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Introduction

Nowadays it is impossible to imagine our life without science and technology. Much attention is paid to scientific development at the level of higher education. The English language proved to be the main means of communication in the field of research, development and science. That is why graduate and postgraduate students have to understand the bulk of information that is provided in English.

This textbook can be regarded a guide to reading scientific and popular scientific texts in various fields, about the greatest inventions and researchers of the past and present as well as about perspectives of scientific development.

The textbook consists of 5 units:

1. What Is Science?
2. Evolution of Science
3. Knowledge Society
4. Perspectives of Science Development
5. Science in Our Everyday Life

Each unit contains 26 tasks (from A to Z) providing brainstorming activities, reading comprehension, vocabulary work, creative and interactive tasks, tips for graduates and postgraduates about presentations, thesis writing, communication skills needed in the field of their research as well as tasks for development of skills of speaking and writing in English. The texts are selected in the way as to make all graduates and postgraduates be interested in the topics discussed, irrespective of their specialty and qualification.

All texts are accompanied by references of and links to the resources they are taken from. Both varieties of English are used: British and American. After the units there is a section with some additional texts that can be used during the classes of English.

In Appendices one can find some useful information about sciences that exist at present with the detailed definition, abbreviations of college degrees and academic and scientific titles (the US and European use).

The book will be quite useful in preparatory course for passing postgraduate exam in English.

The authors of the textbook would like to express their sincere gratitude to all those who helped them find interesting and useful information as well as to those who will use this book for their studies of English. We hope it will be very useful and we wish graduates and postgraduates all possible success in their researches, theses and scientific careers.

UNIT 1

What is Science?

A. Read the following quotations about science and express your own opinion about science in general and about your field of science.

1. The origin of all science is in the desire to know causes; and the origin of all false science and imposture is in the desire to accept false causes rather than none; or, which is the same thing, in the unwillingness to acknowledge our own ignorance. (***William Hazlitt*** from ***The Atlas***)
2. Science sometimes builds new bridges between universes of discourse and experience hitherto regarded as separate and heterogeneous. But science also breaks down old bridges and opens gulfs between universes that, traditionally, had been connected. (***Aldous Huxley*** from ***Literature and Science***)
3. Let both sides seek to invoke the wonders of science instead of its terrors. Together let us explore the stars, conquer the deserts, eradicate disease, tap the ocean depths and encourage the arts and commerce. (***John F. Kennedy*** from ***Inaugural Address***)
3. When we say "science" we can either mean any manipulation of the inventive and organizing power of the human intellect: or we can mean such an extremely different thing as the *religion of science,* the vulgarized derivative from this pure activity manipulated by a sort of priestcraft into a great religious and political weapon. (***Wyndham Lewis*** from ***The Art of Being Ruled***)
4. Science does not aim, primarily, at high probabilities. It aims at a high informative content, well backed by experience. But a hypothesis may be very probable simply because it tells us nothing, or very little.

(***Karl R. Popper*** from ***The Logic of Scientific Discovery***)

B. Write down 5—10 sentences expressing your ideas about science.

C. Read the definitions of "science" and choose the one, which suits best to your ideas about science from exercise B.

№	Definition	Source
1.	1) the systematic study of the nature and behaviour of the material and physical universe, based on observation, experiment, and measurement, and the formulation of laws to describe these facts in general terms; 2) the knowledge so obtained or the practice of obtaining it; 3) any particular branch of this knowledge the pure and applied sciences; 4) any body of knowledge organized in a systematic manner; 5) skill or technique; 6) *(archaic)* knowledge	*Collins English Dictionary, 8th Edition*
2.	Any system of knowledge that is concerned with the physical world and its phenomena and that entails unbiased observations and systematic experimentation. In general, a science involves a pursuit of knowledge covering general truths or the operations of fundamental laws.	*Britannica*
3.	Science is the study of the nature and behaviour of natural things and the knowledge that we obtain about them.	*Collins COBUILD Advanced Learner's English Dictionary, 4th edition*

Таблица (окончание)

№	Definition	Source
4.	A branch of study in which facts are observed and classified, and, usually, quantitative laws are formulated and verified; involves the application of mathematical reasoning and data analysis to natural phenomena.	*McGraw-Hill Dictionary of Scientific and Technical Terms*
5.	1) a branch of knowledge conducted on objective principles involving the systematized observation of and experiment with phenomena, esp. concerned with the material and functions of the physical universe; 2) (a) systematic and formulated knowledge, esp. of a specified type or on a specified subject (political science); (b) the pursuit or principles of this; 3) an organized body of knowledge on a subject (the science of philology); 4) skilful technique rather than strength or natural ability; 5) *(archaic)* knowledge of any kind.	*Oxford English Reference*
6.	Knowledge about the world, especially based on examination and testing, and on facts that can be proved	*Longman Dictionary of Contemporary English, 3rd edition*

D. Read the following text.

What is Science?

To understand what science is, just look around you. What do you see? Perhaps, your hand on the mouse, a computer screen,

papers, ballpoint pens, the family cat, the sun shining through the window ... Science is, in one sense, our knowledge of all that — all the stuff that is in the universe: from the tiniest subatomic particles in a single atom of the metal in your computer's circuits, to the nuclear reactions that formed the immense ball of gas that is our sun, to the complex chemical interactions and electrical fluctuations within your own body that allow you to read and understand these words. But just as importantly, science is also a reliable process by which we learn about all that stuff in the universe. However, science is different from many other ways of learning because of the way it is done. Science relies on testing ideas with evidence gathered from the natural world. This website will help you learn more about science as a process of learning about the natural world and access the parts of science that affect your life.

Science helps satisfy the natural curiosity with which we are all born: why is the sky blue, how did the leopard get its spots, what is a solar eclipse? With science, we can answer such questions without resorting to magical explanations. And science can lead to technological advances, as well as helping us learn about enormously important and useful topics, such as our health, the environment, and natural hazards. Without science, the modern world would not be modern at all, and we still have much to learn. Millions of scientists all over the world are working to solve different parts of the puzzle of how the universe works, peering into its nooks and crannies, deploying their microscopes, telescopes, and other tools to unravel its secrets.

Science is complex and multi-faceted, but the most important characteristics of science are straightforward:

- Science focuses exclusively on the natural world, and does not deal with supernatural explanations.
- Science is a way of learning about what is in the natural world, how the natural world works, and how the natural world got to be the way it is. It is not simply a collection of facts; rather it is a path to understanding.

- Scientists work in many different ways, but all science relies on testing ideas by figuring out what expectations are generated by an idea and making observations to find out whether those expectations hold true.
- Accepted scientific ideas are reliable because they have been subjected to rigorous testing, but as new evidence is acquired and new perspectives emerge these ideas can be revised.
- Science is a community endeavor. It relies on a system of checks and balances, which helps ensure that science moves in the direction of greater accuracy and understanding. This system is facilitated by diversity within the scientific community, which offers a broad range of perspectives on scientific ideas.

To many, science may seem like an arcane, ivory-towered institution — but that impression is based on a misunderstanding of science. In fact:

- Science affects your life everyday in all sorts of different ways.
- Science can be fun and is accessible to everyone.
- You can apply an understanding of how science works to your everyday life.
- Anyone can become a scientist — of the amateur or professional variety.

The word "science" probably brings to mind many different pictures: a fat textbook, white lab coats and microscopes, an astronomer peering through a telescope, a naturalist in the rainforest, Einstein's equations scribbled on a chalkboard, the launch of the space shuttle, bubbling beakers ... All of those images reflect some aspect of science, but none of them provides a full picture because science has so many facets:

- **Science is both a body of knowledge and a process.** In school, science may sometimes seem like a collection of isolated and static facts listed in a textbook, but that's only a small part of the story. Just as importantly, science is also a process of discovery that allows us to link isolated facts into coherent and comprehensive understandings of the natural world.

- **Science is exciting.** Science is a way of discovering what's in the universe and how those things work today, how they worked in the past, and how they are likely to work in the future. Scientists are motivated by the thrill of seeing or figuring out something that no one has before.
- **Science is useful.** The knowledge generated by science is powerful and reliable. It can be used to develop new technologies, treat diseases, and deal with many other sorts of problems.
- **Science is ongoing.** Science is continually refining and expanding our knowledge of the universe, and as it does, it leads to new questions for future investigation. Science will never be "finished".
- **Science is a global human endeavor.** People all over the world participate in the process of science.

(from ***Understanding Science: An Overview***)

E. Check your reading comprehension. Choose the best answer (only one variant is possible). What do the underlined words from exercise D mean?

1) ***stuff***
   (a) rubbish
   (b) substance
   (c) medicine
   (d) cloth

2) ***hazard***
   (a) chance
   (b) accident
   (c) venture
   (d) danger

3) ***rigorous***
   (a) strictly exact
   (b) severe
   (c) inflexible
   (d) harsh

4) ***accuracy***
   (a) neatness
   (b) ability
   (c) precision
   (d) stability

5) ***rainforest***
   (a) tropical wood
   (b) rainy zone
   (c) tropical climate
   (d) wet woodland

6) ***endeavor***
   (a) struggle
   (b) essay
   (c) aim
   (d) attempt

F. Match the words in the left column with their definitions in the right column.

1) ***atom***	a) continuing, or continuing to develop;
2) ***multi-faceted***	b) make it easier for a process or activity to happen;
3) ***amateur***	c) trust someone or something to do what you need or expect them to do;
4) ***ongoing***	d) practicing an art or occupation for the love of it, but not as a profession;
5) ***coherent***	e) exceeding of all ordinary bounds in size or amount or degree;
6) ***facilitate***	f) the smallest part of an element that can exist alone or combine with other substances to form molecules;
7) ***accessible***	g) easy to understand because the information is presented in an orderly and reasonable way;
8) ***enormously***	h) a statement in mathematics, showing that two quantities are equal;
9) ***rely***	i) having a variety of different and important features or elements;
10) ***equation***	j) easy to obtain or use, to understand and enjoy

G. Fill in the gaps in the sentences below with the words from the list.

model equip clear reinforce argument explicit operations distinguishable formulate theory

1. It is important that the cognitive skills involved in such activities be defined in a ... and rigorous enough way to make it possible to specify how they develop and how this development is best supported educationally.
2. Students, it is claimed, should be able to ... a question, design an investigation, analyze data, and draw conclusions.
3. Scientific thinking is more closely aligned with ... than with experiment and needs to be distinguished from scientific understanding (of any particular content).
4. Young children are especially insensitive to the distinction between ... and evidence when they are asked to justify simple knowledge claims.
5. Skilled scientific thinking always entails the coordination of theories and evidence, but coordination cannot occur unless the two are encoded and represented as ... entities.
6. The phases of scientific thinking themselves — inquiry, analysis, inference, and argument-require that the process of theory-evidence coordination become ... and intentional, in contrast to the implicit theory revision that occurs without awareness as young children's understandings come into contact with new evidence.
7. Research suggests that children lack a mental ... of multivariable causality that most inquiry learning assumes.
8. Educators want children to become skilled scientific thinkers because they believe that these skills will ... them for productive adult lives.
9. Social scaffolding (supporting) may assist less able collaborators to monitor and manage strategic ... in a way that they cannot yet do alone.
10. The two endeavors ... one another: understanding informs practice and practice enhances understanding.

H. Learn the following words and word combinations with 'science' and 'scientist'.

SCIENCE	• To advance science • To promote science • To foster science • Applied science • Basic science • Behavioral science • Domestic science • Information science • Library science • Linguistic science • Military science • Natural science • Naval science • Physical science • Political science • Popular science • Social science • Space science • An exact science
SCIENTIST	• a nuclear scientist • a political scientist • a social scientist

(Source: ***BBI Combinatory Dictionary of English*** by ***M. Benson, E. Benson, & R. Ilson***)

I. What is the difference between the following synonyms:

1) research
2) survey
3) exploration
4) examination
5) analysis
6) fact-finding
7) investigation
8) enquiry (inquiry)
9) study
10) discovery

J. Read the following text and make up a summary (3—5 sentences):

Teaching Science and Technology

As the twentieth century ended, it was clear that science and technology played significant roles in the lives of all people, including future employment and careers, the formulation of societal decisions, general problem solving and reasoning, and the increase of economic productivity. There is consensus that science and technology are central to living, working, leisure, international competitiveness, and resolution of personal and societal problems. Few would eliminate science from the curriculum and yet few would advance it as a curriculum organizer. The basic skills that characterize science and technology remain unknown for most.

As the twenty-first century emerges, many nations around the world are arguing for the merger of science and technology in schools. Unfortunately many are resisting such a merger, mostly because technology (e.g., manual training, industrial arts, vocational training) is often not seen as an area of study for college-bound students. Further, such courses are rarely parts of collegiate programs for preparing new teachers. Few see the ties between science and technology, whereas they often see ties between science and mathematics. Karen F. Zuga, writing in the 1996 book *Science / Technology / Society as Reform in Science Education,* outlined the reasons and rationale for and the problems with such a rejoining of science and technology. A brief review of what each entails is important.

Although science is often defined as the information found in textbooks for secondary school and college courses or the content outlined in state frameworks and standards, such definitions omit most essential features of science. Instead, they concentrate wholly on the products of science. Most agree with the facets of science proposed by George G. Simpson in a 1963 article published in the journal *Science.* These are:

1. Asking questions about the natural universe, that is, being curious about the objects and events in nature.

2. Trying to answer one's own questions, that is, proposing possible explanations.

3. Designing experiments to determine the validity of the explanations offered.

4. Collecting evidence from observations of nature, mathematical calculations, and, whenever possible, experiments that could be carried out to establish the validity of the original explanations.

5. Communicating evidence to others, who must agree with the interpretation of evidence in order for the explanation to become accepted by the broader community (of scientists).

Technology is defined as focusing on the human-made world — unlike science, which focuses on the natural world. Technology takes nature as it is understood and uses the information to produce effects and products that benefit humankind. Examples include such devices as light bulbs, refrigerators, automobiles, airplanes, nuclear reactors, and manufactured products of all sorts. The procedures for technology are much the same as they are for science. Scientists seek to determine the ways of nature; they have to take what they find. Technologists, on the other hand, know what they want when they begin to manipulate nature (using the ideas, laws, and procedures of science) to get the desired products.

Interestingly, the study of technology has always been seen as more interesting and useful than the study of science alone. Further, the public has often been more aware of and supportive of technological advances than those of basic science.

(from ***Encyclopedia of Education***)

K. Translate your summary of the text from exercise J into Russian.

L. Answer the following questions to the text from exercise J.

1. What is the role of science and technology?
2. Do the nations argue for the merger of science and technology in schools?