honeycomb. 6. Today people are witnessing the appearance of numerous inventions based on biological research some of which is already helping patients worldwide. 7. Francis Bacon was one of the most eloquent advocates of the new experimental method? 8. Did light consisted of distinct rays?

REVISION TEST 2 (Units 4-6)

Task I. **Соотнесите выражения (1–8) с их переводом (A–H).**

1. conservation
2. nutrient cycling
3. technological gain
4. customizable computing
5. information retrieval
6. broadband Internet
7. disruptive innovation
8. forward-thinking tech

A. передовые технологии
B. сохранение природных ресурсов
C. широкополосный Интернет
D. круговорот питательных веществ
E. вычислительная биология
F. технический прогресс
G. информационный поиск
H. специализированное программное обеспечение

Task II. **Переведите слова, данные в скобках, с русского языка на английский.**

1. (Биология систем), ultimately, creates the potential for entirely new kinds of exploration and drives constant innovation in biology-based technology and computation.
2. Redwood trees can live for a long time; one (образец) is 4,000 years old.
3. (Биоразлагаемый) plastic is the latest thing.
4. Dozens of local firms are developing software, equipment, and accessories for (беспроводной) phones.
5. (Утечка данных) happens daily, in too many places at once.
6. I use two separate e-mail (учетные записи).
7. Researchers are hailing (сенсорные технологии) as the technology to drive computing systems into the future.
8. The company provides (поиск данных) training courses, workshops, software, and equipment.

Task III. **Выберите из предложенных в рамочке слов и словосочетаний подходящее по смыслу и вставьте его в предложения (1–8).**

degradation; disruptive technology; advancement; availability; vulnerability; game changer; tablet computer; flexibility

1. Land ... due to natural and cultural factors is widespread.
2. The invention of harnessed electricity was a ... for all of humanity; it allowed us to power our lives and replace obsolete machines and substances.
3. His new contribution to the ... of physiology was of great importance.
4. A ... is a new technology, such as computers and the Internet, which has a rapid and major effect on technologies.
5. The wood of the hornbeam is of considerable tenacity and little ... .
6. ... resembles a Smartphone and can browse the Internet, connect to social network apps, and display HD videos.
7. The ... of this system creates considerable anxiety.
8. There are three main advantages of the design, namely, cheapness, simplicity, and ... .

Task IV. **Замените выделенные курсивом слова их синонимами, используя подсказки, данные ниже.**

1. A vast *array* of literature is available on the topic.
2. Not a *grain* of this substance should be wasted.
3. Choose one frog as a good *specimen* of the breed.
4. There is a need for the *conservation* of trees.
5. The *virulence* of infective diseases varies in different epidemics.
6. A program of complete *immersion* in the language is the only way you're going to learn it.
7. It was a complete *inventory* of emerging technologies.
8. What are the reasons for the *rejection* of the theory?

Clues: type, list, range, care, fatality rate, concentration, bit, refusal.

Task V. **Исправьте ошибки в следующих предложениях.**

1. The Computer is one of the most useful machines which ever created by humans. 2. The advent of the microprocessor have already

changed experimental chemistry. 3. How long our department has been an academic leader in the computer science? 4. If our ecological awareness continues to deepen, new technologies will be foster environmental sustainability. 5. Will a glass bottle takes more than 4,000 years to decompose? 6. Sulfur dioxide emissions are going triple by 2020 if current trends continue. 7. Amazon was created the first e-reader Kindle in November of 2007. 8. Scientists have successfully been created human body parts.

REVISION TEST 3 (Units 7, 8)

Task I. **Соотнесите выражения (1–8) с их переводом (A–H).**

1. cutting-edge technology
2. enhanced material
3. nanoengineered material
4. scanning probe microscopy
5. stretchy circuit boards
6. nanowire
7. composite material
8. topological material

A. сканирующая зондовая микроскопия
B. передовые технологии
C. нанопроводник
D. топологический материал
E. материал повышенной прочности
F. эластичные монтажные платы
G. композитный материал
H. материал, созданный методами нанонженерии

Task II. **Переведите слова, данные в скобках, с русского языка на английский.**

1. (Самовосстанавливающиеся материалы) have the built-in capability to substantially recover their mechanical properties after damage.
2. Brass is an (сплав) of copper and zinc.
3. The Royal Society's Catalogue of Scientific Papers enumerates 318 memoirs under his name published in (сотрудничество) with other investigators.
4. A (копия) of the re-designed R-RAIR aircraft is preserved in the Museum now.
5. The (производство) process is a tedious part in the manipulation of the diamond surface.
6. The method provides algorithm, clear physics conception to study (прочность) of the system.

7. The (прогресс) made in space industry also is of great importance.
8. The (плотность) of helium has been determined by Ramsay and Travers as 1.98.

Task III. Выберите из предложенных в рамочке слов подходящее по смыслу и вставьте его в предложения (1–8).

application; quality; dimension; abrasion; substitute; quantity; trait; conversion

1. The method has been approved after the discussion of its methodology, ..., and competitiveness.
2. The interspace is filled with a very small ... of nickel and silver, about 95 per cent.
3. Sensors can constantly monitor moisture levels in the soil, the size and color of the plants, and air ... .
4. Vibration can cause damage to products by ..., fatigue, and overstress.
5. Persistence is the common ... of anyone who has had a significant impact on the world.
6. An efficient, reliable gas treatment system which works at high temperature is needed in the new generation energy ... system.
7. Length is one ..., and width is another.
8. The oak of Britain is still in demand for the construction of merchant shipping though teak has become in some cases its ... .

Task IV. Замените выделенные курсивом слова их синонимами, используя подсказки, данные ниже.

1. The course will *encompass* physics, chemistry and biology.
2. Frequent cultural exchange will certainly help *foster* friendly relations between our two countries.
3. The facts *emerged* after a lengthy investigation.
4. The bark of some trees *exfoliates.*
5. A huge cloud of dense smoke *stretched* across the horizon.
6. It is a catalyst to *unleash* and study this transformation.
7. Until the construction was complete, extra scaffolding was erected to *reinforce* the facade.
8. The glass prism *refracted* the white light into the colours of the rainbow.

Clues: include, flake off, strengthen, come to light, bend, release/untie, be longer or wider, fortify/support.

Task V. Исправьте ошибки в следующих предложениях.

1. Molecular nanotechnology uses engineered nanosystems which operating on the molecular scale. 2. Technics for the working at a nanoscale have become essential to electronic engineering. 3. A fluorescent nanoparticle glows inside the body and making it easier to image the organ damage. 4. Bulletproof business suits are made from carbon nanotube and have to be cut into shapes with using a saw. 5. The most early tools were made of bone, fibres, feathers and animal skin. 6. Rhodium is one of the most rare metals found on Earth. 7. 50% of the aerospace materials are made of exotical materials. 8. Topological materials are known for the robustness of their electric properties.

FINAL TEST

Task I. **Соотнесите выражения (1–8) с их переводом (A–H).**

1. sustainability
2. awareness
3. breakthrough
4. disruptive innovation
5. information retrieval
6. the Internet of Things
7. customizable computing
8. technological gain

A. информационный поиск
B. революционные инновации
C. технический прогресс
D. заказное программное обеспечение
E. информированность, осведомленность
F. Интернет вещей
G. устойчивость
H. прорыв, революционное достижение

Task II. **Переведите слова, данные в скобках, с русского языка на английский.**

1. The purpose of his lectures was to illustrate the (применение) of the methods of physical chemistry to the study of the theory of toxins and antitoxins.
2. The (отклонение) of the needle is proportional to the insulation resistance.
3. According to the archaeologist, the (образец) dates back seven hundred years.
4. The network will provide the (целый спектр) of computer services to your home.
5. The invention of the wheel was a (веха) in the history of humankind.
6. Durability is one yard of (качество).
7. One of the (свойство) of helium is its lightness.
8. There was a vast (множество/комплект) of CDs to choose from.

Task III. **Выберите из предложенных в рамочке слов и словосочетаний подходящее по смыслу и вставьте его в предложения (1–8).**

data breach; augmented reality; flexibility; transparency; footprint; cybersecurity; vulnerability; challenges

1. Common ... exposures include personal information such as credit card numbers, Social Security numbers, and healthcare histories as well as corporate information.
2. Budget cuts will create new ... .
3. ... is an artificial environment created through the combination of real-world and computer-generated data.
4. Taking long-term courses of certain medicines may increase ... to infection.
5. The advantage of this system is its ... .
6. Twenty-eight per cent of the respondents said their organization had insurance policies to help manage ... .
7. The presence of these enclosed impurities impairs the ... of crystals.
8. Reducing the ecological ... of a city is a positive contribution towards sustainability.

Task IV. **Замените выделенные курсивом слова их синонимами, используя подсказки, данные ниже.**

1. Necessity is the mother of *invention*.
2. The whole process was greatly helped by the widespread *availability* of computers.
3. Toyota is known for its *reliability*.
4. The *equipment* is checked on a regular basis.
5. Accurate *measurement* is very important in science.
6. The project has involved *collaboration* with the Geography Department.
7. Training includes realistic *simulation* of casualty procedures.
8. Salt is a *substance* we use in cooking.

Clues: innovation, material, width/length/height, safety, reproduction, cooperation, accessibility, machinery.

Task V. **Поставьте глаголы, данные в скобках, в подходящую форму (Present/Past/Future Simple, Present Continuous, Present Perfect в действительном или страдательном залоге).**

Technological progress is technological change that (improve) quality of life. Historically, technological change (focus) on meeting the material needs of growing populations. It (increase) life expectancy, (reduce) working hours and (improve) opportunities in technologically advanced nations.

The Industrial Revolution, which (mark) the beginning of a unique economic era of persistent increases in per capita incomes, (be) linked to the scientific revolution. Once an invention (be) made, engineers (take) over, redesigning and learning better how to manufacture it. For example, The Wright brothers' first flight (be) in 1903 and in 1969 Apollo 11 (land) on the Moon! Another example (show) how Henry Ford (demonstrate) that inexpensive cars (can) be mass produced on assembly lines, and how his production methods (be) widely copied.

Progress in storage, electronics, and communication technology (be) significant over the last half century.

As we know, early computers (use) punched paper tape and punched cards for storage. Today's computers typically (use) magnetic and optical disks. But, just as magnetic disks (replace) punched cards, future technologies (replace) disks. As we can see researchers are constantly (look for) new ways to store bits.

PART III
PRACTICE FILE
(ПРАКТИКУМ ДЛЯ САМОСТОЯТЕЛЬНОЙ РАБОТЫ НА УРОКЕ)

GRAMMAR

ИМЯ СУЩЕСТВИТЕЛЬНОЕ
(The Noun)

A. Суффиксы существительных (noun suffixes)

Существительные могут быть образованы от прилагательных, глаголов и других существительных с помощью следующих суффиксов:

-tion/-ation: invention, collaboration, application
-sion: explosion, corrosion, inclusion
-ence/ance: existence, coincidence, performance
-ment: establishment, measurement, improvement
-ness: happiness, friendliness
-ist: economist, chemist
-al: proposal, arrival, refusal
-y/ity: discovery, ability, prosperity
-sis: analysis, diagnosis, emphasis
-ure: signature, failure
-age: usage, breakage, storage

Exercise 1. Образуйте существительные от прилагательных, глаголов и других существительных. Запишите их в таблицу, распределив по группам.

Прилагательные: dark, great, correct

Глаголы: adjust, agree, arrange, approve, dismiss, remove, assist, attend, coincide, analyze, paralyze, hypothesize, emphasize

Существительные: science, chemistry, physics

-ment	-ness	-al	-ist	-ence/ ance	-sis

Exercise 2. **Образуйте существительные от глаголов, данных в рамочке, и закончите предложения.**

fail; resist; reduce; apply; remove; emphasize; approve; measure

1. The developers submit building plans to the council for ... .
2. Don't let one ... discourage you, try again.
3. The ... of graphene has great potential.
4. ... is a cornerstone of trade, science, technology, and quantitative research in many disciplines.
5. The company places the ... on preventive action.
6. He is investigating the electrical ... of electrolytes.
7. The city is having problems with trash ... .
8. The workers are against the ... of wages.

B. Формы множественного числа существительного (plural forms)

1. Существительные, у которых формы единственного и множественного числа совпадают:

headquarters (главное управление — центральные органы);
means (средство, способ — способы);
news (новость — новости);
series (серия — серии);
species (вид — виды);
spacecraft (космический корабль — космические корабли);
information (информация — данные);
evidence (доказательство — доказательства).

2. Существительные греческого и латинского происхождения, которые сохраняют архаичные формы множественного числа:

antenna — antennae (антенна — антенны);
bacterium — bacteria (бактерия — бактерии);
datum — data (данная величина — данные);
focus — foci (фокус/акцент — акценты);
medium — media/mediums (средство/среда — средства)
millennium — millennia (тысячелетие — тысячелетия);
phenomenon — phenomena (явление — явления);
stimulus — stimuli (стимул — стимулы).

3. Существительные, имеющие две формы множественного числа (в зависимости от значения); одна форма образуется регулярным, а другая — нерегулярным способом:

genius — geniuses (гении — в значении «гениальные личности») и genii (гении — в значении «духи-покровители»);

index — indexes (оглавление; алфавитные указатели; индексы) и indices (*математический термин*: показатели степени; коэффициенты).

4. Существительные, которые имеют только форму множественного числа:

scales — весы;

wages — заработная плата;

contents — оглавление, содержание (книги).

Exercise 3. Переведите следующие предложения с русского языка на английский.

1. Ваши сведения верны. 2. Деньги в сейфе. 3. Алфавитные указатели находятся в конце книги. 4. На крыше многоэтажного дома много антенн. 5. Проверьте, пожалуйста, все данные. 6. Их главное управление находится в Женеве. 7. Эти явления невозможно точно описать. 8. Представьте доказательства надежности нового оборудования. 9. Оглавление включает 10 глав.

C. Притяжательный падеж существительного (Possessive Case)

Притяжательный падеж употребляется:

- с существительными одушевленными (обозначающими людей и животных):
  Plank's law;
  Wright brothers' status as inventors;
  Zaccharias Janssen and Hans Lipperhey's microscope;
  Sir Charles's address.
- с некоторыми существительными неодушевленными (в единственном и множественном числе), обозначающими время, расстояние, мир, страну, город, корабль, организацию:
  the Earth's surface;
  a day's work;
  the world's biggest observatory;
  the companies' revenues.

Exercise 4. Преобразуйте следующие предложения в словосочетания, употребляя существительные в притяжательном падеже.

Model: Magnifying glass was first discovered by Roger Bacon, he is also known as Doctor Mirabilis [*Mirabilis* in Latin is "wonderful teacher"]. — Roger Bacon's magnifying glass *or* Doctor Mirabilis's magnifying glass.

1. Philo Taylor Farnsworth successfully demonstrated the first television signal transmission.
2. Elisha Graves Otis invented a safety device that prevents elevators from falling.
3. The first typewriter to be commercially successful was invented in 1878 by Americans Christopher Latham Sholes, Frank Haven Hall, Carlos Glidden, and Samuel W. Soule.
4. The ancient Egyptians are believed to be the first to invent a four-legged seat with a back, better known to most as a chair.
5. In 1938, László Bíró, a Hungarian newspaper editor, with the help of his brother George, a chemist, designed a new type of pen.
6. "Blue jeans" were invented by Jacob W. Davis in partnership with Levi Strauss & Co. in 1871.
7. Lyman Reed Blake was an American inventor who conceived a sewing machine for sewing the soles of shoes to the uppers.
8. In the 1920s, William Moulton Marston developed an early lie detector (a systolic blood-pressure test) which later evolved into the modern day polygraph.
9. Nanotechnology has its roots in a talk delivered in 1959 by physicist Richard Feynman to the American Physical Society.
10. Gustavo Stolovitzky predicts that soon we'll be able to spot diseases like cancer before we even feel sick (February 2017).

D. Конструкции «существительное + существительное (Noun + Noun)»

Двучленные конструкции

Существительное в качестве определения в конструкции N + N переводится на русский язык:

- прилагательным: a pump house — насосная станция; light waves — световые волны;
- существительным с предлогом: an exchange contract — договор об обмене.

Многочленные конструкции

Главным в многочленной конструкции является последнее существительное, которое отвечает на вопрос «что?». Существительные, предшествующие ему, являются определениями и отвечают на вопрос «какой?» или «чего?».

- a test result indicator — индикатор (*чего?*) результатов (*чего?*) контроля;
- surface spin-glass layer — (*какой?*) поверхностный слой (*чего?*) спинового стекла.

Exercise 5. Переведите следующие цепочки существительных с английского языка на русский.

spectacle maker, glass lens, lens design, light year, helium fusion, key observation, space exploration, entertainment industry, games consoles, internet access, palm top computer, home audio systems, microwave oven, storage capability, scrap paper, vacuum cleaner, traffic lights, television companies, distance learning, information technology, computer scientist

ИМЯ ПРИЛАГАТЕЛЬНОЕ (The Adjective)

A. Суффиксы прилагательных (adjective suffixes)

Прилагательные образуются от других частей речи с помощью следующих суффиксов:

-able/ible: renewable, achievable, sensible, incredible, responsible

-full: powerful, careful, plentiful

-al: economical, political, environmental, digital, virtual, interpersonal

-ive: interactive, creative, massive, negative

-ic: atomic, scientific, economic

-ant/ent: significant, dependent, different, convenient

-ous: various, marvelous, enormous, disastrous

-ing: damaging, surprising, provoking, frustrating
-ed: unprecedented, advanced, customized
-less: wireless, endless, fearless
-ly: daily, weekly, friendly
-proof: waterproof, bulletproof, fireproof
-ward: backward, downward, eastward

Exercise 6. **Образуйте прилагательные от слов, данных в скобках. Переведите предложения с английского языка на русский.**

1. Even using extremely primitive technology, we have made (marvel) progress.
2. Cashmere, baize, (water) ponchos of fine wool and silk, and many other fabrics are made by the Indians of the Andean departments.
3. Cable systems can be integrated with (wire) transmission networks to provide voice transmissions to phones and data transmissions to personal communicators.
4. The current (frustrate) situation, where so many people have such wildly divergent understandings about nutrition, will fade away.
5. There's not enough water to meet the (day) needs of the city's people.
6. They will provide you with (custom) communications software to make the job of connecting easier.
7. Wind and water are (renew) fuel sources.
8. (Environment) awareness has increased over the years.
9. It's not surprising, that the proponents of nanotechnology predict that it will lead to a new (industry) revolution.
10. Iron and (essence) fats such as omega-3 do not remain stable in liquids; they oxidize and that changes the colour, odour, and the taste of the product.

Exercise 7. **Поставьте прилагательные, данные в скобках, в сравнительную степень.**

1. New technologies or gadgets are making things (fast), (easy), (comfortable), and (interesting).
2. The Internet is getting (powerful), and nobody controls it.
3. Many people who travel alone feel (safe) with a mobile phone.

4. Mobile phones also make the roads (dangerous) because people use them while they are driving.
5. It is difficult to make predictions about the future of computing: the future is often (close) than you think it is.
6. Modern technology has shortened the distance between cultures and made the world (small).
7. Nowadays, we use smartphones which are merely an advanced version of an (old) mobile phone.
8. At one time, steam-powered trains were widely used, now they have been replaced by electric powered trains which move significantly (fast), allowing for (efficient) use of time, and (good) use of natural resources.
9. Customers are excited by the prospect of intelligent packaging and the ability to give foods a (long) shelf life.
10. A (safe) development of a new technology should not depend on whether an academic wins a highly competitive research grant.

B. Наречия, совпадающие по форме с прилагательными

fast (быстрый) — fast (быстро)
hard (трудный) — hard (трудно)
late (поздний) — late (поздно)
early (ранний) — early (рано)
little (маленький) — little (мало)
low (низкий) — low (низко)

Exercise 8. Перестройте предложения, употребляя прилагательное вместо наречия.

Model: She smacked him hard. — She gave him a hard smack.

1. The train runs fast.
2. She rises late in the morning.
3. He left early each Friday afternoon, often returning late on Monday morning.
4. Poor men's words weigh little.
5. She learns fast.
6. The car drives fast.
7. The man swam fast.
8. He walks fast.
9. I am accustomed to working hard.

10. Experience teaches hard because it gives the test first, the lesson afterwards.

Exercise 9. **Переведите следующие предложения на русский язык, обращая внимание на перевод слов *hard, late, low, fast, little.***

1. He is accustomed to *hard* work.
2. Better *late* than never.
3. Their warning was too *late* to help him.
4. I've always been a *late* riser.
5. There is *little* hope for success.
6. She complained about her *low* salary.
7. *Early* explorers used the stars for navigation.
8. *Early* to bed and *early* to rise, makes a man healthy, wealthy, and wise.
9. It happened *fast*.
10. Your watch is 5 minutes *fast*.

C. Трудные случаи образования степеней сравнения прилагательных

modern — moderner / more modern — the most modern
common — commoner / more common — commonest / most common
polite — politer /more polite — the politest / the most polite
able — abler — the ablest
late (time) — later — the latest
late (order) — latter — the last
far (place) — farther — the farthest
far (time) — further — the furthest
eager — eagerer — the eagerest
quiet — quieter / more quiet — the quietest / the most quiet
clever — cleverer / more clever — the cleverest / the most clever
narrow — narrower / more narrow — the narrowest / the most narrow

Exercise 10. **Переведите прилагательные в сравнительной и превосходной степени, данные в скобках, с русского языка на английский.**

1. It had the merit of stimulating (более способный) workers in the same field.

2. (Дальнейший) testing is needed.
3. Amongst (самый способный) and most zealous students of the history of philosophy is Bernhard Alexander.
4. Brick is in (самый распространенный) use for general domestic building.
5. In the modern industrial world, machines carry out most of the agricultural and industrial work and as a result, workers produce much more goods than a century ago and work (меньше).
6. The coast region varies in width from a few miles to as many as fifty, being (самый узкий) on the south-east side.
7. The new studios are (более современные) than before.
8. He was (самый азартный) researcher in the team.
9. Nano-sized particles are (легче) and (безопаснее) degraded in the environment.
10. At the medical level, technology can help treat (больше) sick people and consequently save many lives and combat very harmful viruses and bacteria.

ЧИСЛИТЕЛЬНОЕ
(The Numeral)

А. Количественные числительные (cardinal numerals)

- Количественные числительные от 13 до 19 образуются с помощью суффикса *-teen*: thir*teen*, four*teen*, fif*teen*, six*teen*, seven*teen*, eigh*teen*, nine*teen*.
- Количественные числительные, обозначающие десятки от 20 до 90, образуются с помощью суффикса *-ty*: twen*ty*, thir*ty*, for*ty*, fif*ty*, six*ty*, seven*ty*, eigh*ty*, nine*ty*.
- В цифровой записи в числах больше 999 каждые три разряда (начиная с последней цифры) отделяются запятыми (в отличие от русского языка, где в числах больше 9999 каждые три разряда отделяются пробелами): 3045 (рус.) — 3,045 (англ.), 27 368 (рус.) — 27,368 (англ.), 1 000 000 (рус.) — 1,000,000 (англ.).
- Количественные числительные, обозначающие сотни, тысячи, миллионы, миллиарды, образуются с помощью числительных первого ряда (от одного до десяти) и слов *hundred, thousand, million, billion* (которые стоят в форме единственного числа):

100 one hundred, 200 two hundred, 4,000 four thousand, 5,000,000 — five million, 6,000,000,000 — six billion.

- Если перед числительными *hundred, thousand, million, billion* не стоит конкретное числительное, они употребляются в форме множественного числа с предлогом *of*: тысячи студентов — thousands of students.
- Сложные количественные числительные образуются путем присоединения десятков к сотням с помощью союза *and*: 123 — one hundred and twenty three; 1,865 — one thousand, eight hundred and sixty five.
- В датах занятые не ставятся: in 1925 в 1925 году.
- При произнесении дат, состоящих из четырех цифр, для удобства произношения четыре цифры разбивают на две группы по две цифры: 1964 nineteen sixty four.
- Запомните чтение следующих числительных: 1009 — one hundred and nine; 2001 — two thousand and one.

Exercise 11. **Напишите следующие числительные прописью и прочтите их вслух.**

11; 18; 36; 27; 549; 877; 1,425; 2,698; 15,111; 30,787; 1,934,765; 987,358,412; 63,927,168,452

Exercise 12. **Переведите следующие словосочетания с русского языка на английский.**

сотни туристов, тысячи деревень, миллионы телезрителей, двести человек, миллион идей, два миллиарда долларов, три тысячи студентов

Exercise 13. **Произнесите вслух следующие даты.**

1147, 1613, 1812, 1980, 2003, 2011, 2018

B. Порядковые числительные (ordinal numerals)

- Порядковые числительные, отвечающие на вопрос «какой по счету?», образуются от количественных числительных с помощью суффикса *-th*: four*th*, six*th*, eigh*th*, ten*th*. Исключения составляют числительные: первый — the first, второй — the second, третий — the third.

- При образовании порядковых числительных, обозначающих десятки, происходят изменения в написании и произношении (буква *y* в слове *twenty* заменяется на *i*): двадцатый — the twentie*th*, тридцатый — the thirtie*th*, сороковой — the fortie*th*.
- При произнесении конкретных дат необходимо употреблять предлог *on* и определенный артикль *the*: 12 августа 1964 года on the twelfth of August, nineteen sixty four.

Exercise 14. Переведите следующие словосочетания с порядковыми числительными с русского языка на английский.

Вторая мировая война, Третий Рим, пятая колонна, пятнадцатое октября, двадцатый урок, столетний юбилей

Exercise 15. Подберите правильный перевод для устойчивых выражений с порядковыми числительными (1–8), используя подсказки (A–H).

1. at the eleventh hour
2. in seventh heaven
3. a fifth wheel
4. the sixth sense
5. second chance
6. second nature
7. second to none
8. the first fiddle

A. пятое колесо
B. вторая натура
C. шестое чувство
D. второй шанс
E. в последнюю минуту
F. непревзойденный
G. на седьмом небе
H. первая скрипка

C. Дробные и десятичные числа (fractional and decimal numerals)

- Простые дроби состоят из количественного числителя и порядкового знаменателя: ⅓ — one third.
- Исключения составляют: ¼ — one quarter, ½ — one half.

- Если числитель больше единицы, знаменатель употребляется в форме множественного числа: ¾ — three fourths.
- В смешанных числах дробная часть присоединяется к целой части союзом *and*: 5¾ — five and three fourths.
- Существительные, связанные с дробным числом, употребляются в единственном числе и с предлогом *of*: ¼ mile — one quarter of a mile.
- Существительные, связанные со смешанной дробью, употребляются во множественном числе и без предлога *of*: 5¾ kilograms — five and three fourths kilograms.
- В цифровой записи десятичных дробей в английском языке дробная часть отделяется от целой части точкой (а не занятой, как в русском): 0,5 (рус.) — 0.5 (англ.). При этом вслух произносится слово *point* («точка»). Если после десятичной точки больше одной цифры, они могут читаться как одно число или каждая отдельно: 8.2 — eight point two; 4.25 — four point twenty five (four point two five).
- Если целая часть равна нулю, слово «ноль» (*zero* или *oh*) может не читаться: 0.75 (zero/oh) point seventy five; 1.002 one point oh oh two.
- Если в дробном числе нет целых единиц, то существительное, которое следует за ним, стоит в единственном числе: 0.75 centimetre — point seventy five centimetre; 1.75 centimetres — one point seventy five centimetres.

Exercise 16. Подготовьте чтение следующего текста вслух, обращая внимание на произношение сложных числительных и числительных, обозначающих дробные числа.

The report says that 301 species of animals are threatened by hunting, 126 of them being primates. The group of heavily hunted mammals represents 7.53 per cent of all assessed terrestrial mammals and approximately 26.2% of all threatened terrestrial mammal species on Earth.

Just 2% of the mammals have populations that are stable or increasing. On average only 10.5% of all the species endangered by hunting lie within protected areas.

The largest animals, those weighing more than 2,200 lb, are most at risk of extinction.

ГЛАГОЛ
(The Verb)

A. Произношение форм прошедшего времени правильных глаголов

1. Если глагол в форме прошедшего времени оканчивается на гласный или звонкий согласный, окончание ***-ed*** произносится как звонкое [d]: appear — appeared, believe — believed.
2. Если глагол в форме прошедшего времени оканчивается на глухой согласный, окончание ***-ed*** произносится как глухое [t]: work — worked.
3. Если глагол в форме прошедшего времени оканчивается на согласный ***d*** или ***t***, окончание произносится как [id]: collaborate — collaborated, depend — depended.

B. Образование форм прошедшего времени неправильных глаголов

1. Неправильные глаголы имеют три основные формы, которые зафиксированы в словаре: неопределенная форма без частицы *to* — *break*, форма прошедшего времени (т.е. вторая форма глагола, V2) — *broke* и форма причастия II (третья форма глагола, V3) — *broken*.
2. Можно выделить несколько групп неправильных глаголов по способу их образования:
   - у одних глаголов все три формы разные (take — took — taken);
   - у некоторых неправильных глаголов формы прошедшего времени и причастия II совпадают: lose — lost — lost;
   - у некоторых неправильных глаголов неопределенная (неличная) форма совпадает с формой причастия II: run ran — run;
   - у некоторых глаголов все три формы совпадают: put — put — put.

Exercise 17. Распределите следующие правильные глаголы по группам в зависимости от произношения окончаний прошедшего времени. Выучите произношение этих форм.

propose, originate, map, perform, encompass, check, float, advance, weigh, deliver, replace, invent, hope, design, influence, rely, work, complete, remove, accelerate, result, contribute, research, threaten

[d]	[t]	[id]

Exercise 18. Произнесите формы правильных глаголов в прошедшем времени в соответствии с правилом. Запомните их.

[d] — anchor, remember, destroy, stem, transfer, use, fail, obey, restrain, manage, discover, explain, earn, realize;

[t] — develop, produce, notice, reach, place, look, drop, talk, overlap, discuss, stress, launch;

[id] — separate, isolate, need, prevent, unite, create, illustrate, detect, generate, explode, test, count, consult, avoid.

Exercise 19. Распределите следующие неправильные глаголы по группам: 1) совпадают все формы; 2) совпадают начальная форма и форма причастия II; 3) совпадают формы прошедшего времени и причастия II.
Выучите формы прошедшего времени неправильных глаголов.

Неличная форма	Прошедшее время	Причастие II
be	was/were	been
bear	bore	born
begin	began	begun
build	built	built
come	came	come
cost	cost	cost
do	did	done
fall	fell	fallen
feel	felt	felt
find	found	found
have	had	had
hear	heard	heard
get	got	got
give	gave	given

Окончание таблицы

Неличная форма	Прошедшее время	Причастие II
know	knew	known
learn	learnt	learnt
make	made	made
read	read	read
set	set	set
sit	sat	sat
shot	shot	shot
speak	spoke	spoken
take	took	taken
think	thought	thought
understand	understood	understood

ПРЕДЛОГ
(The Preposition)

A. Предлоги места (prepositions of place)

in: in London, in the book, in the world, in the North/South, in an office, in the picture, in the middle (пребывание в пределах какого-л. пространства, объекта или предмета)

at: at home, at work, at the University, at the research centre, at the conference, at the meeting, at a scale (местонахождение где-л. — у чего-л., в чем-л., при чем-л., на чем-л., за чем-л. и т.п., например, в здании и возле него)

on: on top, on the desk, on TV, on the (пребывание на поверхности, способ передвижения)

B. Предлоги времени (prepositions of time)

in: in March, in winter, in 2018, in the 21st century
on: on Monday, on the 3d of May, on a cold day
at: at 4 o'clock, at Christmas, at night, at present, at the moment

while: while we were on holiday
during: during the experiment

C. Предлоги направления (prepositions of direction)

to: to work, to London (движение к какой-л. точке)
from ... to: from Moscow to St. Petersburg
onto: onto the water (сверху вниз)

D. Предлоги, выражающие абстрактные отношения

of: the leg of the table (часть чего-л.), the invention of the telescope (родительный падеж)
by: by M.V. Lomonosov (действующее лицо), by teaching (метод)
with: with the knife (инструмент)

E. Устойчивые выражения с предлогами

at last — наконец
by means of посредством
by no means — ни в коем случае
by the way — между прочим
at the expense of — за счет чего-л., кого-л.
at any rate — во всяком случае
at present — в настоящее время
by chance — случайно
in conclusion — в заключение
in fact — фактически
in case — в случае
as a result — в результате
start with начать с чего-л.
based on — быть основанным на чем-л.

F. Предлоги не употребляются с некоторыми словами и выражениями, обозначающими понятия места и времени

here/there
this week/month/year
last week/January/Monday/semester/winter
next year/Tuesday/time/February

Exercise 20. **Из предлогов, данных в скобках, выберите подходящий.**

1. These experiments are a fun way to introduce children (of/from) all ages to basic scientific concepts.
2. It is easy to follow the instructions step (after/by) step.
3. A few discoveries (of/on) the "why have I never noticed this before?!" variety won't pass by without interest from grown-ups.
4. Pour the vegetable oil (in/into) the water.
5. Because oil is lighter than water, it floats (on/in) the water surface.
6. Fill the container with water and place the mirror (on/at) the bottom of the container.
7. Put the container (into/in) a warm place so that the liquid won't cool down right away.
8. Remove the bottle from the freezer and put the coin (at/on) top of the bottle.
9. As most technological discoveries aim to reduce human effort, it may imply that more work is done (by/with) machines.
10. The impact (on/of) technology in modern life is unmeasurable.

Exercise 21. **Вставьте в предложения подходящие по смыслу устойчивые словосочетания с предлогами.**

at any rate; by chance; at the expense of; in conclusion; by means of; in case; as a result; start with

1. ..., a rainbow appears.
2. Charles Darwin first described his theories of evolution in detail in his work entitled "On the Origin of Species ... Natural Selection".
3. Large stores were enriching themselves ... their customers.
4. Keep contact with them ... we need their help.
5. He always works by rule, never ... or guess.
6. ... I would like to thank you for your hard work.
7. Let's ... our meeting ... the analysis of our department's performance.
8. ..., your plan needs revision.

Exercise 22. **Заполните пропуски в тексте, употребляя предлоги *of, in, at, on, with, by, to, from.***

The development ... the family of scanning probe microscopes started ... the original invention of the STM ... 1981. Gerd Binnig and Heinrich

Rohrer developed the first working STM while working ... IBM Zurich Research Laboratories in Switzerland.

The STM is based ... several principles. One is the quantum mechanical effect ... tunneling. This effect allows us to "see" the surface. Another principle is the piezoelectric effect which allows us to precisely scan the tip with angstrom-level control. Lastly, a feedback loop is required, which monitors the tunneling current and coordinates the current and the positioning of the tip.

The STM is used to obtain images of conductive surfaces ... an atomic scale. It can also be used to alter the observed material ... manipulating individual atoms, triggering chemical reactions, and creating ions ... removing individual electrons ... atoms and then reverting them ... atoms ... replacing the electrons.

(Retrieved from http://www.edinformatics.com/nanotechnology/scanning_tunneling_microscope.htm)

ПРИДАТОЧНЫЕ ВРЕМЕНИ, ОТНОСЯЩИЕСЯ К БУДУЩЕМУ (Future Time Clauses)

Придаточные времени (с союзами *when, before, after, until, as soon as, as long as*), относящиеся к будущему, требуют употребления Present Simple (Present Perfect) вместо Future Simple:

when/whenever: Whenever you *need* my car, you can take it.
before: I'll finish the course before I *go* abroad for a year.
after: I will master English after I *complete* every Exercise in my textbook. After I *have finished* my experiment, I will write the report.
until: I won't go home until I *finish* this Task.
while: I'll be waiting outside while you *are speaking* to the director.
once: I'll contact you once I *receive* an estimate.
as soon as: As soon as I *arrive*, I'll give you a call.
as long as: I'll stay as long as you *need* me.
by the time: It will be dark by the time we *arrive* home.

Exercise 23. **Поставьте глаголы, данные в скобках, в нужную форму.**

1. I will watch the movie as long as it (be) interesting.
2. As soon as Elon Musk's Hyperloop system (be) in place, passengers will travel between San Francisco and LA in 35 minutes, compared to 7.5 hours by train.
3. Once Arthur Kay's big idea to use his company, bio-bean, is approved, he (turn) 85 per cent of coffee waste into biofuels for heating buildings and powering transport.
4. After Elon Musk (send) almost 4,000 small satellites into low-Earth orbit, he (cover) the world with Wi-Fi.
5. The frequency and the intensity of forest fires (die out) when researchers at George Mason University (devise) their sonic extinguisher.
6. As soon as "use by" and "best before" dates on food packaging (be replaced) by a new "Bump Mark", people (throw away) less food they buy from supermarkets.

7. Laser removal of tattoos (be used) until PhD student Alec Falkenham in the US (patent) a cream that delivers drugs to white blood cells called "macrophages" (Greek for "big eaters") causing them to release the ink.
8. The company World View Enterprises (send) tourists into the stratosphere, 32km above Earth, on hot air balloons once they (pay) £75,000 per person!
9. When we (not have) computers, we (make) calculations ourselves.
10. As long as there (to be) virtual reality gadgets, people will be enjoying them as an integral part of their safety, health, and happiness.

Exercise 24. Составьте предложения, сопоставив начало предложения (1–8) с его окончанием (A–H). Переведите полученные предложения на русский язык.

1. Sergio Canavero, an Italian neurosurgeon, will restore body function to some spinal injury patients...
2. The UK-built Airlander 10 will replace long-haul freight trucks and cargo ships...
3. People in big cities will have enough food...
4. A shorter working week will reduce global carbon emissions...
5. Russian scientist Sergey Zimov will study the impact of the animals on environment and climate...
6. An aerogel will be a material with incredible insulating properties...
7. There will be e-commerce, e-medicine and e-governance, etc...
8. Chemotherapy for cancer treatments, prosthetic devices as a medical alternative for replacing injured or missing body parts will improve...

A. by the time Smart Floating Farm measuring 350 × 200 metres producing 8.1 tonnes of vegetables and 1.7 tonnes of fish a year is in operation.

B. after fewer commuters clog the roads on certain days.

C. as soon as science and technology merge.

D. as long as advances in science and technology continue.

E. when he recreates a 12,000-year-old environment in a wildlife park for herbivores like wild horse and bison.

F. as long as gas molecules can't squeeze through pores.

G. as soon as he makes a human head transplant.
H. when the researchers get government grants to investigate it.

ВОПРОСИТЕЛЬНЫЕ ПРЕДЛОЖЕНИЯ (Interrogative Sentences)

A. Общие вопросы (yes/no-questions)

Вспомогательный глагол + подлежащее + другие члены предложения

- Are you a student?
- Have you got a credit card?
- Can you finish your work by Friday?
- Do you know how to curb the environment pollution?
- Did you anticipate the progress in science and technology?
- Will cancer, HIV, and other fatal diseases be a menace in the years to come?

B. Специальные вопросы (w-h-questions)

Вопросительное слово + вспомогательный глагол + подлежащее + другие члены предложения

- How old are you?
- What properties has this alloy got?
- When can you find evidence to prove this point?
- What do you know about this substance?
- When was this device invented?
- Why did you quit the experiment?
- How much will cosmetic surgeries cost in years to come?

Exercise 25. **Вставьте необходимые вспомогательные глаголы в следующие предложения.**

1. ... the past and present play an enormous role when predicting the future?
2. ... cell phones become a necessity in our everyday lives today?
3. ... genetics, eugenics, nanotechnology, and the likes be common courses in colleges and universities in the future?

4. ... everything we have today all science fiction five decades ago?
5. ... advancements in science and technology live up to our demands and expectations?
6. ... the impact of technology in modern life unmeasurable?
7. ... we implement various technologies to do more damage than good?
8. ... civilization evolve because of modern technology?
9. ... the future of technology even more interesting than what is happening right now?
10. ... the techniques of shaping tools taken as the chief evidence of the beginning of human culture?

Exercise 26. Задайте специальные вопросы к следующим предложениям, употребляя вопросительные слова, данные в скобках.

1. Virtual reality was only fiction a few years back. (*What?*)
2. Over the past forty years, we have seen more advances in science and technology than in all of previous history. (*What kind of?*)
3. 2019 will see mainstream adoption of BTC in a significant part of the worldwide financial industry. (*Where?*)
4. The year 2019 will finally see the public embrace million-fold cheaper personal genomes, thanks to better education and awesome software. (*Due to what?*)
5. The evolution of technology is beneficial to humans for several reasons. (*Why?*)
6. Modern technology can help treat more sick people. (*Who?*)
7. Modern technology has simplified our lives in so many ways by making it easier and enjoyable. (*How?*)
8. With the challenges of technology, the brain must react quickly to the amount of new and interesting data that is being presented. (*What kind of data?*)
9. Technology extends our abilities to change the world: to cut, shape, or put together materials; to move things from one place to another; to reach farther with our hands, voices, and senses. (*How?*)
10. The electronic computer, for example, has led to substantial progress in the study of weather systems, demographic patterns, gene structure, and other complex systems. (*Where?*)

КОНСТРУКЦИЯ *USED TO DO*
(*Used to do* Construction)

Конструкция "*used to* + Verb", или конструкция *used to do*, употребляется для обозначения действия, которое часто, регулярно или периодически происходило в прошлом, а сейчас не происходит. Она имеет только форму прошедшего времени; на русский язык переводится словами: *бывало; имел обыкновение; раньше делал (а сейчас нет).*

Примеры:

- People *used to* interact more with each other before the invention of the Internet. — До изобретения Интернета люди больше общались друг с другом (а сейчас нет).
- *Did* people *use to* calculate simple math problems themselves before calculators appeared? — До появления калькуляторов люди сами производили простейшие математические вычисления?
- People *didn't use to* speak on the phone so much 100 years ago. — Сто лет назад люди не имели обыкновения так много разговаривать по телефону.

Exercise 27. **Переведите предложения, описывающие события столетней давности, с английского языка на русский, с помощью выражений: *бывало, раньше, (не) имел обыкновения.***

1. Scientists didn't use to create human hearts using stem cells.
2. People didn't use to fly to other planets.
3. Scientists didn't use to modify the genes of a young girl to cure her cancer.
4. In 1918, Americans used to drive their Model T's to see Charlie Chaplin movies.
5. Alabama, Mississippi, Iowa, and Tennessee used to be more heavily populated than California.
6. The Eiffel Tower used to be the tallest structure in the world.
7. The average U.S. worker used to make between $200 and $400 per year.
8. More than 95 per cent of all births in the United States used to take place at home.
9. People used to build their houses from leaves and branches.
10. In the past, girls never used to put on make-up.

Exercise 28. **Задайте вопросы к следующим предложениям.**

100 years ago, in America...

1. Most women only used to wash their hair once a month and used to use borax or egg yolks for shampoo.
2. In Denver teenage boys used to gallop down the street on horses randomly shooting at houses, carriages or anything else that caught their fancy.
3. People didn't use to celebrate Mother's Day or Father's Day.
4. Americans used to sell Marijuana, heroin, and morphine over the counter at corner drugstores because heroin was thought to be a perfect guardian of health.
5. Coca-Cola used to contain cocaine instead of caffeine.
6. In 1900, men used to live to become 48 years old.
7. In 1913, gas/petrol selling used to be a side business in America.
8. In 1910, less than half of the US population used to live in urban areas. (Today, it's 80%.)
9. In 1918, Americans used to name their children "Stormi".
10. In 1915, Americans used to live in crowded houses.

МОДАЛЬНЫЕ ГЛАГОЛЫ И ИХ ЭКВИВАЛЕНТЫ (Modal Verbs and Their Equivalents)

А. Модальный глагол *can*. Значения: *мочь, уметь, иметь физическую возможность (быть способным, быть в состоянии) сделать что-л.*

- Глагол *can* не имеет окончания *-s* в 3-м лице единственного числа.

  He can prove this fact.
- После глагола *can* инфинитив употребляется без частицы *to*.

  Computers can perform a lot of functions.
- Для образования вопроса с глаголом *can* не требуется вспомогательный глагол.

  Can they manufacture a replica of this plane?
- Глагол *can* имеет форму прошедшего времени (*could*), но не имеет формы будущего времени.

  They could assemble engines, machine tools, and machine parts.

- В будущем времени вместо глагола *can* употребляется его эквивалент — выражение *to be able to.*

  I will be able to explain the rule.

Exercise 29. **Поставьте глаголы в предложениях в Present Simple, Past Simple и Future Simple, употребляя эквивалент модального глагола *can*.**

Present Simple — am/is/are able to;
Past Simple — was/were able to;
Future Simple - will be able to.

1. He can create new things. 2. Scientists can predict future. 3. They can change our understanding of the Universe. 4. Can scientists and policy makers work together? 5. How can scientists become entrepreneurs? 6. You can use your knowledge and experience in any sphere. 7. Scientists can now bend and stretch diamond like rubber. 8. Ordinary diamonds can only withstand stresses of well below 1% without breaking, but needle nanodiamonds can stretch by as much as 9%. 9. The effectiveness of science communication can affect the science policy-related legislation. 10. Scientists can now tell how smart you are just by looking at a scan of your brain.

B. Модальный глагол *may*. Значения: *мочь; можно (кому-л. сделать что-л.); быть разрешенным/позволенным.*

- Модальный глагол *may* имеет такие же ограничения в употреблении, как и глагол *can*, т.е. не имеет окончания *-s* в 3-м лице единственного числа настоящего времени, инфинитив смыслового глагола употребляется после него без частицы *to*, вопросительная форма образуется без помощи вспомогательного глагола.

  He may pay in cash. May I make corrections?
- Глагол *may* имеет форму прошедшего времени *might*, но она употребляется только в косвенной речи.

  The teacher said you might use the calculator at the lesson.
- Глагол *may* имеет эквиваленты *to be allowed to* и *to be permitted to*, которые употребляются в Present Simple, Past Simple, Future Simple.

  He is allowed/permitted to wear casual clothes in the office.

He was allowed/permitted to wear casual clothes in the office.
He will be allowed/permitted to wear casual clothes in the office.

Exercise 30. Замените модальный глагол *may* в следующих предложениях его эквивалентом *to be allowed to* или *to be permitted to*.

1. During the academic year, all students may work a maximum of twenty hours per week. 2. University students may choose the subject they want to learn. 3. All international students may perform self-employed work for an unlimited amount of hours. 4. Students may apply for this wonderful course of lectures. 5. Gifted students may travel to an overseas university free of charge. 6. Students may get free student tickets for more than 100 performances each year. 7. You may work in your free time if your work doesn't interfere with your university timetable. 8. May students work for more than one employer? 9. Students may take into the examination room only those articles, instruments or materials which are permitted in the instructions on the question paper. 10. Students may express and defend their opinions at students' meetings.

C. Модальный глагол *must*. Значения: *должен, надо, необходимо*.

- Модальный глагол *must* не имеет окончания *-s* в 3-м лице единственного числа настоящего времени.
  He must speak only English.
- После модального глагола *must* инфинитив смыслового глагола употребляется без частицы *to*.
  We must obey the rules.
- При образовании вопросов не требуется вспомогательный глагол.
  Must I do it now?
- Модальный глагол *must* имеет эквиваленты: *to be to* (должен по согласованию), *to have to* (приходится/вынужден), *to be obliged to* (обязан).
  He is to hand in the report on Friday.
  He has to take a taxi to come to work in time.
  He is obliged to apologize.
- Вопросительная форма предложений с эквивалентами *to be to, to have to, be obliged to* образуется разными способами.

1. Без вспомогательного глагола:

Are you to be in the office on Saturday? — Yes, I am.

Am I obliged to work overtime? — Yes, you are.

2. С помощью вспомогательного глагола *do* в соответствующем времени:

Do you have to work on Saturday? — No, I don't.

- Отрицательный ответ на вопрос, содержащий глагол *must*:

No, you mustn't. — Нет, нельзя/запрещено.

No, you needn't. — Нет, нет необходимости.

Exercise 31. Сделайте следующие предложения вопросительными и дайте краткие ответы.

Model:

Must I deliver the correspondence without delay? — Yes, you must. No, you needn't.

Am I obliged to stay here? — Yes, you are. No, you aren't.

Do you have to be present at the interview? — Yes, I do. No, I don't.

1. Scientists are obliged to learn what really distinguishes science from pseudoscience.
2. To compare all the genes of one organism to those of another organism, we must first know how to define the entire gene sequence of each organism.
3. You are not allowed to leave the classroom before the end of the lesson.
4. Students were not allowed to speak loudly in the library.
5. You will have to put your pet into the cage.
6. You will be allowed to visit the computer centre tomorrow.
7. We had to stay at home all evening yesterday.
8. In England, many students are obliged to wear a uniform.
9. You will have to do it all over again.
10. We must use our time properly.

D. Модальный глагол *should*. Значения: *следует, стоит, рекомендуется; я советую.*

- Модальный глагол *should* выражает долженствование с оттенком субъективной оценки, которое можно интерпретировать как «я считаю, что вы должны это сделать».

- Модальный глагол *should* употребляется после местоимений, которые показывают обращенность ко 2-му и 3-му лицу единственного и множественного числа.

  You should follow all my instructions.
- Вопросительная форма образуется без вспомогательного глагола.

  What should researchers know?
- Эквивалентами глагола *should* являются выражения *to be supposed to* (вам бы следовало...) и *had better* (вам бы лучше...).

  You had better stop doing what you are doing.
- Долженствование, выраженное глаголом *should*, всегда предполагает возможность выбора.

Exercise 32. **Перефразируйте следующие предложения, употребляя модальный глагол *should*.**

1. He had better warn you about the consequences of the action. 2. He is supposed to hire a team. 3. She had better repeat the experiment because the results are not reliable. 4. What am I supposed to do? 5. You are not supposed to do this right now. 6. You are supposed to meet your prospective employer in a restaurant. 7. You had better go now before the traffic gets too hard. 8. You had better concentrate on the immediate issues of science. 9. She'd better get here soon or she'll miss the opening ceremony. 10. You'd better leave it till Monday. There's no one in the office today.

E. Модальный глагол *ought to*. Значения: *должен, нужно, следует* (с оттенком морального долга).

- В отличие от модальных глаголов *can, may, must, should*, после модального глагола *ought* ставится частица *to*.

  I ought to help them.
- Для образования вопросительной формы не требуется вспомогательный глагол.

  Ought we to finish the work by Friday?
- Отрицательная форма образуется с помощью частицы *not*, которая ставится между глаголом *ought* и частицей *to*.

  I ought not (oughtn't) to obey their regulations.
- В отрицательной форме глагол *ought to* употребляется в основном для выражения совета и рекомендации.

  You ought not to exercise too much. It may cause injuries.

Exercise 33. **Переведите предложения с глаголом *ought to* с английского языка на русский.**

1. I think there ought to be some better way of solving the problem. 2. I feel as if I ought to give up the idea of going to college altogether. 3. Remember no one ought to interfere in such matters! 4. We want to raise this problem at the meeting. You ought to take part in this discussion. 5. Ought I to send out the invitations? 6. You ought to know everything about them. 7. Ought I to retire from service and go abroad? 8. We ought not to speak either for or against her suggestion. 9. Ought I to sacrifice my life for it? 10. It was not clear to him now what he ought to do.

Part IV
WORKSHOP
(ФАКУЛЬТАТИВ)

СЛОВООБРАЗОВАНИЕ (WORD-BUILDING)

СУФФИКСЫ СУЩЕСТВИТЕЛЬНЫХ (Noun Suffixes)

Exercise 1. **Запомните следующие суффиксы существительных. Переведите слова с этими суффиксами на русский язык. Скажите, от каких частей речи (глаголов, прилагательных) они образованы.**

-tion/ion: explanation, radiation, calculation, operation, computation, industrialization, consumption, reduction, solution, description, selection, protection, prediction, destruction, formation, detection, location
-sion: division, conclusion, collision, revision, expansion, explosion, confusion, extension
-ment: advancement, investment, environment, equipment, development, improvement, arrangement, encouragement, treatment, announcement, agreement
-ance: significance, appearance, resistance, disturbance, endurance, resemblance
-ence: interference, reference, existence, difference, coincidence, transparence
-y: discovery, enquiry, recovery, forgery, apology, difficulty
-ty: property, quality, continuity, security, prosperity, safety, validity
-er/or: researcher, transistor, spectrometer, user, protector
-ee: nominee, trainee, employee, licensee, referee, trustee
-ist: scientist, physicist, economist, linguist, chemist, specialist
-ness: weakness, weightlessness, darkness, faithfulness, awareness
-sis: hypothesis, diagnosis, paralysis
-ure: seizure, signature, closure, enclosure
-al: refusal, proposal, arrival, survival, denial, renewal, approval
-age: usage, shrinkage, breakage, leakage, storage
-th: growth, length, width, depth
-ful: mouthful, handful, pocketful

Exercise 2. **Образуйте существительные от следующих глаголов и переведите их на русский язык.**

resist, diagnose, fail, recover, deny, refer, forge, store, resemble, differ

Exercise 3. **Вставьте существительные из упр. 2 в предложения и переведите предложения на русский язык.**

1. This signature bears no ... to our director's signature. It's a forgery.
2. The doctor's ... was that the patient had a sore throat.
3. He was an ambitious person, and his ... to become a scientist was a shock to him.
4. I can't tell the ... between iron and steel.
5. After long ..., the professor gave in at last.
6. He could copy other people's signatures perfectly, that is why he was accused of ... .
7. The ... of a ship from the bottom of the sea is a difficult and expensive operation.
8. Dictionaries, encyclopaedias, and atlases are called ... books.
9. His ... to take part in this dangerous experiment surprised everybody.
10. The ... of this poisonous substance is dangerous.

Exercise 4. **Раскройте скобки, употребляя существительные в соответствующей форме.**

1. There was a very loud ... (explode) in the next door laboratory.
2. The vehicle was badly damaged in the ... (collide).
3. The scientist didn't need any ... (encourage).
4. He asked for an ... (extend) of the deadline for another six months.
5. There was a newspaper ... (advertise) for a new scientific project.
6. Television programmes were interrupted by a special ... (announce) about the latest breakthrough in technologies.
7. The ... (solve) of this problem is still urgent.
8. The failure of the project needs ... (explain).
9. The ... (describe) of the invention was really interesting.
10. Many people would like to see the ... (destroy) of all nuclear weapons.

Exercise 5. **Дополните следующий текст, переведя слова, данные в скобках, с русского языка на английский.**

The National Aeronautics and Space Administration confirmed that there is evidence proving the (существование) of liquid water on Mars. Using the imaging (спектрометр) of NASA's Mars Reconnaissance Orbiter (MRO), (ученые) detected hydrated salts in different (места) on Mars. During the warm season, the hydrated salts darken and flow down steep. However, they fade in cooler seasons. The (обнаружение) of hydrated salts means that water plays a crucial role in their (образование).

Самостоятельная работа

Task 1. **Выберите подходящие по смыслу существительные из слов, данных в рамке, и вставьте их в предложения.**

expedition; pressure; requirement; discoveries; readiness; sharing; simulator; exploration; quality; exposure

1. The triple point occurs when the temperature and ... is just right for the three phases (gas, liquid, and solid) of a substance to coexist in thermodynamic equilibrium.
2. When it comes to oceanic ..., unmanned submersibles (погружной) and automated seafloor stations offer a better value proposition.
3. Both the United States and the Russian space programs continued to cook up manned Mars ... studies.
4. Sending a friendly rover to Mars is a lot easier than actually conquering the technical challenges of sending astronauts there, which include protecting them from radiation ... .
5. To meet your daily caloric ... in space, you'd have to ingest 450 or so standard-sized capsules of fat which would weigh roughly half a pound.
6. As ... continues to improve, coffee will lighten, and dark roasts may just become a relic of the past.
7. One driving ... study found that nearly half the time one vehicle passed another, the lead vehicle had a faster average speed.
8. Business executives, government leaders, and the public would benefit from understanding the current state of technology ... and

adoption, and their converging impact and value on the factory floor.

9. We live in a unique and interesting time in human history where the ... of ideas and information is done at lightning speed, and innovative research is at an all-time high.
10. With all the innovation taking place in the world it's getting pretty hard to keep up to date with the latest ... .

Task 2. **Выберите подходящее по смыслу существительное из слов, данных в скобках.**

1. Technological (advances, advancements) are growing.
2. The idea of being able to check your phone while in the bath tub or riding a bike may have seemed a bit far-fetched several years ago but this idea will most likely become a (reality, realization) in the short future.
3. Nearly one-half of the water used by Americans is used for thermo-electric power (generalization, generation).
4. In some countries, less than half the (population, populace) has access to clean water.
5. Thirty-six states in the USA are anticipating water (shortening, shortages) by 2019.
6. By 2025, water (withdrawals, withdrawingness) are predicted to increase by 50% in developing countries and 18% in developed countries.
7. It is estimated that over 50% of water is wasted from (evaporator, evaporation), wind, or overwatering.
8. Historically, purple clothes were only worn by (magistrates, magicians), emperors and other aristocracy in Rome, Italy.
9. Unlike many substances, water expands as it freezes. An ice (cubic, cube) takes up about 9% more volume than the water used to make it.
10. Hot peppers get their heat from a molecule called capsaicin. While the molecule acts as an (irritant, irritation) to mammals, including humans, birds lack the receptor responsible for the effect and are immune to the burning sensation from exposure.

Task 3. **Догадайтесь о значении существительных, образованных с помощью суффикса *-ful* (они выделены курсивом), в следующих предложениях. Переведите предложения на русский язык.**

1. If you pour a *handful* of salt into a full glass of water, the water level will actually go down rather than overflow the glass.
2. A *teaspoonful* of neutron star would weigh 6 billion tons.
3. It seems unbelievable, but in a *bucketful* of water the molecules are over 10,000 times more than pints of water on Earth.
4. A *bucketful* of water contains more atoms than there are *bucketfuls* of water in the Atlantic Ocean.
5. A degree in that field would give you a *plateful* of possibilities for a career.
6. They bought a *tankful* of gas.
7. He took a *cupful* of water from the well and poured it on the ground.
8. She always has a *bagful* of stories.
9. It may be a *mouthful* to say, but electric eels can produce strong electric shocks of around 500 volts for both self-defense and hunting.
10. She swam as far from the beach as she could, expelled her breath, then drew in a *mouthful* of water.

ОБРАЗОВАНИЕ СУЩЕСТВИТЕЛЬНЫХ ПУТЕМ КОНВЕРСИИ (Nouns Formed by Conversion)

Exercise 1. **Образуйте от следующих глаголов существительные и переведите их на русский язык.**

Model: change (менять) – change (изменение)

research, board, surface, launch, exchange, power, market, price, e-mail, access, google, shape, ship, experience, turn, alert, shift, text, bridge, try, attempt, benefit, transport, work, shop, part, survey, influence, practice, share, cause, contrast, demand, result

Exercise 2. **Переведите предложения с английского языка на русский. Определите, какой частью речи является выделенное слово в каждом предложении.**

1. I will *e-mail* you the document as soon as I can.
2. This source is confidential. There is no *access* to it.
3. The instruments were *shipped* in time.
4. He *experienced* a moment of panic as he saw the explosion.
5. There were significant changes at the *turn* of the century.
6. The scientists *alerted* the Government about the unforeseen consequences of their invention.
7. Do you know how *to bridge* the divisions between the two groups?
8. Today, we are on the verge of a substantially more profound *shift* in life.
9. It took two *tries* to launch the second Gemini.
10. He got excellent results on the first *attempt*.

Exercise 3. **Прочтите предложения. Обратите внимание на неординарные способы образования новых слов путем конверсии (перехода из одной части речи в другую). Переведите предложения на русский язык.**

Виды конверсии

- прилагательное → глагол: green → to green (to make environmentally friendly);
- предлог → существительное: up, down → the ups and downs of life;
- предлог → глагол: up → to up (increase);
- союз → существительное: if, and, but → no ifs, ands, or buts;
- модальное сказуемое → существительное: must get / might get → must-gets / might-gets, may be → maybes

1. His scientific career was thorny. There were ups and downs in it.
2. His ultimate goal was not to pollute the city. Conversely, he wanted to green it.
3. All your ifs disappoint me. Try to be more confident.
4. His aim was to up the efficiency of the process.
5. I want this work finished by Friday and no ifs and buts.
6. It is a must-have for professional digital photographers.
7. What are our long-term aims, might-gets so to say?

8. Because all these biorhythms begin on the day of our birth, we can know our ups and downs ahead of time.
9. By all respects, this was a voyage with ups and downs, but in the end it all worked out.
10. You must finish your work in three days' time and no ifs, buts or maybes.

Самостоятельная работа

Task 1. **Найдите слова, образованные путем конверсии. Определите, какими частями речи они являются (существительным или глаголом).**

1. Traffic jams can form out of the simplest things. One driver gets too close to another and has to break.
2. Big producers want uniform taste, and a dark roast makes that easy.
3. The problem with laptops and tablets is that they are confined by a screen. He wants to turn the entire room into a monitor where you can have the news on your kitchen table while you place a video call on your fridge.
4. 780 million people lack access to an improved water source.
5. $260 billion is the estimated annual economic loss from poor water and sanitation in developing countries.
6. 300 tonnes of water is required to manufacture 1 tonne of steel.
7. People who dress like their boss get a promotion quicker.
8. Many radioactive elements actually glow in the dark.
9. Typically, materials consolidate and shrink as temperatures drop.
10. There's nothing like the fresh, clean smell after a good thunderstorm.

Task 2. **Переведите пары слов, данные ниже. Затем дополните предложения, переведя слова в скобках с русского языка на английский.**

земля — приземляться
дрель — сверлить дрелью
свет — освещать
питьё (напиток) — пить
скорость — ускорять
запах — пахнуть
свечение — светить

1. You are also using an electric drill to drill through the wall, in an attempt to (осветить) the house on fire.
2. When two oxygen molecules smash into each other and are hit by the red (свет), the unpaired electrons in both molecules will "couple up" in one orbital, thus taking in the proton.
3. A cracked egg on (земле/суше) might make a big mess, but 18 metres (60 feet) below the surface of the ocean, the pressure on the egg is 2.8 times atmospheric pressure, and it holds it all together like an invisible egg shell.
4. Cats always (приземляются) on their feet thanks to physics.
5. Coca-Cola was first launched as a tonic (напиток) or a stimulant.
6. Ethylene gas, as a ripening agent, (ускоряет) the decay of some fruits.
7. The characteristic (запах) of coins is not the (запах) of metal.
8. I returned to life, happy to (почувствовать запах) soil again.
9. Of all the metals, only gold, cesium and copper do not have a silvery (свечение).
10. Metals (светятся) because they reflect light rays from their surface.

Task 3. **Из слов в рамке выберите слово, образованное путем конверсии, которое является общим для обоих предложений в паре. Вставьте выбранные слова в предложения.**

number; mix; plants; police; cuts; group; leaks; split

1. If you ... a liter of water in a liter of ethyl alcohol, you get around 1.9 liters of solution.
   A cacophony is a ... of loud sounds.
2. Vitamin F was the name erroneously given to a ... of several essential fatty acids.
   They ... together different elements according to their properties.
3. ... continually replenish our planet's oxygen levels through photosynthesis.
   Tom ... sunflowers every spring.
4. The Earth's crust is ... into gigantic pieces called tectonic plates.
   There was a ... between the scientists.
5. An important ... in an element is the atomic number.
   Let's ... the examples.

6. Up to 50% of water is lost through ... in cities in the developing world.
   That water pipe ... .
7. We start rapid ... just now.
   The company ... emissions by 90%.
8. There were agencies to ... air and water pollution.
   The ... were trying to find the clues.

СУФФИКСЫ ПРИЛАГАТЕЛЬНЫХ (Adjective Suffixes)

Exercise 1. **Запомните суффиксы прилагательных. Переведите прилагательные с английского языка на русский. От каких частей речи они образованы?**

-able: agreeable, knowledgeable, comfortable, suitable
-ful: successful, careful, harmful, boastful, painful, helpful
-al: critical, conical, regional, national, functional, original
-ic: energetic, magnetic, systematic, economic, fantastic
-ive: imaginative, creative, active, inventive, effective
-ent: apparent, evident, sufficient, different, confident, frequent
-ar: popular, regular, particular, scalar, similar
-ish: bullish, amateurish, stylish, childish, sluggish
-ly: friendly, cowardly, daily, costly, unlikely, elderly
-ing: interesting, amazing, boring, fascinating, annoying
-proof: waterproof, foolproof, heatproof, shockproof, soundproof, bulletproof

Exercise 2. **Прочтите текст. Найдите в нем прилагательные. Определите их суффиксы. Переведите текст на русский язык.**

In 1932, a renowned 20th century British political leader Winston Churchill, who had access to his country's top researchers, predicted some future amazing scientific and technological advances, namely that 1) within 50 years, an engine would generate 600 horsepower for hours from a fuel tank the size of a fountain pen, 2) Iceland would be relocated to the tropics, 3) robots would have human-like consciousness, and

4) people would feast on synthetic chicken flesh grown in laboratories. In fact, Churchill did get a few things right. He predicted both cellphones and technology the equivalent of Skype through which anyone could "connect up to any room similarly equipped and hear and take part in the conversation as if he put his head in through the window".

Exercise 3. Образуйте прилагательные с помощью суффикса *-ish* («имеющий оттенок»). Переведите предложения на русский язык.

Model: dark — darkish (довольно темный, темноватый)

seven, twenty, tall, loud, new, old, poor, round, soft, thin, white, yellow, stone, water, small, warm, cheap

Exercise 4. Вставьте в текст слова из рамки, подходящие по смыслу.

elevenish; darkish; smallish; waterish

When the researcher entered his laboratory, it was getting ... and he couldn't see very well. In fact, it was ... . He turned on the light and saw a ... substance on the desk. He took a ... amount of the substance and examined it under the microscope. His prediction was right.

Exercise 5. Найдите подходящие эквиваленты (A–F) следующих словосочетаний (1–6).

1. bulletproof glass
2. waterproof roof
3. shockproof watch
4. heatproof brick
5. soundproof wall
6. foolproof system

A. жаропрочный кирпич
B. водонепроницаемая крыша
C. противоударные часы
D. звукопепроницаемая стена
E. надежная система
F. пуленепробиваемое стекло

Самостоятельная работа

Task 1. **Образуйте прилагательные от слов (1–10) с помощью суффиксов (A–J).**

1.	atom	A.	-ful
2.	function	B.	-ly
3.	faith	C.	-less
4.	revolution	D.	-ive
5.	aim	E.	-ic
6.	avoid	F.	-able
7.	hour	G.	-al
8.	depress	H.	-y
9.	myth	I.	-ous
10.	nutrition	J.	-ary

Task 2. **Подчеркните прилагательные. Определите способ их образования и переведите их.**

1. If you roll a piece of gold into foil with a thickness of 0.002 mm, sunlight will be visible through it. Although it will be a greenish color.
2. DNA isn't the sort of substance that you normally associate with being fireproof, but researchers have found that treating cotton fabric with DNA made it more flame retardant.
3. We need a comprehensive programme that internalizes air and water.
4. Production and consumption are at the centre of the global environmental crisis.
5. Throughout the industrial age, material growth has been the driving force of economic development.
6. The growing population has alarmed scientists who have calculated the availability of natural resources, such as water, to warn about the global and irreversible adverse effects on the environment.
7. Solutions are being discussed as to how wealth can be maintained without continuous exploitation of the ecosystem at the same rapid pace.

8. What is sought is sustainable development, i.e. a policy that responds to society demands while minimizing its environmental risks for future generations.
9. Our relentless pursuit of economic efficiency through unbridled industrialization has left people completely dependent on dwindling supplies of non-renewable fossil energy.
10. There was a significant effort to find alternative sources of energy.

Task 3. **Образуйте прилагательные от слов, данных в рамке. Распределите прилагательные по группам и заполните таблицу.**

narrow; danger; science; wood; dirt; rely; hazard; East; West; Scotland; sand; gold; electron; sustain; accident; observe

-ish	-y	-able	-ous	-al	-en	-ern	-ic

ОБРАЗОВАНИЕ ПРИЛАГАТЕЛЬНЫХ ПУТЕМ СЛОВОСЛОЖЕНИЯ (Compound Adjectives)

Exercise 1. **Переведите следующие прилагательные, образованные путем словосложения (compound adjectives).**

- well-off, brand-new, all-too-common;
- solar-powered, brightly-lit, candle-lit, horse-drawn, self-employed, well-behaved, open-minded, one-sided, well-known, well-versed, thin-papered, strong-willed, ill-informed;
- far-reaching, long-lasting, never-ending, record-breaking, time-consuming, money-making;
- four-year-old, two-litre, three-hour, twelve-inch, five-star;
- first-rate, second-hand, third-floor, eighteen-century;
- smoke-free, sugar-free, calorie-free.

Exercise 2. **Образуйте прилагательные, соединив части из двух колонок. Переведите их на русский язык.**

1.	well	A.	star
2.	far	B.	reaching
3.	record	C.	minded
4.	open	D.	bred
5.	quick	E.	breaking
6.	large	F.	scale
7.	five	G.	witted

Exercise 3. **Найдите в предложениях сложные прилагательные. Переведите предложения на русский язык.**

1. Diana submitted a 6-page document.
2. It was a never-ending project. Everybody was tired of it.
3. In order to defend your graduation project you must be well-versed in your subject.
4. It's a time-consuming task. You have to be patient.
5. The programme is supposed to be a money-making one.
6. This is quick-drying glue.
7. He made a long-winded speech.
8. He couldn't disguise his well-bred manners.
9. She is more well-versed in physics and mathematics than chemistry and biology.
10. A record-breaking 10,000 visitors attended the Festival of Science and Technology.

Exercise 4. **Преобразуйте выделенные курсивом словосочетания с прилагательными по образцу.**

Model: It was a thought-provoking idea. — The idea provoked thoughts.

1. Did you know that there are *meat-eating* plants?
2. He was a *narrow-minded* person.
3. It was *high-priced* equipment.

4. He had a *money-saving* plan.
5. She heard the sound of *gently-flowing* water.
6. In spite of my warnings, he made an *all-too-common* mistake.
7. This is a *thin-papered* solar panel.
8. She is unquestionably a *strong-willed* and moral do-gooder.
9. I recently installed a *brand-new* 1.6-gigabyte Western Digital hard drive in my 100-megahertz Pentium clone.
10. Great goals require *far-sighted* policies.

Exercise 5. **Найдите в тексте прилагательные. Переведите их. Назовите способы их образования.**

Spiral Island looks like an ordinary island but unlike most tropical islands underneath it there are thousands of old plastic bottles to keep it afloat. It was created by Richart Sowa (Rishi), an artist, musician, and carpenter.

When Rishi retired he wasn't a well-off person and he couldn't afford to buy land. He was a practical person, so he built his own island. How? He collected 250,000 empty plastic bottles, tied them together and put a wooden structure on top of them. Then he brought soil to plant trees and bushes in.

Rishi was very inventive. So he constructed a compost toilet, a solar-powered oven, a wave-powered washing machine, a solar-powered waterfall, and a fountain. Thus, he made his island self-sufficient.

According to Rishi, his island is very important. It helps to solve the problem of plastic rubbish which pollutes the sea. Unfortunately, the island isn't safe enough because it can be destroyed by hurricanes.

Самостоятельная работа

Task 1. **Из слов, данных в рамке, выберите слова, подходящие для образования составных прилагательных. Вставьте новые прилагательные в предложения.**

-called; Savanna-; -intensive; time-; -known; -bearing; water-; old-; large-; -sighted

1. Brain death is a total lack of responsiveness, the inability to breathe on one's own, a total lack of reflexes, and no signs of ...-scale electrical activity in the brain.
2. If you'd prefer to build a more ...-fashioned standard Big Bang Universe, you need additional materials.
3. These trees are resistant to ...-induced rot and are commonly used for piers and expensive outdoor furniture.
4. Hardness, flexibility, and load-... capacities are associated with density.
5. America went from a litt le-... colony to a world powerhouse in less than 100 years.
6. The specific costs of raw materials, electricity, employees, buildings, and land are estimated through the ...-tested mechanisms of supply and demand.
7. The melting of ice caps and the process of "savannization" in the Amazon Basin cause forests to be gradually replaced by ...-like vegetation.
8. It will open doors to radically new and different computer designs including so-... parallel processors that could work on more than one problem at a time.
9. We are leaping back towards coal from oil and natural gas which are less carbon-... .
10. He defended natural resources against short-... exploitation by irresponsive businessmen.

Task 2. **Переведите сложные прилагательные, данные в скобках, с русского языка на английский. Используйте подсказки.**

1. It ought to be a (долгосрочная) programme recognizing that we are eventually going to deplete all of our deposits.
2. Rachel Carson, who published the book "Silent Spring", was the catalyst that launched the (современное) environmental movement.
3. The planting of a tree has symbolic, (жизнеутверждающее) meaning.
4. He was (неосведомленный), so he didn't take part in the decision-making.

5. Few are as (многогранный/разносторонний) as you are.
6. It's not (совсем новый), but it's not very old either.
7. The crisis will have (долгосрочный) consequences.
8. The (бесконечный) battle between predators and their prey is a finely balanced one.
9. This process is expensive and (трудоемкий).
10. (мелкий/маломасштабный) mines can provide considerable employment, particularly in rural areas.

Clues: modern-day, small-scale, many-sided, brand new, long-lasting, time-consuming, never-ending, life-giving, ill-informed, long-term.

Task 3. Переведите следующие группы составных прилагательных.

ill-: ill-bred, ill-kept, ill-advised, ill-fitting
well-: well-known, well-educated, well-mannered, well-built, well-paid, well-done
world-: world-known, world-famous, world-wide
self-: self-employed, self-confident, self-educated, self-conscious
-free: fat-free, calorie-free, smoke-free, sugar-free

СУФФИКСЫ НАРЕЧИЙ (Adverb Suffixes)

Exercise 1. Запомните следующие суффиксы наречий. Переведите наречия на русский язык.

-ly: usually, generally, normally, frequently, rarely, hardly, scarcely, nearly, fairly, extremely, awfully, terribly, greatly, significantly, completely, theoretically, certainly, fortunately, honestly
-wise: clockwise, crosswise, lengthwise, likewise, profitwise
-ward/wards: afterwards, backwards, forwards, towards, onwards
-like: warlike, lifelike
-fold: twofold, manifold
-way(s): longways, sideways

Exercise 2. **Образуйте наречия частотности от прилагательных, данных в скобках. Переведите предложения на русский язык.**

1. I (normal) check my e-mail in the evening.
2. He (rare) argues with his colleagues.
3. She (frequent) takes over responsibility in urgent situations.
4. He (general) answers all the questions well.
5. He (occasional) forgets to wind up his alarm-clock.
6. I (regular) participate in scientific conferences.
7. We (usual) employ experienced persons.
8. I (hard) ever exceed speed.
9. My colleagues (occasional) postpone their work.
10. Our team (normal) is ahead of schedule.

Exercise 3. **Найдите в следующих предложениях наречия. Укажите, что они обозначают.**

Значения наречий

- отношение к действию;
- время действия;
- степень уверенности;
- интенсификация действия.

1. Theoretically, with Google Glass, you are able to view social media feeds, text, Google Maps, as well as navigate with GPS and take photos.
2. Currently the device is only available to some developers with the price tag of $1500.
3. A personal 3D printer is definitely a revolutionary idea.
4. Even the James Bond's Aston Martin which was crashed in the movie was a 3D-printed product!
5. More importantly, you can own this future with just $70, a price of a premium PS3-game title!
6. Eye tracking has been actively discussed by technology enthusiasts throughout these years, but it's really challenging to implement.

7. iOS and Android are great, but they each have their own rules and policies that certainly inhibit the creative efforts of developers.
8. Basically, an energy-efficient computer was built for processing complex software simultaneously and effectively.
9. Powered by the rise of smartphones more than 80% of computer use is now through mobile devices, yet, unfortunately, a high percentage of business apps can't be used without a keyboard.
10. We can also expect to see a lot about self-driving technology, and hopefully it will be an improvement over last years' exhibitions where rain during the conference highlighted some of the potential pitfalls of the technology.

Exercise 4. **Сделайте предложения более убедительными, употребляя интенсифицирующие наречия из списка, данного в рамке.**

extremely; greatly; truly; awfully; incredibly; extraordinarily; significantly; surprisingly; completely

1. The experiment was ... difficult.
2. I was ... surprised by her answer.
3. What you did was ... dangerous.
4. This computer is ... fast.
5. Your remark is ... irrelevant.
6. The company has changed ... over the last few years.
7. It is a much better model for studying the human brain, which is ... important, given the vast amount of humans suffering from diseases of the mind and brain.
8. The number of ... irreversible medical outcomes has shrunk over time.
9. Flyte is a wireless light bulb floating in the air above a small wooden base in which magnets are embedded. This lamp is already actively used because it takes ... little energy: if it's on for 6 hours per day, the lamp can work for as long as 22 years.
10. Embryonic development is an ... complex process that scientists are still just beginning to understand.

Exercise 5. **Переведите предложения. Обратите особое внимание на перевод наречий с суффиксами *-wise, -wards*.**

1. To tighten the chain, first loosen the two nuts that hold the bar, then turn the screw *clockwise*.
2. He is lucky *profitwise*.
3. The strip of mahogany has the grain running *lengthwise*.
4. The laws which govern particles of matter in the inorganic world govern them *likewise* if they are joined into an organism.
5. A fire was kindled at the bottom of a deep hole in the ground, big sticks were laid *crosswise* at the top.
6. He made great progress *skills-wise*.
7. He was accurate and meticulous *experimentwise*.
8. *Likewise*, large-scale companies are publicizing major sustainability targets in preparation for a more eco-conscious future.
9. The abstraction keeps moving *forward*, and the technology races to keep up.
10. From 1850 *onwards* it was again repaired and strengthened at great cost.

Самостоятельная работа

Task 1. **Прочтите и переведите предложения с наречиями. Определите, какова роль наречий в предложениях.**

1. Astronomers measure the mind-bogglingly large masses of stars or galaxies in solar masses, with one solar mass equal to the Sun's mass (that is, 2 × 1030 kilograms / 4.4 × 1030 pounds).
2. No matter how hard you try, you will never be able to grasp just how tiny, how spacially unassuming a proton is.
3. Protons are exceedingly microscopic, to say the very least.
4. Conversely, some species can grow in the mud at the bottom of swamps and other places regularly or constantly inundated with water without decaying.
5. It is generally easy enough — to figure out if a tree is alive.
6. Presumably, the ancients who first tried to make barrels or buckets out of red oak were disappointed when their creations leaked.
7. Cultivation of trees, first for foods they produced for human consumption and eventually for their lumber and the decorative and other functions, has been around for millennia.

8. The Roman writer Virgil discussed silviculture approximately two thousand years ago in his *Georgics*.
9. Virtually, all of North America was covered with dense forest when Europeans first set foot on the continent.
10. Ideally, a standing tree leans in a direction that provides a clue to where it will probably fall.

Task 2. **Раскройте скобки, поставьте наречия в соответствующую форму. От какой части речи они образованы?**

1. Bituminous sands are (colloquial) known as oil sands and sometimes referred to as tar sands — a type of conventional petroleum deposit.
2. You need to replant an area (rough) the size of Belgium to offset the emissions from tourism related travel.
3. All things grown (organic), without petroleum-based chemicals, are green.
4. It makes green business so compelling and (catch-shattering) refreshing.
5. There are currently 118 known elements. Of these, only 94 are thought to (natural) exist on Earth.
6. Elements found on Earth and Mars are (exact) the same.
7. Carbon cycle is a method by which carbon is (constant) moved throughout the biosphere.
8. Metal is a substance that is a good conductor of heat and electricity. Metals are (general) malleable, ductile, and shiny.
9. Mixture is a combination of two or more substances that are not (chemical) combined.
10. Robert Boyle, who is considered one of the founders of chemical science, developed Boyle's Law which states that, under a closed system with constant pressure, the pressure and volume of a gas are (inverse) proportional.

Task 3. **Для каждого наречия, образованного путем сочетания служебных и знаменательных слов (1–10), подберите перевод из вариантов A–J.**

1. at length	A. по крайней мере
2. in vain	B. дружелюбно
3. at least	C. по-отечески
4. in a friendly way	D. документально

5.	in a silly manner	E. здраво, разумно
6.	in a lonely fashion	F. детально, обстоятельно
7.	in a cowardly manner	G. глупо
8.	in a fatherly way	H. напрасно, тщетно
9.	in a documentary way	I. трусливо
10.	in an intelligent way	J. одиноко

ПРИСТАВКИ
(Prefixes)

Exercise 1. **Изучите значения следующих приставок. Переведите слова с данными приставками на русский язык.**

anti- (against): antifreeze, antithesis, antipathy, antiseptic, antisocial
bi- (two): bilateral, bilingual, bicameral, biannual
co- (with, together): coworker, cooperation, co-education
counter- (in the opposite direction): counterargument, counterbalance, counterforce
de- (acting against): deforestation, depopulation, decelerate, deactivate
dis- (opposite in meaning): dismantle, disagreeable, disproportionate, displeased
ex- (former, before): ex-president, ex-serviceman
in- (il-, im-, ir-) (opposite in meaning): inaccurate, inconsistent, incredible, inevitable, insecure, incomplete, incoherent, illegal, illogical, impossible, imperfect, imprecise, irregular, irreversible
inter- (between): intercontinental, international, interactive, interrelated, interfere
mis- (opposite in meaning): misconduct, misdiagnosed, misinformed, misinterpreted, mislead
mono- (one): monorail, monolith, monoxide, monotone
multi- (many): multinational, multifunctional
non- (not): nonsence, non-existent, non-practical
over- (too much): overestimate, overconfident, overflow, overproduction
post- (after): postgraduate, postmodern, posthumous, postscript
pre- (before): predisposition, pretext, precondition
pro- (for, in favour of): pro-American, pro-British, project, progress, promote
re- (again): rewrite, repaint, review, replenish, retreat, reverse

semi- (half): semi-circle, semi-formal, semi-annual
sub- (under): substandard, sub-orbital, submarine, subterranean
super- (above): superhuman, supernatural, supersonic
trans- (across): transplant, transform, transcribe, transliterate
tri- (three): triangle, tricolor, tricameral
un- (opposite in meaning): unacknowledged, unattainable, unavoidable, unpredictable, unrealistic
under- (not enough): underestimate, underground, underachiever
uni- (one): uniform, uniaxial, unilateral, universal

Exercise 2. **Вставьте вместо пропусков данные в рамке приставки. Переведите предложения на русский язык. Некоторые приставки употребляются дважды.**

semi-; anti-; tri-; trans-; bi-; super-; de-; sub-

1. It was a ...lateral agreement between two countries.
2. The objects were arranged in a ...circle.
3. Some trains run on just one rail. They are called ...rail.
4. To prevent petrol from freezing, put ...freeze in the tank.
5. ...forestation is one of the threats of modern society.
6. Scientists are working on ...human powers.
7. It is now possible to ...plant a heart from a dead person to a living one.
8. Concord is a ...sonic plane. It flies faster than sound.
9. It was a ...orbital flight.
10. A shape with three angles is called a ...angle.

Exercise 3. **Сделайте данные в скобках прилагательные отрицательными, употребляя следующие приставки.**

ir-; dis-; in-; il-; mis-; un-

1. It's (legal) to drive a car without a license.
2. She was (capable) of completing this work ahead of time.
3. There was an (regular) sound coming out of the room. It was clear there was something wrong with the experiment.
4. His decision is (reversible). He never changes his mind.
5. He was (pleased) with the results of the experiment.

6. The report has many weaknesses. It's (complete) and (accurate).
7. The note was (coherent). I couldn't understand it.
8. The researcher was (led) by inaccurate information.
9. The crisis was (avoidable).
10. His conduct was provoked by the (appearance) of valuable files.

Exercise 4. **Прочтите тексты. Найдите слова с приставками и переведите их.**

(1) Benjamin Franklin (1706-1790) discovered one of the fundamental laws of physics — the Law of Conservation of Electric Charge — and proved that lightning is electricity. He also invented bifocal spectacles, the Franklin stove, and the lightning rod.

(2) Lord Kelvin (1824-1907), whose original name was William Thomson, codified the first two laws of thermodynamics and deduced that the absolute zero of temperature is −273.15°C. He was a physicist and an inventor. He devised equipment that allowed transatlantic telegraph signalling to take place via an undersea cable.

(3) William Crookes (1832-1919) was a physical chemist who discovered and named the element thallium. In 1875, he invented the Crookes tube — an evacuated electrical discharge tube which he used to generate so-called cathode rays. We now know that cathode rays are streams of electrons. Crookes used magnetic fields to prove that cathode rays consisted of negatively charged particles.

(4) Carl Anderson (1905-1991) proved the existence of antimatter with his discovery of the positron. He also discovered the muon.

(5) Niels Bohr (1885-1962) founded quantum mechanics when he remodeled the atom so electrons occupied "allowed" orbits around the nucleus while all other orbits were forbidden.

(6) Satyendra Nath Bose (1894-1974), an Indian physicist, founded quantum statistics with an alternative derivation of Planck's radiation law based on the idea that light photons of the same color are indistinguishable from one another — particles such as these are known as bosons.

Exercise 5. **Прочтите текст. Вставьте пропущенные слова с отрицательными приставками. Переведите текст с английского языка на русский.**

disappear; counterintuitive; inadvertently

Science can be glorious. It can bring clarity to a chaotic world. But many big scientific discoveries are by nature (1) ... and sometimes shocking.

Paleontologists have identified five points in Earth's history when, for whatever reason (asteroid impact, volcanic eruptions and atmospheric changes), mass extinctions eliminated many or most species.

Today, according to many biologists, we're in the middle of a sixth great extinction. Mastodons may have been some of the earliest victims. As humans moved from continent to continent, large animals that had thrived for millions of years began to (2) ... — mastodons in North America, giant kangaroos in Australia, dwarf elephants in Europe. Whatever the cause of this early wave of extinctions, humans are guilty of modern extinctions caused by hunting, destroying habitat, introducing invasive species and (3) ... spreading diseases.

Самостоятельная работа

Task 1. **Найдите в следующих предложениях слова с приставками. Определите их значение. Переведите предложения на русский язык.**

1. This hyper-realistic experience will let you smell and touch your way through events, exotic destinations and even learn about history by stepping into a simulation based in the past.
2. The train which is propelled along through a low-pressure tube can travel at airline speeds for long distances due to ultra-low aerodynamic drag.
3. The programme will help address over-crowding and housing issues in urban areas and open up the countryside to commuters that was previously considered too remote.

4. In May 1958, the episode of "Walt Disney's Wonderful World of Color" awed television audiences with depictions of automated global highways, underwater road systems and antigravity cars.
5. All the deserts are underpopulated because of weather conditions.
6. When helium is cooled to extreme temperatures, just a few degrees away from absolute zero (460°F, or –273°C), it turns into a superfluid, that means it can flow without friction.
7. It has been suggested by several botanists, with considerable plausibility, that the ultra-violet or chemical rays can be absorbed and utilized by the protoplasm without the intervention of any pigment such as chlorophyll.
8. Pills and medications designed to help you stay awake are sometimes referred to as anti-sleepers.
9. It was intended later to continue this line from Vierni to Semipalatinsk and join up with the Trans-Siberian line.
10. The flora of Argentina is varied: from the rich tropical and subtropical regions of the north, the treeless pampas of the centre, to the desert steppes of the south, and the arid plateaus of the northwest.

Task 2. **Образуйте существительные с помощью данных в рамке приставок. Переведите эти существительные на русский язык.**

dis-; self-; hemi-; semi-; pre-; non-; counter-

Nouns: condition, payment, attack, employment, advantage, sphere, conductor.

Task 3. **Образуйте глаголы с помощью данных в рамке приставок. Переведите эти глаголы на русский язык.**

over-; mis-; under-; co-; de-; un-; re-

Verbs: lead, motivate, consider, pack, load, charge, estimate, exist.

ПРОВЕРОЧНЫЕ УПРАЖНЕНИЯ НА СЛОВООБРАЗОВАНИЕ

Task 1. **Заполните таблицу, добавив недостающие слова.**

Глагол	Существительное	Прилагательное	Наречие
		agreeable	
	knowledge		
compare			
			commitedly
		constructive	
vary			
			exploringly

Task 2. **Прочтите текст. Дополните его, переведя слова, данные в скобках, с русского языка на английский. Воспользуйтесь данными в рамке подсказками.**

mystify; disgust; impress; pain; resist; heat

There's no question that science is full of explanations that defy our commonsense expectations. And every year, researchers find ever more (мистические) discoveries about the universe we live in. From (отвратительный) medical anomalies to blueberry planets.

In 2018, for example, scientists succeeded in some (впечатляющий) feats: engineers at SpaceX sent a red sports car flying past Mars. Chinese researchers cloned a pair of monkeys. Over the past year, scientists also figured out how to "touch" the sun using a (термостойкий) probe, use tiny robots to kill cancer, and stop (болезненный) migraines.

Task 3. **Укажите, какое прилагательное (существительное) соответствует каждому из данных определений.**

- able to resist great heat
- something that keeps out water
- not able to be undone
- a quantity that fills the hand
- not real or present

- surpassing a best-ever achievement
- logical and consistent

Clues: record-breaking, heat-resistant, waterproof, coherent, non-existent, handful, irreversible.

Task 4. Определите, к каким частям речи относятся выделенные курсивом слова. Переведите предложения на русский язык.

1. Sir Isaac Newton was a *supergenius*.
2. The *discovery* was confirmed by physicists.
3. The Reading Room in the Library of Congress on Capitol Hill houses a collection of 45 thousand reference books, a part of the *extensive* main catalogue of more than 23 million cards and desks for 212 readers.
4. The food mixer and the domestic *refrigerator* were invented 80 years ago.
5. Supercooled helium has two *different* liquid forms.
6. DNA isn't the sort of substance that you *normally* associate with being fireproof.
7. *Scientists* have found that microorganisms in the air and on surfaces such as rooftops can create Vitamin B_{12} as a metabolic byproduct.
8. Sunflowers are known as *hyperaccumulators* in the science community. They take in high amounts of toxic chemicals or materials and store them in their tissues.
9. You *probably* know that you can't fold a piece of paper in half more than eight times.
10. Venus is the only planet in the Solar System that rotates in *clockwise* direction.

СПОСОБЫ ВЫРАЖЕНИЯ РАЗЛИЧНЫХ ЧЛЕНОВ ПРЕДЛОЖЕНИЯ (WAYS OF EXPRESSING PARTS OF THE SENTENCE)

ПОДЛЕЖАЩЕЕ (The Subject)

Exercise 1. **Изучите способы выражения подлежащего в английском языке по таблице.**

Таблица 4.1

Способы выражения подлежащего

Подлежащее	Пример	Перевод
Существительное	*Evolution* is a biological phenomenon common to all living things.	Эволюция — это биологическое явление, общее для всех живых существ.
Существительное с относящимися к нему словами	*The main goal of physics* is to understand how the universe behaves.	Основная цель физики — понять, как развивается Вселенная.
Местоимение	*They* discovered what classical mechanics could not explain.	Они поняли то, что классическая механика не может объяснить.
Местоимение *it* (формальное подлежащее)	*It* is a classical example of motion.	Это классический пример движения.
Местоимение *one* (формальное подлежащее)	*One* can say that experimental physics, engineering and technology are related.	Можно сказать, что экспериментальная физика, техника и технология связаны между собой.
Формальное слово *there*	*There* are many approaches to studying physics.	Существует много подходов к изучению физики.

Окончание табл. 4.1

Подлежащее	Пример	Перевод
Инфинитив	*To know* a foreign language means to broaden opportunities for communication.	Знать иностранный язык значит расширить возможности общения.
Герундий	*Investing* money in science always pays off.	Вложение средств в науку всегда окупается.
Отглагольное существительное	*The learning* of Latin was widespread in the 13th century.	Изучение латинского языка было широко распространено в XIII веке.
Придаточное предложение	*That scientists of the whole world are occupied with this problem* is good.	То, что ученые всего мира занимаются данным вопросом, это хорошо.

Exercise 2. **Найдите подлежащие в следующих предложениях. Укажите, какой частью речи они выражены. Переведите предложения на русский язык.**

1. Most metals allow electrical current to flow through them.
2. Today there is a new interest in the electric car.
3. It is necessary to develop a new science physics of the weightless state.
4. Physics is a branch of science. It is one of the most fundamental scientific disciplines.
5. To understand how transistors work means to understand how a switched electronic circuit works.
6. One should mention that these materials must withstand very high temperatures.
7. Lazer cutting, welding, and machining are beginning to be big business.
8. Living things include animals, plants, fungi (such as mushrooms), and microorganisms such as bacteria.
9. Malpighi's drawings of plant anatomy remained unintelligible to botanists until the structures were rediscovered in the 19th century.

10. That organisms changed during prehistoric times and that new variations are constantly evolving can be verified by paleontological records.

Exercise 3. **Переведите предложения с оборотом *there is / there are*, обращая внимание на порядок слов в русском предложении.**

1. There are moments in the history of all sciences when remarkable progress is made in relatively short periods of time.
2. Beginning in Italy during the 14th century, there was a general ferment within the culture itself which, together with the rebirth of learning, is referred to as the Renaissance.
3. During that time, there was a great improvement in the classification of plants, which had been described in ancient herbals merely as trees, shrubs, or plants and, in later books, were either listed alphabetically or arranged in some arbitrary grouping.
4. There was a group of biologists known as the Encyclopedists, best represented by Conrad Gesner, a 16th-century Swiss naturalist, who compiled books on animals that were illustrated by some of the finest artists of the day.
5. Erasmus Darwin (grandfather of Charles Darwin) concluded that species descend from common ancestors and that there is a struggle for existence among animals.
6. By the 21st century, there were many important categories in the biological sciences and hence numerous specialities within fields.
7. There was plenty of time to make corrections in the paper.
8. In the last decade, there was outstanding progress in the development of lazer technology.
9. In these times of growing urbanization there are people who choose to escape from cities and live a simpler, cleaner life.
10. There is still debate about the pros and cons of genetic engineering.

Exercise 4. **Измените порядок слов в предложениях таким образом, чтобы подлежащее стояло на первом месте.**

1. Crucial to those studies was the development in the late 20th century of tissue culture methods that allowed for the growth of mammalian embryonic stem cells.

2. Perhaps the last of the ancient biological scientists of note was Galen of Pergamum, a Greek physician who practiced in Rome during the middle of the 2nd century.
3. Among the many philosophical and religious ideas advanced to answer that question, one of the most popular was the theory of spontaneous generation, according to which living organisms could originate from nonliving matter.
4. It became necessary for biologists to redefine their social obligations and functions, particularly in the realm of making judgments about ethical problems.
5. Of particular consequence in the biological sciences was the development of genetic engineering.
6. It is necessary to turn our economy into eco-economy.
7. It's important to get a sense of how the tectonic plates of the innovation landscape are shifting.
8. It is the King Cobra that makes its nest on the ground to lay eggs.
9. Of all the natural substances found on the planet, the diamond has the highest melting point.
10. It is the Peregrine falcon, which can clock a speed of 200 mph in air, that is the fastest animal on Earth.

Exercise 5. Определите, в каких предложениях инфинитив является подлежащим. Переведите эти предложения на русский язык.

1. To find solutions to global warming, pollution, and other environmental problems, biologists worked with social scientists and other members of society in order to determine the requirements necessary for maintaining a healthy and productive planet.
2. To build an eco-economy means to restore carbon balance, to analyze population and water use.
3. Around 1885, Herman Hollerith invented the tabulator, which used punched cards to process statistical information.
4. To save the planet we need eco-economy.
5. According to the estimates of American experts production of materials in space is to bring $60,000,000 in the future.
6. Imagine a future where every individual professional has the capability to mass produce their own creative physical products without limitation.

7. Honey is one food that is not capable of spoiling. It is possible to safely eat honey that is thousands of years old.
8. It is impossible to kill a cockroach if you separate its head from its body as its brain is located in its body.
9. The hummingbird also has the distinction of being the only bird in the world with the ability to fly backwards.
10. We can't tickle ourselves because even before we think about doing it, our brain gets programmed to feel it.

Exercise 6. **Переведите следующие предложения. Обратите особое внимание на перевод подлежащего, выраженного придаточным предложением.**

1. That satellites can control physical, chemical, biological, and geographical changes on the global scale is well-known.
2. That different wind energy plants are being developed is evident.
3. That real-time object tracking, holographic heads-up display, speech recognition will become even stronger and smarter raises no objection.
4. That humans began cooking food on controlled fires around 790,000 years ago is a proven fact.
5. That a human baby has 99 more bones than an adult is incredible.
6. That Mercury is the only metal on the planet that stays in a liquid state at room temperature and standard pressure is known to everybody.
7. That mercury is incredibly toxic and is responsible for Mad Hatter Syndrome is not a new fact.
8. That giraffes have blue tongues surprised all of us.
9. That scientists of the 17th century were called natural philosophers kindled the students' interest.
10. That a lightning strike can reach a temperature of 30,000°C, or 54,000°F, is shocking.

Самостоятельная работа

Task 1. **Укажите, какими частями речи выражены подлежащие в данных предложениях. Переведите предложения на русский язык.**

1. One should mention that these materials must withstand very high temperatures.

2. Today there is a new interest in the electric car.
3. Laser cutting, welding, and machining are beginning to be big business.
4. It is necessary to develop a new science — physics of the weightless state.
5. It is possible to grow crystals under the zero-gravity conditions.
6. Calling friends, browsing web, taking photos, playing games are possible on Firefox OS.
7. Working with digital marketing teams and partners who know artificial intellect and delivery systems is becoming profitable.
8. Testing of driverless cars on public roads actually has been approved in Nevada, Florida, and California.
9. There is enough DNA in the average person's body to stretch from the sun to Pluto and back — 17 times.
10. Transforming a venom into a painkiller is called "toxineering".

Task 2. **Дополните предложения, выбрав из данного списка наиболее подходящие по смыслу подлежащие.**

the world's largest amphibian; female sharks; British theoretical physicist Stephen Hawking; covering a broad range of scientific fields; to constantly keep in touch with; the Internet; spending a great deal of time grooming each other; the human body; a parent and child; hot water

1. ... can freeze faster than cold water.
2. ... share 99.5 per cent of the same DNA, and you have 98 per cent of your DNA in common with a chimpanzee.
3. ... contains enough carbon for 9,000 pencils.
4. ... is a termites' habit because good hygiene is important to their survival.
5. From humble beginnings, ... has transformed the way we gather information, interact with friends and family and entertain ourselves.
6. ... friends, search the web, take photos, and more you need a movile phone.
7. ... such as biology, physics, astronomy, and chemistry, these men and women have pushed the world of science forward, allowing the human race to answer seemingly impossible questions while at the same time opening the door to new fields of research and discovery.

8. ... is famous for his work on black holes. He also wrote books such as "A Brief History of Time" enabling a wide audience to appreciate his ideas.
9. Why do ... have thick skins?
10. ... is the giant salamander. It can grow up to 5 ft in length.

Task 3. Переведите следующие предложения с русского языка на английский.

1. Мы все знаем, что гелий (helium) в газообразной форме (gaseous form) легче воздуха.
2. Токсинонженерия (toxineering) — это новое направление в науке, в котором ученые пытаются превратить яд (venom) змей, насекомых и паукообразных (arachnids) в болеутоляющее средство (painkillers).
3. Не следует добавлять (supplement) капли дождя в ваш рацион. Достаточно выйти на улицу и постоять под дождем.
4. Невозможно сложить (fold) бумагу больше чем в 8–11 раз.
5. Человеческий мозг может жить без кислорода в течение 4–6 минут, после чего мозг начинает медленно умирать.
6. Самая высокая гора в мире — Эверест — имеет высоту 8,842 метра.
7. Поддержание удовлетворительного состояния здоровья (comfortable state of health) — это цель, которую ставит перед собой большинство людей в мире.

СКАЗУЕМОЕ
(The Predicate)

Exercise 1. Изучите способы выражения сказуемого в английском языке по таблице.

Таблица 4.2

Способы выражения сказуемого

Сказуемое	Пример	Перевод
Глагольное сказуемое		
Личная форма глагола	Children *live* in their own world.	Дети живут в своем особом мире.

Сказуемое	Пример	Перевод
Модальное сказуемое		
Модальный глагол (+ смысловой глагол)	We *must develop* technologies.	Мы должны развивать технологии.
Составное именное сказуемое		
Именная часть сказуемого	Схема образования: ***to be*** **–** ***именная часть***	
Существительное	Europe *is* ***a continent***.	Европа это континент.
Прилагательное	Russia *is* ***rich*** in mineral resources.	Россия богата полезными ископаемыми.
Инфинитив	Our task *is* ***to explore*** this territory.	Наша задача — исследовать эту территорию.
Герундий	His short-term aim *is* ***gaining*** experience.	Его цель — приобрести опыт.
Сказуемое, выраженное придаточным предложением		
Придаточное предложение	My idea *is* ***that we should go forward***.	Моя идея заключается в том, что мы должны идти вперед.

Exercise 2. Найдите глагольные сказуемые в предложениях. Определите их видо-временную форму и залог.

1. GPS satellites circle Earth twice a day in a very precise orbit and transmit signal information to Earth.
2. Many new and very interesting projects are planned for orbital station.
3. Preparatory work for industrial production in space at a larger scale is being carried out in Russia.
4. TellSpec was invented and released for those who want to quickly and accurately know the composition of a dish.
5. London's coffee industry creates over 200,000 tonnes of waste every year.

6. The balloon flew its first successful test flight into the stratosphere in June, and the company will soon start selling tickets at the bargain price of just £75.000 per person!
7. They're searching for antibiotic resistant bacteria known as superbugs.
8. The Internet of Things has long been talked about amongst tech insiders as the next big innovation in home technology.
9. The Internet of Things will continue to integrate more aspects of the home into one harmonious system by utilizing the internet, allowing a user to control anything from the air conditioning to their security via voice command and a small personal assistant.
10. We take the common eye-tracking technology and combine it with a front-facing camera plus some serious computer-vision algorithm, and voilà, fruit slicing is done with the eyes!

Exercise 3. Найдите составные именные сказуемые. Определите, чем выражена их именная часть.

1. One reason for the popularity of the countryside is that the English people like to live in small houses and have small gardens.
2. The advantage of sun-powered lamps is that they can bring light to areas distant from any other power supply.
3. One of the advantages of quarts is that it is very stable.
4. Transistors are miniature electronic switches.
5. To understand how transistors work means to understand how a switched electronic circuit works.
6. The most difficult problem is to find a material that is light enough to allow the craft to float back to the surface in case of emergency.
7. Port is a compact portable battery that charges your phone using solar energy. All you need to do is attach it to any window in the house or car.
8. Entrepreneur Arthur Kay's big idea is to use his company, bio-bean, to turn 85 per cent of coffee waste into biofuels for heating buildings and powering transport.
9. Many companies have said the trucks will still need a human passenger to ensure their cargo is safe.
10. An aerogel is a material that's full of tiny holes.

Exercise 4. **Переведите предложения с модальными сказуемыми. Используйте данные ниже подсказки.**

must — должен, необходимо
can — можно
may — можно (разрешено)
should — следует, сто́ит
ought to — обязан

1. There may soon be a gentler, cheaper alternative to tattoo laser removal.
2. Aerogels can't transport heat so they have incredible insulating properties.
3. In 20 years, humanity can have access to 100 terawatts of energy, five times the amount produced today (17.5 terawatts).
4. Exploring ethical implications of the Internet must not be ignored.
5. The Toronto Declaration should protect the right to equality and non-discrimination in machine learning systems.
6. They ought to present information in playful, non-threatening ways.
7. Companies must reinvent old technologies using a fresh approach.
8. This shouldn't come as a surprise to anyone that the rise of China's tech companies has been major stories for a few years now.
9. Technological advances must transform every facet of our lives.
10. I know it sounds crazy, but it just might work.

Exercise 5. **Переведите предложения. Обратите особое внимание на употребление герундия как части составного именного сказуемого.**

1. Part of surfing is swallowing seawater.
2. A way to thrive in today's volatile world is making the most profound impact on both industry and culture.
3. What made Meituan Dianping, a Chinese tech platform, popular in the first half of 2018 is delivering services such as food, hotel stays, and movie tickets for more than 350 million people in 2,800 cities.
4. Chris Moody's idea was using supercomputers to simulate how galaxies crash into each other.
5. An inspiring dream for humanity that will symbolize the next frontier of innovation is going to another planet.

6. Google's big idea is nurturing a culture that allows for innovation.
7. Our aim in TV is driving toward sharper picture.
8. Our purpose is widening our horizons and revenue opportunities through new products and a rebuilding of traditional offerings.
9. The company's ambition is showing off transparent TV displays, making the kind of visual tech popularized by sci-fi films over the last couple of decades.
10. His plan is doubling the efficiency of his company.

Самостоятельная работа

Task 1. **Прочтите следующие предложения. Найдите в них сказуемые. Определите их тип.**

1. An adult's blood vessels could circle Earth's equator four times!
2. Bodies give off a tiny amount of light that's too weak for the eye to see.
3. A tongue print is absolutely unique.
4. The number of bacteria in a person's mouth is equal to the number of people living on Earth or even more.
5. A human eye can distinguish up to 10 million different colors. But our brain can't remember all of them.
6. What triggers 17 muscles of the face is smiling while crying activates 43 ones.
7. The heart of a shrimp is located in its head.
8. The fingerprints of a koala are so indistinguishable from humans that they have on occasion been confused at a crime scene.
9. Elephants are the only animals that can't jump.
10. The ultra-rare Sumatran rhinoceros recently disappeared for 40 years before finally being spotted again in Indonesia.

Task 2. **Прочтите следующие предложения. Найдите в них сказуемые. Выпишите предложения, в которых сказуемое включает герундий или инфинитив. Переведите предложения на русский язык.**

1. You can expect that one of these devices will be simplifying life in your home and the homes around you by 2020.
2. While large-scale innovation in automation has traditionally been limited to the production side of society, the technology will have far reaching implications for consumers by 2020.

3. My aim today is to show that the Moon is slowly drifting away from our planet, by about 1.48 inches, or 3.78 centimetres every year.
4. As of today, the hottest temperature on the planet has been recorded in Libya (136°F in 1922), while the coldest has been recorded in Antarctica (128.6°F in 1983).
5. Our objective is to find out why we are not aware of some earthquakes that occur on the planet.
6. Lake Baikal in Russia has the distinction of being the deepest lake in the world with an average depth being 2,442 feet.
7. Compiling a list of interesting facts on this subject is no easy job.
8. It would take us 2 million years to travel to Andromeda – the galaxy which is nearest to us.
9. Our ambition was to launch a spacecraft to space as soon as possible.
10. It is interesting to know that our mouth produces about one litre of saliva each day!

Task 3. Поставьте глаголы в соответствующую форму (время, залог) для образования сказуемого.

1. Flocks of birds, no matter how large, ... never ... (lead) by a single individual. The movement ... collectively (control) by each bird.
2. Over the last five decades there ... (be) huge advances in the field of space travel with probes being landed on moving comets, talk of space "tourists", and even plans for a mission to Mars.
3. Have you heard a story of how NASA ... (spend) millions trying to create a pen that would work in zero gravity?
4. One very famous astronaut, Canadian Chris Hadfield, ... (become) the first person to record a song in space.
5. Right from the moment Apollo 11 took off, there ... (be) conspiracy theories that the Moon landings were faked.
6. Various astronauts who have been on missions to the Moon ... (claim) that the Moon smells of wet ashes or spent gunpowder.
7. According to a Stanford University study of more than 15,000 Americans, excessive amounts of light from street lamps ... (have) a strong effect on sleep.
8. A wolf's howl doesn't produce an echo even if the animal ... (howl) right in the middle of a valley surrounded by large mountains.

9. The white-tailed deer native to North America ... (consider) the most harmful animal for humans in the United States, owing to the large number of accidents that it is involved in.
10. At least, half of Earth's oxygen ... (come) from the ocean, not trees.

ДОПОЛНЕНИЕ
(The Object)

Exercise 1. **Изучите способы выражения дополнения в английском языке по таблице.**

Таблица 4.3

Способы выражения дополнения

Дополнение	Место в предложении	Пример	Перевод
Местоимение: — личное; — в объектном падеже; — притяжательное; — указательное; — неопределенное	После глагола	We learned this rule at school, and we can use *it*. You ought to know *all* about it. Who gave you *that*?	Мы учили это правило в школе, и мы можем применять его. Вы обязаны знать всё об этом. Кто дал вам это?
Существительное в общем падеже		The driver started *the car* after he had examined *the engine*.	Водитель завел автомобиль после того, как проверил мотор.
Инфинитив, объектный инфинитивный оборот		He often forgot *to register* the results of the experiment. We *know Newton to express* the connection between force and motion in the form of laws.	Он часто забывал записывать результаты эксперимента. Мы знаем, что Ньютон выразил связь между силой и движением в форме законов.

Окончание табл. 4.3

Дополнение	Место в предложении	Пример	Перевод
Герундий, герундиальный оборот	После глагола с предлогом	We insist on their *taking* part in this experiment.	Мы настаиваем на том, чтобы они приняли участие в этом эксперименте.
	После глагола без предлога	During the test, I need *recording* the temperature immediately.	Во время опыта мне нужно сразу же фиксировать температуру.
Дополнительное придаточное предложение с союзом *that*, *where* или *what*	После глагола	The professor said *that he had received* unexpected results.	Профессор сказал, что он получил неожиданные результаты.

Exercise 2. **Найдите дополнения в предложениях. Определите, какой частью речи они выражены. Переведите предложения с английского языка на русский.**

1. A computer's hardware comprises a central processing unit which is the brain of the computer.
2. Charles Babbage started the design of the first automatic mechanical calculator, his Difference Engine, in 1822, which eventually gave him the idea of the first programmable mechanical calculator.
3. Surprisingly, we have found that life without electric gadgets is quite liberating.
4. In the 1960s, a decade of famous experiments in social psychology, a lot of researchers decided to study social behavior in innovative ways.
5. In the 1990s, the first companies produced genetically modified (GM) crops.
6. The supporters of genetic engineering claim that it increases food production.

7. Benefits of genetic engineering include making farm animals more productive and saving endangered species.
8. Many engineers believe that the electric car will replace other forms of transport.
9. The Intergovernmental Panel on Climate Change has cautioned against ascribing particular rain or drought events to human activity.
10. For millennia, people were considered dead when they stopped breathing and their hearts ceased to beat.

Exercise 3. **Найдите в следующих предложениях дополнения. Какой частью речи они выражены? Определите, в каких предложениях дополнение является прямым, а в каких — косвенным. Переведите предложения на русский язык.**

1. You can store data on the hard disc to transfer it from one computer to another.
2. Car companies are working on developing a supercar.
3. Many materials (most metals) allow electrical current to flow through them.
4. This means making the submarine's cross section as small as possible.
5. The last period, from 1981 to 2017, saw a reappearance of the human influence on drought and moisture.
6. The company insisted on cancelling the Programme.
7. Up to 30 per cent of us have trouble sleeping.
8. Zimov will study the impact of the animals on environment and climate.
9. After Bitcoin's meteoric price jump in 2017, major tech players have begun to take cryptocurrencies seriously.
10. Companies have applied the technology to everything, from simplifying tracking and access to information in academia to interesting and amusing games that use complex algorithms to create unique experiences.

Exercise 4. **Переведите предложения, обращая внимание на случаи употребления *it* для введения дополнения, выраженного инфинитивом, герундиальным оборотом, придаточным предложением (после глаголов *to think, to consider, to make, to find*).**

1. He found it impossible to start the experiment without the famous professor.
2. He made it a point to reduce travel costs in the company.
3. He made it clear from the beginning that environmental issues are top priority for him.
4. The new method made it possible to get good results.
5. The cellular structure gives wood one of the most favourable strength-weight ratios of any material, and also makes it easier to cut, shape and process.
6. All the woodlands had been inventoried by 1956, which made it possible to compile the maps of forests.
7. His experiment made it possible to prove that gut bacteria are also very important for maintaining immunity.
8. He found it surprising to learn that bananas contain potassium, which makes them slightly radioactive.
9. He found it difficult to prove that water is capable of freezing and boiling at the same time.
10. Let's make it clear that a full head of hair on a human is capable of supporting 12 tonnes of weight.

СЛОЖНОЕ ДОПОЛНЕНИЕ
(Complex Object)

Оборот «объектный падеж с инфинитивом» (Objective with the Infinitive) в предложении является *сложным дополнением*. Этот оборот употребляется после глаголов, обозначающих:

- восприятие: to see, to hear, to watch, to notice, to feel, etc. (после этих глаголов частица to перед инфинитивом не ставится);
- желание: to want, to wish;
- предположение или уверенность: to expect, to consider, to think, to believe, to know, to suppose;
- приказание, просьбу или разрешение: to order, to ask for, to allow, to make, to let (после глаголов to make и to let частица to не ставится).

Exercise 5. **Переведите следующие предложения с английского языка на русский. Обратите особое внимание на перевод Complex Object.**

1. The Company made their employees take part in the experiment.
2. We know Samsung to put their Galaxy X tablets on display this year.
3. The world thinks Intel to announce their first dedicated graphics cards, hoping to snag some market share from Nvidia and AMD.
4. Customers suppose the next few years to feature cars that have integrated smart technology like map navigation, more sophisticated driver-assistance, and entertainment.
5. The engineer wanted his invention proposal to be put into operation as quickly as possible.
6. The laboratory workers watched the scientist proceed with his experiment.
7. Some people remembered Tsiolkovsky to teach them aerodynamics.
8. The ancient people believed the Sun to be moving round Earth.
9. Some scientists considered Mars to be covered with vegetation.
10. We think this experiment to be of great importance.

Самостоятельная работа

Task 1. **Составьте предложения. Обратите особое внимание на место дополнения в предложении.**

1. Long, involved, the plan, transportation, over, distances.
2. Work, can't endure, we, being disturbed, at.
3. Importance, attach, relations, we, with, scientists, widening, great, to, foreign.
4. The results, he, with, fully, said, they, satisfied, were, that.
5. Specialist, personal, needs, every, experience.
6. The project, thought, we, what, about, asked, the designer, us.
7. Proper, he, of, misunderstood, the, question, meaning.
8. Made, interesting, he, at, an, report, the conference.
9. Are making, the scientists, to solve, the food, great, problem, efforts.
10. Venomous, spiders, snakes, include, species, lizards, fish, and.

Task 2. **Из слов, данных в рамке, выберите подходящие предлоги и вставьте их в предложения для образования косвенных дополнений.**

in (2); for; to; from; about; without; on; with; at

1. Scientists succeeded ... developing means of obtaining synthetic rubber with properties similar to those of natural rubber.
2. The functions of a boring machine consist ... boring, turning, and drilling.
3. Corporations are increasingly looking forward ... pioneering new technologies to increase employee engagement and expand their market base.
4. The researcher was surprisingly clever ... finding new solutions.
5. How can I prevent her ... using this dangerous method?
6. After all I am personally responsible ... funding the project.
7. They positively insisted ... inspecting the instrument before using it.
8. Their mission had very little to do ... finding fault with the team.
9. He left the room ... explaining the reason.
10. What ... going there without invitation?

Task 3. **Преобразуйте данные ниже дополнительные придаточные предложения в предложения с объектным инфинитивным оборотом по образцу. Переведите полученные предложения на русский язык.**

Model: They know that steel is stronger than iron. — They know steel to be stronger than iron.

1. Scientists consider that Neptune, Uranus, Jupiter, and Saturn produce diamonds.
2. A group of researchers believes that Saturn can turn carbon atoms into diamonds to produce 2.2 million pounds of diamonds every year.
3. Scientists know that solar flares release the energy which is the equivalent of 100-megaton atomic bombs exploding at once.
4. Scientists suppose that the human body consists of 39 trillion bacteria and 30 trillion human cells.

5. Scholars think that about 96 per cent of the Universe is made up of dark matter and dark energy, which are undetectable to humans.
6. We all know that rockets are fast, and space is big, and it takes us eight months to get to Mars.
7. Scientists proved that the Moon has only 1% of the mass of Earth.
8. Scientists expect that the human brain takes in 11 million pieces of information every second, but is aware of only 40.
9. Scholars suppose that sunflowers don't just produce delicious seeds and beautiful flowers, they can also be helpful with cleaning up radioactive waste.
10. Scientists believe that the potato has more chromosomes than a human being.

ОПРЕДЕЛЕНИЕ (The Attribute)

Exercise 1. **Изучите способы выражения определения в английском языке по таблице.**

Таблица 4.4

Способы выражения определения

Определение	Место в предложении	Пример	Перевод
Существительное	В конструкции Noun + Noun	*wood* furniture; *steel office* furniture	деревянная мебель; стальная офисная мебель
Прилагательное	В сочетании Adj. + Noun	*atomic* power	ядерная энергия
Местоимение: — притяжательное; — указательное; — неопределенное	В сочетании Pron. + Noun	*their* capabilities; *this* information; *some* time	их возможности; эта информация; какое-то время

Окончание табл. 4.4

Определение	**Место в предложении**	**Пример**	**Перевод**
Числительное: — количественное; — порядковое	В сочетании Numeral + Noun	*three* generations; the *first* application	три поколения; первый способ применения
Причастие	До определяемого существительного	the *leading* countries	ведущие страны
Причастный оборот	После определяемого существительного	The engineers *constructing* the gas pipe-line came across many difficulties.	Инженеры, строящие газопровод, столкнулись с многочисленными трудностями.
Герундий	После существительных с предлогами *of, for*	A sleeping car is a car with places *for sleeping.*	Спальный вагон — это вагон со спальными местами.
Инфинитив	Всегда после определяемого существительного	A clock is an instrument *to show* the time. Leonov is the first cosmonaut *to step* out of the cabin into space. Plastics are a material *to be* widely *used* in industry.	Часы — это механизм, который показывает время. Леонов — первый космонавт, который вышел в открытый космос. Пластмасса — материал, который широко применяется в промышленности.
Придаточное предложение	После определяемого существительного (после союзов *that, which*)	The device *which is used for mixing fuel and air* is called the carburetor.	Устройство, которое используется для смешения топлива и воздуха, называется карбюратором.

Exercise 2. **Найдите в предложениях определения. Определите, какой частью речи они выражены. Переведите предложения на русский язык.**

1. A super-efficient car will have an electric motor.
2. The internal combustion engine is used in cars and diesels of a new type.
3. Machines for calculating fixed numerical tasks such as the abacus have existed since antiquity.
4. Wilhelm Schickard designed and constructed the first working mechanical calculator in 1623.
5. Before Faraday's inventions in the field of electricity and magnetism, the only source of electricity that was used was the galvanic battery.
6. Recycling is one of the main ways of helping the environment.
7. Batteries are an easy way to give electricity to many things in our life, from cars to mobile phones and children's toys.
8. Transistors are the building blocks of the microprocessor which is the brain of the computer.
9. The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites.
10. The market for laser systems represents around 2,5% of the world machine tool market.

Exercise 3. **Сделайте следующие определительные предложения бессоюзными (в первом и втором предложениях определительные конструкции выделены курсивом). Переведите предложения на русский язык.**

1. The only information *that computers understand* are electrical signals that are switched on and off.
2. Microprocessors are essential to many of the products *that we use* every day.
3. The possibilities that this product offers both sportspeople and the general public are astonishing.
4. Although humans still need to feed the AI with information, the machine in this experiment was able to create a new, abstract theory independently — a huge step towards the development of a conscious computer, and potentially a landmark step in the way that we carry out research.

5. A team at Binghamton University, New York, looked at the way in which volunteers' brain signals changed as they read a list of acronyms.
6. By 2050, 80% of all people will be living in cities, and most food which they eat in urban areas will be brought in.
7. There are two things which the majority of people in the Western world own: a refrigerator and a mobile phone.
8. Smartphones, cloud computing, multi-touch tablets, these are all innovations that revolutionized the way that we live and work.
9. Parallella is going to change the way that computers are made.
10. Developments on the current state of electricity that we know today started back in the 17th century with several discoveries like differentiation between negative and positive current, electrostatic generators and identification insulators and conductors.

Exercise 4. Переведите определительные придаточные предложения с английского языка на русский. Найдите предложения, в которых слово *which* относится ко всему предложению и переводится придаточным предложением с союзом *что*.

1. Google is slowly trying to solve the problem using helium balloons to beam the Internet to inaccessible areas while Facebook has abandoned plans to do the same using drones, which means companies like Hiber are stealing a march.
2. Algorithms process the data to accurately detect irregular heartbeats such as arrhythmia heart beats, which could prove life saving.
3. Shoppers are guided by "use by" and "best before" dates on food packaging, which are kept unchanged because they are driven by shops' desire to avoid legal action.
4. The units of a single Smart Floating Farm are designed to bolt together, which is handy since we'll need a lot of them.
5. Artificial intelligence, which once may have seemed like something out of a Sci-Fi novel, is seeing the light and applications of the technology are already being worked on.
6. In the 1990s, the U.S. Department of Transportation sponsored the National Automated Highway System Consortium (NAHSC), which successfully demonstrated the potential of radar, magnetic

and visual sensors that allowed test vehicles to navigate a specially prepared length of highway.

7. The average raindrop contains from 500,000 nanogrammes to 70,000,000 nanogrammes of vitamin B_{12}, which is an insignificant amount.
8. Astronauts have a pretty dull diet because of limited space. They are restricted to 3.8 pounds of food a day which is pre-processed and then made ready to eat by adding water or heating.
9. Time crystals which scientists created in a lab are structures that repeat periodically in time rather than space, potentially defying the laws of physics.
10. When electricity gathers in one place it is known as static electricity, which means that it doesn't move.

Придаточные предложения, вводимые союзом *that*

Типы предложений:

- дополнительное придаточное предложение (отвечает на вопросы косвенных падежей);
- определительное придаточное предложение (отвечает на вопрос *какой?*).

Exercise 5. **Переведите следующие предложения. Обратите особое внимание на тип придаточного предложения, вводимого союзом *that*.**

1. This prediction is based on our understanding that Earth is an integral system.
2. Some experts consider that it is practically impossible to protect big cities from pollution.
3. The generator replaced the batteries and other devices that had been used before.
4. Most people living in towns consider it a usual thing that streets are lit at night.
5. Scientists are confident that planned actions of all countries can eliminate pollution.
6. It is known that natural changes in climate may have more catastrophic effects than human activity.
7. It is considered that the development of the induction motor has become the most important technical achievement.

8. On a tiny silicon chip there are millions of switches and pathways that help computers make important decisions and perform various tasks.

9. Materials that do not allow electrical current to flow through them are called insulators.

10. Experts estimate that within a few coming years industrial production of various materials will be started in space.

Exercise 6. **Замените следующие инфинитивные обороты придаточными предложениями с союзом *who*, *which* или *that*.**

Model: Russia was *the first country to launch* Luna 2, the first spacecraft, to successfully reach the Moon. — Russia was the first country *that* launched Luna 2.

1. Alessandro Volta, a renowned Italian physicist, was the first to discover that electricity can be produced by several chemical reactions and build an electric battery known as the voltaic pile.
2. Volta became the first person to successfully create steady flow of electrical charge (not considering ancient times because it is really difficult to say whether those ancient people succeeded in doing what Volta did).
3. Edison was the first to use his direct current system for illuminating the first street lamps of New York in September 1882.
4. Nicholas Copernicus was the first to publish his theory that the Sun is a motionless body at the centre of the solar system, with the planets revolving around it.
5. Isaac Newton, an English mathematician and physicist, was the first to figure out that gravity is the force that draws objects toward each other in 1664.
6. Michael Faraday became the first person to produce an electric current by moving a wire through a magnetic field.
7. Charles Darwin, a British naturalist, was the first to say that all organisms evolve, or change, very slowly over time, and these changes are adaptations that allow a species to survive in its environment.

8. A French chemist Louis Pasteur was the first to notice that bacteria could be killed by heat and disinfectant which in fact caused doctors to wash their hands and sterilize their instruments to save millions of lives.
9. Luc Montagnier of France and Robert Gallo of the United States were the first people to determine that the HIV virus was the cause of AIDS in 1983 and 1984.
10. A Russian chemist Dmitry Mendeleev was the first to notice that, when arranged by atomic weight, the chemical elements lined up to form groups with similar properties.

Самостоятельная работа

Task 1. **Переведите данные двучленные и многочленные словосочетания. Распределите их в четыре колонки в зависимости от того, как переводится существительное в функции определения: 1) прилагательным; 2) существительным в родительном падеже; 3) существительным с предлогом; 4) причастным оборотом.**

power consumption, development plan, consumption fund, construction work, time contract, energy reduction, unemployment rate, service sector, market conditions, space research laboratories, space exploration programme

Task 2. **Найдите в каждом предложении определения и укажите, какой частью речи они выражены. Переведите словосочетания с существительным в функции определения на русский язык.**

1. New electronic components are developed for automatic machinery and computers.
2. It is very important to create a reliable and "intelligent" robot.
3. These robots release people from arduous and hazardous work.
4. The world's population is suffering from increasing environmental pollution.
5. The chairman spoke of the problems faced by space industry.
6. The assortment of polymer materials manufactured by our industry is growing every year.

7. The experiments proved that many of the properties of the materials obtained under the zero-gravity condition were much better than those produced on Earth.
8. Sleepbuds have noise-masking technology designed to cover up sudden noises like dog barks or sirens.

Task 3. Вставьте пропущенные определения в предложения.

which Korolev called *Mechta* ("the Dream"); obtaining any amount of electric power; destroying some of their properties; resembling minerals in their properties; using solar energy; to think about spanning; combined with steel; mixed with crushed stone; establishing firm ties; which would propel Soviet spacecraft to the Moon

1. The primitive man used clay ... in construction.
2. The introduction of aluminum, titanium, cobalt and other elements into the molecules of polymers can produce a material ... .
3. The problem of ... had been studied for several years before the scientists designed the world's first solar power station.
4. Aluminum ... formed a mixture called an alloy.
5. Contacts between scientists and production workers are the only sure and promising way of ... between science and industry.
6. In order to protect certain types of rubbers from the influence of ozone ..., wax is added to them and a protective coating develops on the article produced.
7. Solar energy promises to be the most valuable means for ... any point of the globe.
8. Kulibin was the first ... the river with an arched bridge.
9. In the 1950s, Sergey Korolev developed a massive and at the time almost unthinkably powerful rocket, the R-7, ...
10. In January 1959, the spacecraft Luna 1 ... was launched at the Moon, but missed by around 3,700 miles and went into orbit between the Sun and Mars.

ОБСТОЯТЕЛЬСТВО
(The Adverbial Modifier)

Exercise 1. Изучите способы выражения обстоятельства в английском языке по таблице.

Таблица 4.5

Способы выражения обстоятельства

Обстоятельство	Место в предложении	Пример	Перевод
Наречие	В начале предложения в целях эмфазы или противопоставления;	*This year*, they have applied a new method of research.	В этом году они применили новый метод.
	в середине предложения;	He *often* works in the laboratory.	Он часто работает в лаборатории.
	в конце предложения	She works *hard*.	Она много работает.
Существительное с предлогом	В начале или в конце предложения	Prof. Petrov teaches chemistry *at the University*.	Профессор Петров преподает химию в университете.
Инфинитив (обстоятельство цели)		Tomorrow, he will go to the clinic *to be x-rayed*.	Завтра он пойдет в поликлинику, чтобы сделать рентгеновский снимок.
		To understand the text, you must know all new words.	Чтобы понять текст, вы должны знать все новые слова.
Зависимый причастный оборот (с причастием I и причастием II)	В начале или в конце предложения; иногда уточняется союзами: *when, while, if, as, although*.	(*When*) *reading* some interesting article, I always make notes.	Читая интересную статью, я всегда делаю пометки.
		Based on a deep analysis, the report was of great value.	Основанный на глубоком анализе, доклад представлял большую ценность.

Обстоятельство	Место в предложении	Пример	Перевод
Независимый причастный оборот: 1) обстоятельство времени; 2) обстоятельство причины; 3) сопутствующее обстоятельство	В начале или в конце предложения	1) The *value* of the damaged goods *having been calculated*, they found that the loss amounted to 150 pounds. 2) The country's *population being* a little more than 2 million and purchasing power low, the market is limited. 3) Agricultural products are 50% of the import, the biggest *items being* grain, oils, and sugar.	1) После того как была подсчитана стоимость испорченных товаров, выяснилось, что потери составляют 150 фунтов. 2) Так как население страны составляет немногим более двух миллионов, а покупательская способность низкая, рынок невелик. 3) На сельскохозяйственные продукты приходится 50% всего импорта, причем это в основном зерно, масло и сахар.
Герундий	В начале или в конце предложения (всегда с предлогом)	*By concentrating* sunrays on some object, we can light it. The TU representative's repost revealed the impossibility of planning *without having* control of the major companies in the country.	Сконцентрировав солнечные лучи на каком-либо объекте, мы можем зажечь его. Доклад представителя профсоюза показал невозможность планирования при отсутствии контроля над крупнейшими компаниями в стране.

Exercise 2. **Укажите, какой частью речи выражены обстоятельства в данных предложениях.**

1. To better understand the physiology of organisms, researchers study the tissues and organs of which organisms are composed.
2. Prior to Carl Linnaeus, most taxonomists started their classification systems by dividing all the known organisms into large groups and then subdividing them into progressively smaller groups.
3. In order to reconcile his scientific findings with his personal religious beliefs, George Cuvier postulated a series of catastrophic events that could account for both the presence of fossils and the immutability of existing species.
4. By isolating various species of bacteria and yeasts in different chemical media, Louis Pasteur was able to demonstrate that they brought about chemical change in a characteristic and predictable way, thus making a unique contribution to the study of fermentation and to biochemistry.
5. To account for the large number of observed hereditary characters, Theodor Heirich Boveri suggested that each chromosome in a pair can exchange the hereditary factors it carries with those of the other chromosome.
6. Likewise, anthropologists and archaeologists apply knowledge of human culture and society to biological findings in order to more fully understand humankind.
7. In 1945, IBM founded the Watson Scientific Computing Laboratory at Columbia University in New York City.
8. GPS receivers take the information and use triangulation to calculate the user's exact location.
9. Many well-known processes go on differently due to the absence of weight.
10. Using brains from animals killed for food, researchers have now restored some cellular functions in pig brains hours after death, potentially offering a new avenue for studying and treating brain diseases and disorders.
11. A shorter working week could even reduce global carbon emissions, with fewer commuters clogging the roads on certain days.

Exercise 3. **Переведите следующие предложения. Обратите особое внимание на перевод придаточных предложений, вводимых союзом *as*.**

Значения союза as:
1) по мере того как; когда
2) поскольку; так как
3) как

1. During the 1940s, as new and more powerful computing machines were developed, the term computer came to refer to the machines rather than their human predecessors.
2. As the population of large cities like London, Birmingham and Manchester continues to grow, pollution problems become worse.
3. Electricity has replaced other sources of energy as it offers improved service and reduced cost.
4. As the media and communication sector is becoming more diverse and dynamic, careers in the field of media and communication studies are growing in popularity.
5. Educational software and applications are becoming more "adaptive" as they rely on modern technology.
6. As the pulses travel through the electric circuits of the microchip, their rate is gradually halved.
7. Advanced users hope that the project's production is launched as soon as possible.
8. Water Walker & Spa looks like a huge bathtub and has a moving surface at the bottom for walking or running. It's the perfect machine for those recovering from an injury as it reduces the amount of pressure put on the body during cardio.
9. As soon as you insert these tiny headphones into your ears, they start automatic translation to the language chosen by you without connecting to the Web.
10. Wearable sports bands that measure your heart rate are nothing new, but as numerous studies have shown, the accuracy can vary wildly (especially if you rely on them to count calories).

Функции союза *since*

Союз *since* вводит:
1) придаточное времени;
2) придаточное причины.

Exercise 4. **Прочтите предложения. Определите функции слова *since*. Переведите предложения на русский язык.**

1. Since sound is made up of pressure waves, it can be used to disrupt the air surrounding a fire, essentially cutting off the supply of oxygen to the fuel.
2. Since food decays at the same rate as any protein-based food within, "Bump Mark" label is far more accurate than printed dates.
3. Since seahorses don't have stomachs, they have to eat often. They just have intestines which quickly absorb and process their food.
4. Since they were all dressed up, she assumed they were going to the presentation together.
5. Since each wagon had three teams of horses, the journey could become time consuming — and time was their enemy.
6. Ever since we had agriculture, people have been employing technology to make it better.
7. Since then, the changes have become more about intellectual property and technique.
8. Since rice is relied upon by so much of the world's poor, efforts here really can save lives.
9. I feel that I cannot vanish, since nothing vanishes in this world, but that I shall always exist and always have existed.
10. For the active and health-conscious person, a restaurant is a great benefit since eating heavy, fatty foods can make it difficult for your body to handle strenuous activity.

Самостоятельная работа

Task 1. **Найдите обстоятельства в предложениях. Укажите их тип (причины, времени, образа действия, сопутствующее обстоятельство) и способ выражения. Переведите предложения на русский язык.**

1. At the right frequency, the fire simply dies out, as researchers at George Mason University in Virginia recently demonstrated with their sonic extinguisher.
2. The US National Highway Traffic Safety Administration has developed devices that can monitor alcohol levels by sniffing a driver's breath or scanning the blood in their fingertips via the steering wheel.

3. Originally developed for blind people, it's a label that starts out smooth to the touch but gets bumpier as food decays.
4. A Russian scientist Sergey Zimov hopes to recreate a 12,000-year-old environment in a wildlife park for herbivores like wild horse and bison, with extinct megafauna like mammoths replaced by modern hybrids.
5. Startups and multinational companies alike are beginning to feel the ripple effects of innovation in the industry, with technology becoming more intertwined in everyday lives each year.
6. As 2019 progresses, here are 5 future technologies you can expect to reach the public in the next couple of years.
7. With all the current progress of AI technology, it is reasonable to expect that by the year 2020 the innovation will be deeply entrenched in both business and consumer activities.
8. Within the next five years, the world's population will hit the 8 billion mark, with one billion of them not having adequate access to the food supplies necessary for a healthy life.
9. A new level of self-training allows robots to draw their own conclusions and make deductions that haven't been hard-coded into them, so that when looking at large volumes of data they can point out things that humans would probably have missed.
10. It would take you 21 minutes to "fall" to the Earth's centre, with gravity causing you to accelerate.

Герундий и причастие I в функции обстоятельства

Герундий всегда употребляется с предлогами *by, instead of, beyond, apart from, due to.*

Причастие I обычно употребляется без предлога, но может употребляться с союзами *when* и *while.*

Task 2. Переведите данные предложения. Обратите особое внимание на перевод герундия и причастия I в функции обстоятельства.

1. It is possible to hypnotize a frog by placing it on its back and gently stroking its stomach.
2. Bats always turn left when leaving a cave.
3. Around 50% of orangutans have fractured bones due to falling out of trees on a regular basis.

4. Beyond lighting rooms and powering devices, electricity can do a lot more things.
5. If a bird sitting on one power line touched the other one with a wing or a foot, it creates a circuit causing electricity to flow through its body.
6. Benjamin Franklin carried out extensive electricity research in the 18th century inventing the lightning rod.
7. Why do you get a shock when walking across carpet and touching something metallic?
8. An electric current is a flow of electric charge. In electric circuits this charge is often carried by moving electrons in a wire.
9. That little spark you sometimes see when you pull towels apart after removing them from the dryer is an electron hopping through the air.
10. Ocean thermal energy conversion is a technology that was invented at the end of the 19th century. It has the potential to satisfy twice the global electricity demand without affecting the temperature of the ocean or the world's environment.

Союзы *when* и *where*

Союзы *when* и *where* вводят придаточные предложения:
1) определительные (отвечают на вопрос *какой?*);
2) обстоятельственные (отвечают на вопросы *когда? где?*);
3) дополнительные (отвечают на вопрос *что?*).

Task 3. Найдите в следующих предложениях обстоятельственные придаточные предложения. Обратите особое внимание на значение союза.

1. Your brain is sometimes more active when you're asleep than when you're awake.
2. When an electric charge builds up on the surface of an object, it makes static electricity.
3. To ensure electricity is available when we want it, the power companies are always making it in huge amounts.
4. The electricity that is created is then sent on huge wires to homes, schools, stores, factories, and any other place where power is needed.

5. Electricity is made in different ways depending on the resources available in the location. It is usually created where rivers are plentiful.
6. When electricity makes a complete circle, the circuit is called "closed".
7. Huge amounts of renewable energy can be stored over a long period of time by using Pumped Storage Hydropower where water is pumped up a hill with renewable electricity, then sent back down the hill to generate on demand clean electricity at up to 80% efficiency.
8. The element Selenium conducts electricity only when a light is shined on it. In the dark, it is an insulator.
9. There is a pedal powered cinema in which one person on a cycle can generate enough power to show a film to an audience of hundreds. It is used in schools in Africa where they do not have electricity.
10. They noticed that when amber and fur are rubbed together, they attract each other.

APPENDIX

FAMOUS SCHOLARS AND THEIR CONTRIBUTION TO SCIENCE AND TECHNOLOGY

Alferov, Zhores Ivanovich (1930-2019) — a Soviet and Russian physicist and academician who contributed to the creation of modern heterostructure physics and electronics. He is the inventor of the heterotransistor and the winner of 2000 Nobel Prize in Physics.

Ambartsumian, Victor Amizaspovich (1908-1996) — a Soviet Armenian scientist, one of the founders of theoretical astrophysics who worked in the field of physics of stars and nebulae, stellar astronomy, dynamics of stellar systems, and cosmogony of stars and galaxies and contributed to mathematical physics.

Babbage, Charles (1791-1871) — an English mathematician, philosopher, inventor, and mechanical engineer. Babbage devised the concept of a digital programmable computer.

Bacon, Francis (1909-1992) an English philosopher, the developer of the scientific method. His practical ideas are still central in debates about science and methodology today.

Bell, Alexander (1847-1922) — a Scottish-born scientist, inventor, engineer, and innovator who invented and patented the first practical telephone.

Bíró, László József (1899-1985) — a Hungarian-Argentinian inventor who patented the first commercially successful modern ballpoint pen.

Blake, Lyman Reed (1835-1883) — an American inventor who devised a sewing machine for shoemaking.

Bohr, Niels (1885-1962) a Danish physicist, a philosopher and a promoter of scientific research who made foundational contributions to understanding atomic structure and quantum theory, for which he received the Nobel Prize in Physics in 1922.

Boyl, Robert (1627-1691) an Anglo-Irish natural philosopher, chemist, physicist, and inventor, one of the pioneers of modern experimental scientific method. He is best known for Boyle's law.

Bridgman, Percy Williams (1882-1961) – an American experimental physicist noted for his studies of materials at high temperatures and pressures. For his work he was awarded the Nobel Prize for Physics in 1946.

Einstein, Albert (1879-1955) a German-born theoretical physicist who developed the theory of relativity. He received the 1921 Nobel Prize in Physics for his services to theoretical physics and especially for his discovery of the law of the photoelectric effect.

Engelbart, Doug (1925-2013) – an American engineer and inventor, and an early computer and Internet pioneer.

Eyring, Henry (1901-1981) – a Mexican-born American theoretical chemist whose primary contribution was in the study of chemical reaction rates and intermediates.

Faraday, Michael (1791-1867) – a British scientist who contributed to the study of electromagnetism and electrochemistry. His main discoveries include the principles underlying electromagnetic induction, diamagnetism and electrolysis.

Farnsworth, Philo Tayor (1906-1971) – an American inventor and television pioneer. He is known for the first fully functional and complete all-electronic television system.

Faynman, Richard (1918-1988) – an American theoretical physicist known for his work in quantum mechanics, particle physics, and the physics of the superfluidity of supercooled liquid helium.

Galilei, Galileo (1564-1642) – an Italian astronomer, physicist, and engineer. He is called the "father of observational astronomy", the "father of modern physics", the "father of the scientific method", and the "father of modern science".

Geim, Andre (1958-) – a Soviet-born Dutch-British physicist working in the School of Physics and Astronomy at the University of Manchester and awarded the 2010 Nobel Prize in Physics jointly with Konstantin Novoselov for his work on graphene.

Hall, Frank Haven (1841-1911) – an American inventor who invented the Hall Braille writer and the stereographer machine.

Herodotus (484-425 B.C.) – an ancient Greek historian. He was the first writer to have treated historical subjects using a method of systematic investigation. He collected his materials and then critically arranged them into a historiographic narrative. He is known as "The Father of History".

Jobs, Steve (1955-2011) – an American business magnate and investor. He was the chairman, chief executive officer, and co-founder of Apple Inc. He is widely recognized as a pioneer of the microcomputer

revolution of the 1970s and 1980s, along with Apple co-founder Steve Wozniak.

Newton, Isaac (1642-1726/27) an English mathematician, theologian, and physicist. He laid the foundations of classical mechanics, made contributions to optics and shared credit with Gottfried Wilhelm Leibniz for developing the infinitesimal calculus.

Malthus, Thomas Robert (1766-1834) — an English scholar, influential in the fields of political economy and demography.

Marston, William Moulton (1893-1947) — an American psychologist, the inventor of an early prototype of the lie detector.

Morse, Samuel Finley Breese (1791-1872) — an American painter and inventor. He contributed to the invention of a single-wire telegraph system based on European telegraphs. He is best known for the Morse code and developing the commercial use of telegraphy.

Ørsted, Hans Christian (1777-1851) — a Danish physicist and chemist who discovered that electric currents created magnetic fields, which was the first connection between electricity and magnetism.

Otis, Elisha Graves (1811-1861) — an American industrialist, the inventor of a safety device that prevents elevators from falling.

Pascal, Blaise (1623-1662) a French mathematician, physicist, inventor. His earliest work was in the natural and applied sciences where he made important contributions to the study of fluids and clarified the concepts of pressure and vacuum by generalizing the work of Evangelista Torricelli.

Plank, Max (1858-1947) a German theoretical physicist and the originator of quantum theory which revolutionized human understanding of atomic and subatomic processes and won him the Nobel Prize in Physics in 1918.

Rutherford, Ernest (1871-1937) — a New Zealand-born British scientist who won the Nobel Prize in Chemistry in 1908 for his work on nuclear physics and for the theory of the structure of the atom.

Sholes, Christopher Lathan (1819-1890) — an American inventor who invented the QWERTY keyboard. He is one of the inventors of the first typewriter in the United States.

Spencer, Percy (1894-1970) — an American physicist and inventor of the microwave oven.

Vedaldi, Andrea — Associate Professor in Engineering Science at the University of Oxford whose research focuses on computer vision methods.

Zimov, Sergey Afanasyevich (1955-) — a Russian geophysicist, the most cited earth scientist. In 1991, he was awarded the Wolf Vishniac Award at the 10th International Symposium on Environmental Biogeochemistry.

Zuckerberg, Mark Elliot (1984-) — an American technology entrepreneur and philanthropist. He is known for co-founding and leading Facebook as its chairman and chief executive officer.

LIST OF ABBREVIATIONS

3D — 3-dimensional (трехмерный)

B.C. before the Christ (до рождества Христова)

BCE before the Common Era (до нашей эры)

CD compact disc (компакт-диск)

CO_2 — carbon dioxide (углекислый газ)

DNA — deoxyribonucleic acid (ДНК)

eBook — electronic book (электронная книга)

ft — foot, an equivalent of 0.3048 metres (фут — мера длины, равная 0,3048 м)

GB — gigabyte (гигабайт)

GPS — Global Positioning System (глобальная система позиционирования / система навигации)

GST — $Ge_2Sb_2Te_5$, germanium-antimony-tellurium (материал с фазовым переходом)

IBM — International Business Machines (компания по производству ЭВМ)

Inc. — incorporated (акционерное общество)

IoT — Internet of Things (Интернет вещей)

Lb. — pound *or* pound-mass (фунт — мера веса, равная 0,45359 кг)

LED — light emitting diode (светоизлучающий диод, СИД)

m, ml, mi. — mile, the equivalent of 1.609.344 metres (миля — мера длины, равная 1609,344 м)

Sci-Fi — science fiction (научная фантастика)

STM — system test mode (режим испытаний на уровне системы)

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