

Пояснительная записка

« Владение иностранным языком повышает уровень гуманитарного образования школьников, способствует формированию личности и ее социальной адаптации к условиям постоянно меняющегося поликультурного, полиязычного мира.»

(Примерные программы по иностранным языкам. Английский язык)

Изучая в 11ом классе тему «Открытия, которые потрясли мир», учитель со старшеклассниками обсуждает такие интересные проблемы, как использование научно – технических изобретений в современной жизни; правила эксплуатации различных приборов в быту; преимущества и недостатки высоко технологичной современной жизни в крупнейших городах мира. Многие учащиеся старших классов, имеющие достаточно широкий кругозор и высокий познавательный интерес, хотели бы получить как можно больше сведений и фактов о современных научных и культурных открытиях, которые являются высочайшими достижениями человеческого разума; узнать подробности из истории великих открытий; познакомиться с биографическими историями и судьбами их авторов. Безусловно, в учебнике есть материал, посвящённый некоторым величайшим открытиям, изобретениям, научным инновациям (3-й урок темы №7), но нельзя сбрасывать со счетов и проявление ученического интереса к теме исторического развития науки, истории жизни и открытий ярчайших её представителей, роли нашей страны и её достижений в мировых научных изысканиях. Кроме того, изучение вклада русских, советских, российских учёных во всемирный научный прогресс помогает воспитанию чувства патриотизма, гордости за свою Родину у подрастающего поколения, что, несомненно, является важным фактором формирования личности в современном обществе.

Создавая систему дополнительных материалов, учитель ставит такие цели как: развитие речевых навыков и умений учащихся путём овладения новыми лексическими единицами, грамматическими конструкциями, новой страноведческой информацией.

А так же развитие иноязычной коммуникативной компетенции учащихся в совокупности таких её составляющих как: речевая, языковая, социокультурная, учебно-познавательная компетенции учащихся.

Предлагаемые упражнения сформированы по различным видам речевой деятельности учеников от простых к более сложным: начиная с формирования произносительных и лексических навыков заканчивая развитием и совершенствованием навыков говорения.

Предлагаемые материалы могут быть использованы учителем как на уроке в форме выполнения отдельных упражнений (в дополнение к изучаемым темам учебника), так и во внеклассной работе (при подготовке тематических вечеров, встреч по интересам и т.п.). Кроме того, данные упражнения, принимая во внимание их обучающий характер, наличие ключей к упражнениям, высокую информативность, подбор фактического и иллюстративного материала, могут быть полезны и самим учащимся для самостоятельной работы с лексикой и грамматикой английского языка, а также и при подготовке докладов, рефератов, презентаций.

Большое внимание уделяется работе по введению новой лексики, которая способствует не только обогащению лексикона учащихся, но и в целом развивает их мышление и кругозор.

Эта работа тоже строится в определённой логике – от простого к сложному:

*введение новых слов;

*работа со словосочетаниями;

*конструирование предложений;

*работа с текстами: составление текста по данным предложениям; по данным микротемам и

т. д.

Part 1.

Lexical and grammar exercises.

1. A. Read the words and guess their meanings.

- | | |
|-----------------|------------------|
| 1. to invent | 10.to achieve |
| 2. to train | 11.to initiate |
| 3. to extend | 12.to bridge |
| 4. to bear | 13.to accelerate |
| 5. to enter | 14.to apply |
| 6. to introduce | 15.to innovate |
| 7. to reach out | 16.to explore |
| 8. to produce | |
| 9. to discover | |

- a. to create / to design something
- b. to give teaching / practice
- c. to enlarge, to make longer
- d. to give birth to something or somebody / to come into the world by birth
- e. to come or go into something / to become a member of / to begin or open something
- f. to bring in or forward / to bring into use or operation / to cause somebody to be acquainted with something
- g. to stretch out / to extend / to get to / to go as far as / to pass
- h. put or bring forward / to manufacture or make / to grow
- i. to find out / to get acknowledged / to bring to view / to realize
- j. to get done / to complete / to reach by effort / to do anything successfully
- k. to set working / to give somebody instructions / to give secret knowledge
- l. to join / to overcome
- m. to become faster / to cause to happen earlier / to increase the speed of...
- n. to ask for / to serve a purpose by doing something to concentrate one's thoughts / to make practical use
- o. to introduce new thing / to make changers / to put into practice
- p. to travel into or through (the country, etc.) for the purpose of learning about it / to examine thoroughly in order to test

1. B What words can you find in the crossword?

What does the longest word in the crossword mean?

1. to give teaching
2. to do anything successfully
3. to extend
4. to examine thoroughly in order to test
5. to make practical use
6. to create
7. to join
8. to come into the world by birth
9. to bring into use or operation
10. to begin or open something

The wanted word means ‘to increase the speed of...’.



2. A. Find the difference.

- 1) to invent
- 2) invention
- 3) inventor
- 4) inventress
- 5) inventive
- 6) inventiveness
- 7) inventory

B. Fill in the gaps using the words from part A.

1. I.Kurchatov was one of theof a cyclotron.
2. A. Popov ...the radio in 1895.
3. Russia is reach with ... people.
4. ... is a leading feature of people’s character.
5. M. Sklodowska-Curie from Poland got her popularity as anwho played an important role in nuclear research.
6. Writing was ... practically ten thousand years ago.
7. It’s useful to have a ... book.
8. In 1926 J. Baird from Scotland ... a TV set.

3. A. Match the English words and their Russian equivalents.

1. to invent [in'vent]
2. to devise [di'vaiz]
3. to contrive [kən'traiv]
4. to develop [di'veləp]

- А. придумать
 В.развивать
 С.изобретать
 Д.ухитриться

что-то сделать

B. Fill in the table.

Verb	Noun	Adjective / participle
To develop		
	A device	
		Applied
	A contrivance	

4. A. How many English equivalents to the Russian word «прибор» do you know?

- 1 - something thought out, invented or adapted
- 2 - a set of instruments or other mechanical appliances put together on purpose
- 3 – apparatus, used in performing an action
- 4 – an invention or mechanical device
- 5 –an instrument or apparatus
- 6 – an appliance or mechanical device with parts working together to apply power, often steam or electric power

- 7 – machine that converts energy into power or motion, or instrument
 8 – working parts of a machine, structure or arrangement of parts that work together
 9 - small mechanical contrivance or device

4. B. Find the words from the list in the crossword.

What word is not found?

r	e	m	g	t	i	o	a	u	i	k
t	r	a	a	n	a	s	p	f	d	b
y	y	c	d	e	p	y	p	d	e	n
b	d	h	g	m	p	q	a	d	v	h
x	h	i	e	u	l	j	r	f	i	h
c	o	n	t	r	i	v	a	n	c	e
s	a	e	w	t	a	o	t	b	e	s
g	j	y	f	s	n	j	u	v	a	f
h	j	a	i	n	c	s	s	x	f	p
k	a	w	j	i	e	n	g	i	n	e

4.C. Add the suitable noun to these adjectives.

Ex.1. scientific and technological ... **revolution**

2. complex cybernetic ...
3. nuclear ...
4. highly efficient producing ...
5. mighty power and nuclear ...
6. automatic production ...
7. major mineral ...
8. the law of ...

4.D. Add the suitable noun to these verbs.

to bear	<i>an invention</i>
to make	<i>space</i>
to introduce	<i>a discovery</i>
to enter	<i>to the other planet</i>
to reach out	<i>a machine</i>
to create	<i>nuclear energy work for the man</i>
to make	<i>our knowledge</i>
to extend	<i>the process of applying scientific innovation in industry</i>
to train	<i>the gap between theory and practice</i>
to bridge	<i>laser technology</i>
to accelerate	<i>highly efficient specialists</i>
to initiate	<i>a new idea</i>

5. Fill in the words from the box.

exploration, inventions, reached out, operate, discovered, created, achieved, put into operation

1. We can't imagine our life without modern
2. I don't think anybody would be surprised with space ... today.
3. Do you know who ... this construction?
4. Nobody knows how to ... his computer, he hasn't given us the code.
5. Columbus ... America, but he didn't explore the continent.
6. Let us see what mankind ... with the help of science.
7. Spaceships ... the orbits of other planets.
8. In 1954 the first atomic power station in the world was... .

6. Find the words in the chainword.

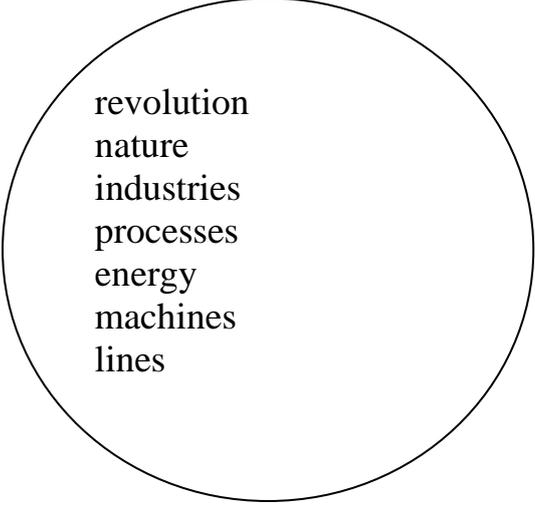
discoveradiope
lateexploratio
naturefficient
technological

7. Make words as many as possible.

de	plora
in	vice
ex	velop
dis	termine
re	volu
cover	construct
vent	dustri
tion	al

8. Make word combinations.

Laws of ...
Scientific and technological...
Complex cybernetic...
Nuclear...
Highly efficient producing ...
Mighty power and nuclear ...
Automobile production ...



revolution
nature
industries
processes
energy
machines
lines

9. Do you know these facts? Fill in the gaps with the necessary form of the verbs: to invent, to pioneer, to use, to know, to establish, to introduce.

1. In 1791 optical telegraphy (... ..) by Claud Chappe in France, it (... ..) as semaphore.
2. In 1832 a telegraph communication (... ..) in St. Petersburg by Pavel Shilling.
3. In 1839 an electric telegraph (... ..) by Charles Wheatstone.
4. In 1843 Samuel Morse (...) code signals.
5. In 186 the telephone (... ..) by Alexander Bell in the USA.

10. Find the most suitable synonym-word for the one in the text.

Landmark Inventions of the Millennium.

The last 1,000 years have produced an *incredible* (1: improper/impressive /impossible /unbelievable) number of variety of scientific and technological *breakthroughs* (2: advantages/advents/advances/adventures)– but which of these were the most important?

Narrowing a list of the thousands of inventions made since the year 1000 to the ten greatest requires some *exact* (3: exaggerate/precaution/accurate/penetrating) criteria. The qualifying inventions either proved *radically* (4: fantastically/fundamentally/far/further) new ways to do an important job, or they made possible tasks that were previously unimagined. Their *impact* (5: affect/affection/pressure/influence) was felt, if not right *away* (6: instant/instantaneously/initially/once) then eventually, by a large portion of humanity. These developments have *enabled* (7: made available/made away/made after/made change) significant new technological innovations and scientific discoveries. And finally, they have had an *enduring* (8: long-expected/long-term/long-acting/long day) effect on the world.

The inventions that meet these criteria, in *chronological* (9: such-and-such/suchlikesequential/ suchwise) order, are the compass, the mechanical clock, the glass lens, the printing press, the steam engine, the telegraph, electric power, wireless communication, antibiotics, and the transistor.

Missing from this list are many extremely significant technological advances, including the airplane, telephone, automobile, and computer. In many cases these inventions were *omitted* (10: passed down/passed for/passed for/ passed from/ passed over) because they are based on earlier developments or breakthroughs.

11. Can you understand these sentences? Match the first part of each sentence to the second one.

1. Science is important to world peace and understanding,	are the results of advances in technology.
2. A lot of scientific researches have	in the future that it does now.
3. The problem of supplying the world with enough energy	improved life for people.
4. Many of the things that make our life easier and better	is the most important scientific problem for the mankind.
5. Technology will affect us even more	and the origin and development of the human race.
6. The study of science provides people with	for many people all over the world
7. Scientists are studying various aspects of human biology	to the understanding of technology, and understanding of the world.
8. The study of the natural world may help to improve life	is essential for everyone.
9. A basic knowledge of science	their way in the changing world.
10. Scientific knowledge helps people to find	understanding of natural worlds.

12. Read the story about one of the greatest physicists of the world. Put the verbs to the necessary grammar tense.

Pierre Curie, a great physicist

On April 19, 1906, the scientists of all countries **(to shock)** at the news of Pierre Curie having become the victim of road accident. Since then the importance of Curie's discoveries **(to grow)** to an immeasurable extent, his findings **(to include)** in all physics text books throughout the world. They **(to know)** to have become the foundation for several branches of industry and, first and foremost, the atomic industry. This is why scientists and public opinion as a whole both in the Soviet Union and throughout the world honour the memory of this remarkable French scientist.

Pierre Curie, the son of a doctor of moderate means, (**to be born**) on May 15, 1859. His father, who took interest in natural sciences, (**to exercise**) a great influence on the choice of his son's future career. At the age of 18 the talented youth (**to start**) work as a laboratory assistant at the Sorbonne University. In 1895 he was already a well known scientist with a doctor's degree. It was then that he (**to marry**) his colleague Marie Sklodowska, who (**to be**) to become his scientific associate. Their joint work in the study of radioactivity which (**to lead**) to the discovery of radium widely (**to know**) all the world over. In 1904 they both (**to award**) the Nobel prize which was at that time the highest scientific recognition.

Pierre Curie's principal work (**to be**) in the fields of electricity, magnetism and radioactivity, his first studies being on physics of crystals and on piezoelectricity. At the time his remarkable discoveries in this branch of science(**to make**), the very term "physics of crystals" was yet unknown. Pierre Curie (**to establish**) a direct connection between the symmetry of crystals and their physical properties, which resulted in the discovery of piezoelectric properties of crystals. This discovery (**to open**) a way to an extremely wide field of technique and (**to enable**) scientists to transform mechanical forces into electrical ones and vice versa. Underwater and atmospheric sound emitters now (**to base**) on piezoelectrical transformer.

Soviet scientists (**to achieve**) great success in this field, the application of ultra-waves for the detector of flaws in metals and the work on a new piezoelectric material – titanate of barium – being of particular interest.

The joint work of Pierre Curie and his wife Marie Sklodowska in the field of radioactivity now (**to lead**) to the discovery of methods for using atomic energy for peaceful purposes. This is the great service the two scientists (**to render**) to science and mankind as a whole.

13. A. Give Russian equivalents to the English words.

- | | |
|----------------------------------|--|
| 1) научно-техническая революция | 10) заставить ядерную энергию работать на человека |
| 2) компьютер | 11) сделать вклад в науку |
| 3) ядерная энергия | 12) внедрить использование лазерных технологий |
| 4) законы природы | 13) производить новые виды компьютеров |
| 5) выдать новую идею | 14) достичь видимых результатов |
| 6) сделать открытие | |
| 7) впервые использовать что-либо | |
| 8) выйти в космос | |
| 9) создать машину | |

B. Make up your own sentences with these words. Check them with your desk mate.

Part 2.

Listening and Reading.

1. A. What is the difference between two words “invention” and “discovery”?

The difference between “invention” and “discovery” is not as clear as one might think. A discovery can be as simple as observation of a previously unnoticed phenomenon, while an invention is a human-devised machine, tool, or apparatus that did not previously exist. For example, ancient people discovered that drops of water and certain gemstones distorted light in a predictable way. However, it was not until medieval times that others tried to reproduce this effect by applying new glass-shaping technology to the formation of lenses – the basic elements of spectacles, microscopes, telescopes, and cameras. Similarly, people knew about and studied electricity as a force of nature for thousands of years, but it was the technological leap of mass-producing electricity and delivering it to homes and factories in the early 20th century that transformed the world.

1. B. Choose the most interesting information and put it into two columns.

An invention	A discovery

1. In 1535 Polish astronomer Copernicus suggested that the Earth revolves around the Sun.
2. In 1628 William Harvey, the English doctor, studied circulation of blood.
3. On 21st of November 1783, the Montgolfier brothers flew in the first hot-air balloon, in Paris.
4. Jacques Gamerin made the first jump with a parachute in 1797 in France.
5. On 17th of December, 1903, Orville Write made the first flight in airplane. He was in the air for 12 seconds.
6. Richard Trevithick, an Englishman, built the first steam-powered locomotive in 1804.
7. About 1820 Michael Faraday began his electrical researches of the motion of a wire carrying a current in the field of a magnet.

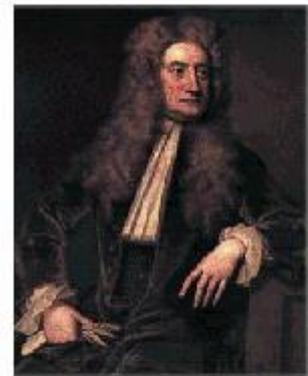
8. On 13th of November 1907, Paul Cornu made the first flight in a helicopter. He was in the air for 20 seconds.
9. In 1936 Y. Frenkel proposed the first theory of nuclear fission.
10. In 1939 the Soviet physicist D. Ivanenko advanced his nuclear theory of the atom.

2. A. Do you know these people?

1. The greek *mathematician* and the *discoverer* of the law of displacement



2. The English *physicist* and the *pioneer* in the laws of gravity



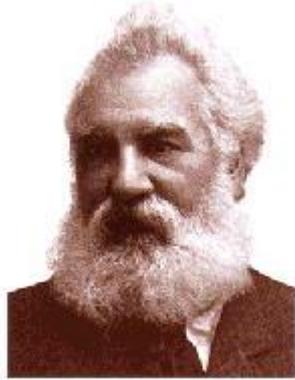
3. The Scottish *inventor* and the designer of the early steam engine.



4. The *founder* of the modern theory of probability from France



5. The *inventor* of the telephone from Scotland.



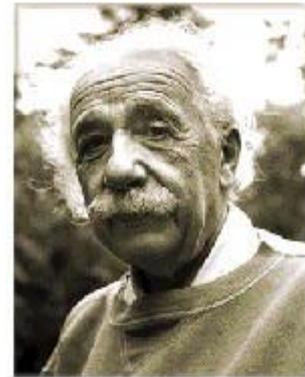
6. The greatest of all English experimental physicists and *investigator* of electricity



7. The first woman *professor* of Paris university and the Noble Prize *winner* in the field of physics (1903) and chemistry (1911).



8. The introducer of the revolutionary new theories of time, space, energy and gravity.



1. B. Listen to the short stories about these people and match them to the photos. What are they famous for?

2. A. Do you know the words?

influence(s)
has been influenced
to increase
rapid
the energy of...
to domesticate
to pass somebody's knowledge to...

the printing press
steam as a source of power
a source of energy
means of communication
wireless communication
APS (Atom Power Station)
electricity supply network

B. You will read a story about historical development of the world. Find out the most important events of scientific achievements. What is unusual in the author's point of view?

From Fire to Atom.

Today we see the world in which social, industrial and even political order has been greatly influenced by science. The development of science during the past hundred years has increased man's knowledge of nature so greatly that it influences of human life.

This development has been very rapid if we consider man's long history.

Man has probably lived on the Earth for more than 2, 000, 000 years. Let us imagine the whole period of his life on the earth compressed into one century, that is, let us imagine that man began history about a hundred years ago.

On this scale, it took him 99 years (20 thousand years) to learn how to use the energy of fire and how to use clay for making pots, to domesticate animals and to be able to make the simplest clothes for himself.

By the middle of the hundredth year (10 thousand years ago), writing was invented, and it became possible for man to pass his knowledge to the people living after him.

1,5 month ago art, and literature, and early science appeared in Greece.

The printing-press is just 10 days old (460 years), and modern experimental science began just a week ago (380 years ago).

Only about four days ago , two men at different points of the earth, Ivan Polzunov in Russia and James Watt in England, began thinking of steam as a source of power, and two days later, the steam power was already used in railroad trains and ships.

A few days ago man only dreamed of electricity as a source of energy and means of communication, while about 1,5 days ago (in 1895) Alexander Popov successfully solved the problem of wireless communication. And exactly 12 hours ago (in 1959), the Soviet Sputnik televised back the earth photographs of the other side of the moon. It is 14 hours since, on June 26, 1954 the first APS in the world was connected to the Moscow electricity supply network.

On April 12, 1961, about 11 hours ago, Yuri Gagarin flew into space. Just about 11 hours ago, by a hundred years' scale!

The early 1970s (about 6 hours ago) saw the beginning of mass introduction of larger integrated circuits, also called chips and microcomputers. This period was called the "second computer revolution". And it's just not more than a few moments since, on March 6, 1986, the Russian space station "Vega" took close-range picture of the head of Halley's comet.

If we think of man's history compressed into one century, we can clearly see that civilized man, though he has made many bad mistakes, is only "a child". We can see that our modern world is very young, and the possibilities for material and social development are very great indeed.

(By Fomin L.I. and Veize A.A. "Selected stories", M., Просвещение, 1989)

2. C. Read the story once more and fill in the table.

Date / Time	Invention / Investigation	Inventor / Explorer
2 0,000 years ago	using the energy of fire	primitive people

2. D. Compare your table with your classmate's one. Who has got more information?

2. E. Agree or disagree to the statements. Prove your point of view.

- a) Science is the level of knowledge which the nation has achieved.
- b) The development of science has increased the level of people's knowledge.
- c) Science was born in the epoch of feudalism.
- d) The first energy that man used was the energy of the Sun.
- e) Writing made it possible to pass people knowledge to the other generations.

3. A. New inventions are appearing every day to make our life easier, longer, warmer, and speedier and so on. But only a few inventors design a new machine or product that becomes so well-known that the invention, named after its creator, becomes a household word. Here are ten famous inventors and their inventions named after them.

Study the information from the table. Is everything right?

Who ?	Where from?	When?	What?
1. Ladislao Biro	Hungary	1943	The famous Rolls-Royce car
2. John Bowler	England	1850	The rubber solution for coating fabrics which led to the production of waterproof raincoats or mackintoshes
3. Louis Braille	France	1824	The telegraphic dot-dash alphabet or Morse code
4. Samuel Colt	America	1836	The diesel engine
5. Rudolf Diesel	Germany	1897	The pistol with a revolving barrel that could fire 6 bullets, one after the other
6. Hans Wilhelm Geiger	Germany	1906	The counter for detecting radioactivity
7. Charles Mackintosh	The UK	1823	The hard round hat known as the bowler
8. Samuel Finley Breeze Morse	The USA	-	The alphabet patterns for the blinds
9. Louise Pasteur	France	-	The method of sterilizing milk by heating it or pasteurization
10. Charles Rolls and Henry Royce			The ball-pointed pen or biro

2. B. Correct the information in the table. Don't forget to use speech patterns such as

- | | |
|------------------|-------------------------|
| 1. as for me... | 5. as far as I know |
| 2. in my opinion | 6. as far as I remember |
| 3. to my mind | 7. it seems to me |
| 4. I'm sure... | etc. |

3. A. Russian scientists paid a great contribution to the development of the world science. You will listen to the story about one of them but to understand it better pay attention to the following words.

1) phenomena (pl. from phenomenon)	явления
2) a peasant	крестьянин
3) admission	допуск в учебное заведение
4) to conceal one's origin	скрыть своё происхождение
5) to gain	получить что-либо
6) Slavonic-Greek-Latin Academy	славянская Греко-латинская академия
7) to live a hand-to-mouth	сводить концы с концами
8) to fill the quota	набрать нужное количество
9) for versatility	количество открытий
10) to win recognition	получить признание

3. B. Listen to the story about one of the greatest Russian scientist Mikhail Lomonosov. And answer the questions.

- 1) What kind of family was he born in?
- 2) What kind of childhood did he have?
- 3) What kind of life did he have during his studies?
- 4) Why was he able to enter the Academy of Science?
- 5) What role did Lomonosov play in development of Russian science?

4. A. Read the story about V.V. Petrov. Fill in the gaps with the words below.

The follower, was known, attention, occupied, experiments, the achievements, various bodies, a pioneer, knowledge, electrodes, luminescence, the possibility.

V. V. Petrov (1761 – 1834) was ... of Lomonosov in studying electricity in our country. He deserved the right to be called ... of the world electrical engineering.

An actual member of the Petersburg Academy of Science and professor of the Medical Academy of Surgery, he was always in the course of all ... of the world scientific through, he mastered its most progressive ideas and contributed

much to the cause of science. His good ... of Latin, English, French and German greatly helped him in doing this.

Petrov's investigations on the nature of the luminosity of bodies which is called ... are widely known. This problem ... the minds of the progressive scientists tending to devine its nature during many centuries.

Having carried on many ... and tests on luminescence, Petrov published a great number of articles on this subject. According to Academician Vavilov's conclusion he succeeded in dividing the two conceptions: luminescence and semi luminescence. The range of his scientific interests was extremely wide. For example, he carried out an extensive work, practically proving Lavoisier's theory of oxygen and, besides, studied the oxidation of... .

Up to the 90-ties of the 18-th century it was only immovable distribution of electrical charges in bodies that... . In 1791 Luigi Galvani discovered the electrical current, i. e., the motion of electrical charges through conductors. Galvani was succeeded by Volta who carried out a good deal of investigations in the field of Galvanic electricity. In 1800 Volta constructed an apparatus known to everybody at present as the voltanic pile.

Petrov's ... was immediately drawn to the first generator of electric current and he built a gigantic voltaic pile of his own. Having constructed the generator of Galvani electricity of unusual size, the Russian investigator was able to make many discoveries of great importance. Petrov's book (1802) in which he clearly described his battery made him an innovator in his field of science and enabled everybody to make a battery and to carry on experiments with it.

Only electrical sparks jumping between two ... were known before Petrove's time. In 1802 something entirely different was discovered by him, namely – the permanent flame, setting up between two char-coals under current. He pointed out the possibility of using the electric arc lighting. Three years before the famous London voltaic pile was constructed his own one having 100 Galvanic couples more than that presented by Davy.

The electric arc discovered by Petrov became later the first source of electric lighting put to service. Another Russian innovator F. Yablochkov used this idea in his electrical lighting known abroad under the name of the "Russian Light".

Petrov was the first to discover ... of getting metals out of ores by means of electricity. The very fact of these discoveries gives the right to call Petrov a pioneer of modern electrical engineering and electrical metallurgy.

B. Answer the questions.

1. What scientific problems did V.V. Petrov study?
2. How did he accelerate the works by L. Galvani?
3. Who and when discovered the voltaic pile?
4. What was done by V.V.Petrov in 1802?
5. Who of the Russian inventors used Petrov's idears?

C. What new facts have you learnt about his life and work?

5. Comment on the following statement by M.Lomonosov

"...Russia can produce her own Platos and quick-witted Newtons..."

What do you think of it?

6. Explain your attitude to the sayings:

- 1) "The job of science is to serve people." (By Leo Tolstoy)
- 2) "The only good is knowledge, and the only evil is ignorance" (By Diogenes)

7. A. You are sure to know about Russian inventor of the radio A.S.Popov. There are some facts about his life and work. If you put these parts of the story to the right order, you will learn some more interesting facts about him.

After many experiments carried out together with his assistant Ribkin the device they constructed began receiving electromagnetic waves at a long distance.

In the following year his receiver was used at the electric power station in Nizhny Novgorod for warning about approaching thunderstorm. In the same year he demonstrated the transmission of words over a wireless telegraph.

In summer 1895, Popov's invention was successfully tested and in the same year attached to the device an apparatus previously used for recording telegrams over the wire telegraph.

In this way the future wireless communication between the continents was been prepared. The year 1998 witnessed a new important invention made by Popov together with his assistants Ribkin and Troitsky, namely the reception of audible signals by means of a receiver.

A. Popov was born in 1858. By the time he graduated from the Petersburg University in 1883 he had already possessed a broad knowledge of electrical theory as well as a wide experience in that field.

By means of his receiver Popov could detect the waves at a distance of some metres and then kilometers. Thus he connected his first receiver to the first antenna.

On April 25, 1895 Alexander Popov demonstrated his device at the Russian Physico-Chemical Society.

Popov was offered immense profits from commercial use of his invention in case he leaves Russia. But the Russian patriot refused the wealth offered to him, preferring to stay in his native country.

By 1914, the beginning of the First World War, the results of Popov's work had been concentrated in foreign hands. Even the supply of the Russian army with radio devices depended upon a German concern in Berlin.

The tsarist government did nothing to provide the training of specialists for the newly born branch of science and engineering. Neither was home production of devices for wireless telegraphy organized in Russia. Instead it was handed over to foreign companies.

Working both as scientist and teacher, he always carried on some practical work, solving many practical problems such as the introduction of electricity into the Navy and others. Popov was one of the first to pay attention to the works of Hertz who proved by experiments the existence of electromagnetic waves.

At the end of 1905 police was sent to the Petersburg Electrotechnical Institute, where Popov was elected director. On December 31, 1905, the great inventor died at the age of 47.

B. Answer the questions.

1. When was A. Popov born?
2. What scientific problems did he study?
3. Whose works did he pay attention to?
4. What was his first device?
5. What did A. Popov with his assistants Ribkin and Troitsky invent?
6. Why did Popov refuse to go abroad?

8. A. Read the story about I. Kurchatov.

Igor Kurchatov

Among the distinguished atomic scientists the first place belongs by right to academician Igor Kurchatov.

As far back as the early thirties, atomic research was being successfully conducted in our country. Russian nuclear physics was in need of powerful sources of fast particles capable of inducing a nuclear reaction. This problem was being solved by a group of research workers with I. Kurchatov at the head. His optimism, vigour and faith in success inspired their work.

Having completed a series of experiments, I Kurchatov launched Europe's first cyclotron at the Radio Institute. Shortly before the break of the Great Patriotic War the biggest in Europe cyclotron was built at the Leningrad (St. Petersburg) Physico-Technical Institute.

Igor Kurchatov together with B. Kyrchatov, L. Mosovsky and L. Rusinov made a major discovery in nuclear physics – the isomerism of artificial radio-active nuclei.

Kurchatov knew that the neutron was the key to splitting of the atom. This is why he put all the efforts into neutron research. The main, the most important objective to release the power of atomic nucleus was still ahead of him. The idea of releasing gigantic resources of atom energy haunted Kurchatov but the World War II broke out and all research programs had to be suspended.

Academician A. Alexandrov having discovered a way of protecting ships from mines,

I, Kurchatov joined in and began to work for the Navy.

Research into uranium fission having been resumed at the decision of the Government, Kurchatov left the front line. The war was drawing to close and I. Kurchatov was already dreaming of using the atom for peace.

On June 27, 1954, the first atomic power plant in the world with a capacity of 5,000 kw was put into operation near Moscow. This power generating installation based on the uranium-graphite reactor was the favourite creation of I. Kurchatov.

Like other scientists Kurchatov was carried away by another great idea – to master controlled thermonuclear reactions.

In 1956 he was accompanied by the First Secretary of the Communist Party of the Soviet Union N. Khrushchov on his visit of peace and friendship to Britain. At Harwell he presented a report on Soviet research into controlled fusion.

B. Are these statements true or false?

1. Atomic research was conducted in Russia in 1830s.
2. I. Kurchatov with his father B. Kurchatov led the works of fast particles capable of inducing a nuclear reaction.
3. I. Kurchatov launched Europe's first cyclotron at the Radio Institute.
4. Igor Kurchatov made a discovery in the isomerism of artificial radio-active nuclei.
5. The main, the most important objective to release the power of atomic nucleus was solved by the American scientists.
6. I. Kurchatov discovered a way of protecting ships from mines.
7. The war was drawing to close in 1944 and I.Kurchatov was already dreaming of using the atom to make the victory of our people nearer.
8. In 1956 he was accompanied by the First Secretary of the Communist Party of the Soviet Union L. Brezhnev on his visit of peace and friendship to Britain.

C. Make the wrong sentences correct.

Keys to the exercises.

Lexical and grammar exercises.

Ex. 1. A

Keys:

- a. *to create / to design something*
- b. *to give teaching / practice*
- c. *to enlarge, to make longer*
- d. *to give birth to something or somebody / to come into the world by birth*
- e. *to come or go into something / to become a member of / begin or open something*
- f. *to bring in or forward / to bring into use or operation / to cause somebody to be acquainted with something*
- g. *to stretch out / to extend / to get to / to go as far as / to pass*
- h. *put or bring forward / to manufacture or make / to grow*
- i. *to find out / to get acknowledged / to bring to view / to realize*
- j. *to get done / to complete / to reach by effort / to do anything successfully*
- k. *to set working / to give somebody instructions / to give secret knowledge*
- l. *to join / to overcome*
- m. *to become faster / to cause to happen earlier / to increase the speed of...*
- n. *to ask for / to serve a purpose by doing something to concentrate one's thoughts / to make practical use*
- o. *to introduce new thing / to make changers / to put into practice*
- p. *to travel into or through (the country, etc.) for the purpose of learning about it / to examine thoroughly in order to test*

(значения слов даны в алфавитном порядке)

Ex. 1. B.

		r		a	i				
t		e		p	n		b	i	
r	a	a		p	v	b	e	n	
a	c	c	e	l	e	r	a	t	e
i	h	h	x	y	n	i	r	r	n
n	i	o	p		t	d		o	t
	e	u	l			g		d	e
	v	t	o			e		u	r
	e		r					c	
			e					e	

Ex. 2.A.

Key:

- 1) *verb; - to create something*
- 2) *noun; - something invented*
- 3) *noun; - a person (man or woman) who has invented something*
- 4) *noun; - a woman who has invented something*
- 5) *adjective; - able to invent*
- 6) *noun; - ability to invent something*
- 7) *noun; - detailed list of something*

Ex. 2. B.

Keys:

1. *inventors*
2. *invented*
1. *inventive*
2. *inventiveness*
3. *inventress*
4. *invented*
5. *inventory*
6. *invented*

Ex. 3. A.

Keys:

- 1 – C
- 2 – A
- 3 – D

4 – B

Ex. 3. B.

Key:

To develop – a development, a developer – developing, developed

To devise – a device, a deviser – devising, devised

To apply – an appliance – applied, applying

To contrive – a contrivance, a contriver – contriving, contrived

Ex. 4. A.

1. *a device*

2. *an apparatus*

3. *an instrument*

4. *a contrivance*

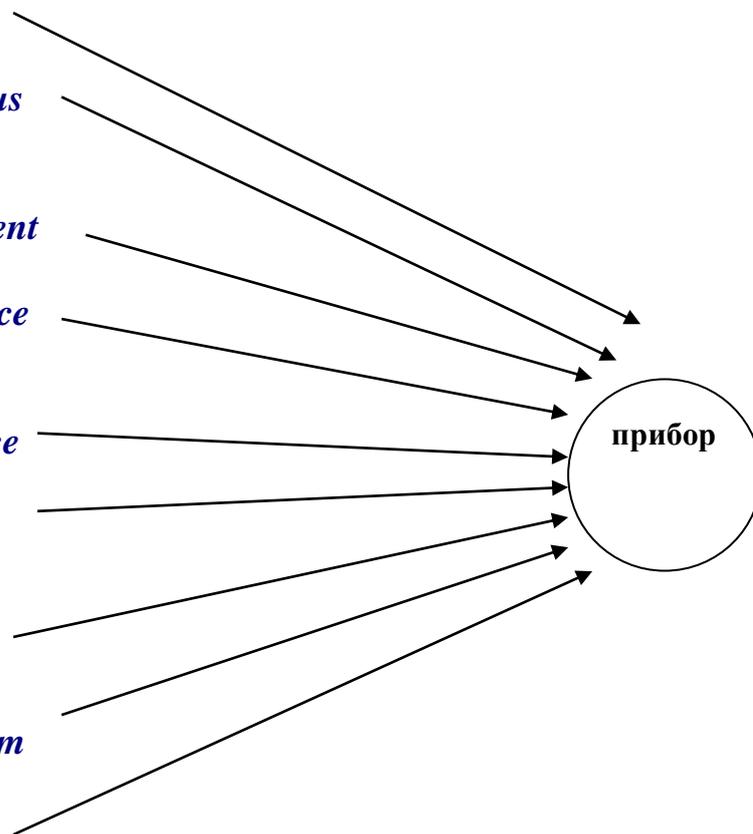
5. *an appliance*

6. *a machine*

7. *an engine*

8. *a mechanism*

9. *a gadget*



Ex. 4.B

Key: the word 'mechanism' is not in the crossword

		m	g	t			a			
		a	a	n	a		p		d	
		c	d	e	p		p		e	
		h	g	m	p		a		v	
		i	e	u	l		r		i	
c	o	n	t	r	i	v	a	n	c	e
		e		t	a		t		e	
				s	n		u			
				n	c		s			
				i	e	n	g	i	n	e

Ex. 4.C.

Keys:

- 1. scientific and technological revolution*
- 2. complex cybernetic machine*
- 3. nuclear energy*
- 4. highly efficient producing processes*
- 5. mighty power and nuclear industries*
- 6. automatic production lines*
- 7. major mineral deposits*
- 8. the law of nature*

4. D

Keys:.

- A) to bear a new idea*
- B) to make a discovery*
- C) to introduce an invention*
- D) to enter space*
- E) to reach out to the other planet*
- F) to create a machine*

- G) to make nuclear energy work for the man*
- H) to extend our knowledge*
- I) to train highly efficient specialists*
- J) to bridge the gap between theory and practice*
- K) to accelerate the process of applying scientific innovation in industry*
- L) to initiate laser technology*

E.5.

Key:

- | | |
|----------------|-----------------------|
| 1) inventions | 6) achieved |
| 2) exploration | 7) reached out |
| 3) created | 8) put into operation |
| 4) operate | |
| 5) discovered | |

Ex. 6.

Key:

Discover-radio-operate-eexploration-nature-efficient-technological

Ex 7.

Key:

4. Develop, device, determine, invent, industrial, exploration, discover, recover, revolution, reconstruction.

Ex. 8.

Key:

- Laws of nature*
- Scientific and technological revolution*
- Complex cybernetic machine*
- Nuclear energy*
- Highly efficient producing processes*
- Mighty power and nuclear industries*
- Automobile producing lines*

Ex. 9.

Key:

- 1. was introduced, is known*
- 2. was established*
- 3. was pioneered*
- 4. used*
- 5. was invented*

Ex. 10.

Keys:

- 1 - unbelievable*
- 2 - advances*
- 3 - accurate*
- 4 - fundamentally*
- 5 - influence*
- 6 - instantaneously*
- 7 - made available*
- 8 - long-term*
- 9 - sequential*
- 10- passed over*

Ex. 11.

Key:

- 1. Science is important to world peace and understanding, to the understanding of technology, and understanding of the world.*
- 2. A lot of scientific researches have improved life for people.*
- 3. The problem of supplying the world with enough energy is the most important scientific problem for the mankind.*
- 4. Many of the things that make our life easier and better are the results of advances in technology.*
- 5. Technology will affect us even more in the future that it does now.*
- 6. The study of science provides people with understanding of natural worlds.*
- 7. Scientists are studying various aspects of human biology and the origin and development of the human race.*
- 8. The study of the natural world may help to improve life for many people all over the world.*
- 9. A basic knowledge of science is essential for everyone.*
- 10. Scientific knowledge helps people to find their way in the changing world.*

Ex. 12.

Key:

Pierre Curie, a great physicist

*On April 19, 1906, the scientists of all countries **were shocked** at the news of Pierre Curie having become the victim of road accident. Since then the importance of Curie's discoveries **has grown** to an immeasurable extent, his findings **having been included** in all physics text books throughout the world. They **are known** to have become the foundation for several branches of industry and, first and foremost, the atomic industry. This is why scientists and public opinion as a whole both in the Soviet Union and throughout the world honour the memory of this remarkable French scientist.*

*Pierre Curie, the son of a doctor of moderate means, **was born** on May 15, 1859. His father, who took interest in natural sciences, **exercised** a great influence on the choice of his son's future career. At the age of 18 the talented youth **started** work as a laboratory assistant at the Sorbonne University. In 1895 he was already a well known scientist with a doctor's degree. It was then that he **married** his colleague Marie Sclodowska, who **was to become** his scientific associate. Their joint work in the study of radioactivity which **led** to the discovery of radium **is widely known** all the world over. In 1904 they **were both awarded** the Nobel prize which was at that time the highest scientific recognition.*

*Pierre Curie's principal work **was** in the fields of electricity, magnetism and radioactivity, his first studies being on physics of crystals and on piezoelectricity. At the time his remarkable discoveries in this branch of science **were made**, the very term "physics of crystals" was yet unknown. Pierre Curie **established** a direct connection between the symmetry of crystals and their physical properties, which resulted in the discovery of piezoelectric properties of crystals. This discovery **opened** a way to an extremely wide field of technique and **enabled** scientists to transform mechanical forces into electrical ones and vice versa. Underwater and atmospheric sound emitters **are now based** on piezoelectrical transformer.*

*Soviet scientists **have achieved** great success in this field, the application of ultra-waves for the detector of flaws in metals and the work on a new piezoelectric material – titanate of barium – being of particular interest. The joint work of Pierre Curie and his wife Marie Sclodowska in the field of radioactivity **has now led** to the discovery of methods for using atomic energy for peaceful purposes. This is the great service the two scientists **have rendered** to science and mankind as a whole.*

Listening and reading exercises.

Ex. 1 A.

Key:

1. Archimedes
2. Isaak Newton
3. James Watt
4. Blaise Pascal
5. Alexander Graham Bell
6. Michael Faraday
7. Marie Curie
8. Albert Einstein

Ex. 1. B.

Short Texts for Listening.

Michael Faraday

There are electric motors in most household appliances, from cassette players to washing machines. The design of all these motors is based on the principles discovered more than 150 years ago by Michael Faraday, the greatest of all English experimental physicist. First learning about science from an encyclopedia, Faraday was lucky enough to become an apprentice to the noted English chemist Humphry Davy (1778-1829).

Scientists at the time had just realized how to produce electricity, and were looking for ways of applying it. Faraday's discoveries were perfectly timed to exploit this new power.

Marie Curie

Polish-born physicist Marie Curie and her French husband Pierre are famous for their work on radioactivity. They were inspired by the work of French physicist Henry Becquerel (1852-1908). Marie Curie was the first to use the term 'radioactive' for substances that have considerable electromagnetic activity. She also isolated two new radioactive elements, polonium and radium. After Pierre's death she took over his job as professor of physics at the University of Paris, the first woman to teach there.

She continued her research, looking for medical uses for radioactivity.

She was awarded the Nobel Prize for physics in 1903 and for chemistry in 1911.

Isaac Newton

The English physicist and mathematician Isaac Newton was one of the great scientists of all time. His theories revolutionized scientific thinking and laid the foundations of modern physics. His book 'Principia Mathematica' is one of the most important works in the history of modern science.

Newton discovered the law of gravity, and developed the three laws of motion that are still in use today.

He was the first person to split white light into colors of the spectrum, and his research into light led him to design a reflecting telescope.

Newton was also one of the pioneers of a new branch of mathematics called calculus.

Archimedes

The Greek mathematician Archimedes was the father of geometry. He discovered the value of π , which is the ratio of the circumference of a circle to its diameter. Pi is used to calculate the volume of cylinders and spheres.

Archimedes then looked for ways of measuring the volume and mass of irregular objects. Eventually, he discovered the principle of displacement: that an object put wholly or partly into water loses weight equal to the weight of water it displaces.

One method of lifting water is known as the Archimedes' screw because it is thought that he invented it.

James Watt

The Scottish inventor James Watt improved the design of the early steam engine, ensuring that it could be used successfully throughout industry.

He refined the steam engine designed by the English engineer Thomas Newcomen (1663-1729) and made it more efficient. Watt's work helped to bring about the industrial revolution in Britain.

The new Watt steam engines provided much of the power for Britain's industries during the 1800s.

The watt (W), the unit of work or power, is named for James Watt. The power of most electrical devices, such as light bulbs and heaters, is rated in watts.

Blaise Pascal

The Frenchman Blaise Pascal was a brilliant mathematician and religious thinker. He was the founder of the modern theory of probability (an expression of the likelihood of something happening).

Following work on barometers by Italian scientists Galileo Galilei (1564-1642) and Evangelista Torricelli (1608-47), Pascal made a mercury barometer and measured atmospheric pressure.

He formulated Pascal's principle: in a liquid or gas, pressure applied to one point is transmitted equally to all parts of the fluid.

He invented the first digital calculator, but it was too costly to make and was never used.

Alexander Graham Bell

The inventor of the telephone, Alexander Graham Bell, was born in Scotland, where he studied voice production and hearing. He later moved to America, where he combined this work with an investigation into the transmission of sound by electricity.

Bell managed to transmit his voice electrically in 1875, patenting his idea the next year.

He formed the Bell Telephone Company in 1877, as part of a legal fight to protect his patent.

He used some of the profits from his invention of the telephone to finance special schools for the deaf.

Bell carried on inventing for the rest of his life, designing hydrofoils to make ships faster and kites capable of lifting people.

Albert Einstein

The work of German-born mathematician and physicist Albert Einstein has made him one of the most famous scientists in history. He overturned many of the long-established ideas of the English physicist Isaac Newton (1642-1727), by introducing revolutionary new theories about the nature of time, space, energy, and gravity. Einstein became a U.S. citizen in 1940.

He opposed war - but ironically his theories were eventually used to produce nuclear bombs,

the most destructive weapons known to humanity. Einstein saw many of his theories confirmed during his lifetime, and others were proved after his death.

Ex. 1. B.

Key:

An invention	A discovery
On 13 th of November 1907, Paul Cornu made the first flight in a helicopter. He was in the air for 20 seconds	About 1820 Michael Faraday began his electrical researches of the motion of a wire carrying a current in the field of a magnet.
Richard Trevithick, an Englishman, built the first steam-powered locomotive in 1804.	In 1939 the Soviet physicist D. Ivanenko advanced his nuclear theory of the atom.
On 21 st of November 1783, the Montgolfier brothers flew in the first hot-air balloon, in Paris.	In 1936 Y. Frenkel proposed the first theory of nuclear fission.
On 17 th of December, 1903, Orville	In 1535 Polish astronomer Copernicus

Write made the first flight in airplane. He was in the air for 12 seconds.	suggested that the Earth revolves around the Sun.
Jacques Gamerin made the first jump with a parachute in 1797 in france.	In 1628 William Harvey, the English doctor, studied circulation of blood.

Ex. 3. A.

Key:

Who ?	Where from?	When?	What?
1. Ladislao Biro	Hungary	1943	The ball-pointed pen or biro
2. John Bowler	England	1850	The hard round hat known as the bowler
3. Louis Braille	France	1824	The alphabet patterns for the blinds
4. Samuel Colt	America	1836	The pistol with a revolving barrel that could fire 6 bullets, one after the other
5. Rudolf Diesel	Germany	1897	The diesel engine
6. Hans Wilhelm Geiger	Germany	1906	The counter for detecting radioactivity
7, Charles Mackintosh	The UK	1823	The rubber solution for coating fabrics which led to the production of waterproof raincoats or mackintoshes
8. Samuel Finley Breeze Morse	The USA	-	The telegraphic dot-dash alphabet or Morse code
9. Louise Pasteur	France	-	The method of sterilizing milk by heating it or pasteurization
10. Charles Rolls and Henry Royce			The famous Rolls-Royce car

Ex. 3. B.

Key:

Mikhail Lomonosov

Mikhail Lomonosov was born in 1711 in the family of a fisherman in the northern coast village of Denisovka not far from Archangelsk. When he was 10 years of age his father began to take him sea fishing. The dangerous life of a fisherman taught him to observe the natural phenomena more closely. During the long winter nights young Lomonosov studied his letters, grammar and arithmetic diligently.

Being the son of a peasant, he was refused admission to the local school. After some years, through concealing his peasant origin, he gained admission to the Slavonic-Greek-Latin Academy and for years lived a hand-to-mouth existence on three kopecks a day. The noblemen's sons studying with him made fun of the twenty-year-old giant who, in spite of the jeers and his own poverty, made rapid progress.

After five years came the chance of entering the Academy of science, as there were not enough noble-born students to fill the quota. His ability and diligence attracted the attention of the professors and as one of three best students he was sent abroad. He spent all the time there studying the works of leading European scientists in chemistry, metallurgy, mining and mathematics. On his return to Russia in 1745 he was made a professor and was the first Russian scientist to become the member of the Academy of Sciences.

For versatility Lomonosov has no equal in Russian science. Many of his ideas and discoveries only won recognition in the 19th century. He was the first to discover the vegetable origin of coal, for instance, and as a poet and scientist he played a great role in the formation of the Russian literature language, eliminating distortions and unnecessary foreign words. He died in 1765. His living memorial is the Moscow University, which he founded in 1755.

4. A. The story about V.V. Petrov.

V. V. Petrov (1761 – 1834) was the follower of Lomonosov in studying electricity in our country. He deserved the right to be called a pioneer of the world electrical engineering.

An actual member of the Petersburg Academy of Science and professor of the Medical Academy of Surgery, he was always in the course of all the achievements of the world scientific through, he mastered its most progressive ideas and contributed much to the cause of science. His good knowledge of Latin, English, French and German greatly helped him in doing this.

Petrov's investigations on the nature of the luminosity of bodies which is called luminescence are widely known. This problem occupied the minds of the progressive scientists tending to divine its nature during many centuries.

Having carried on many experiments and tests on luminescence, Petrov published a great number of articles on this subject. According to Academician Vavilov's conclusion he succeeded in dividing the two conceptions: luminescence and semiluminescence. The range of his scientific interests was extremely wide. For example, he carried out an extensive work, practically proving Lavoisier's theory of oxygen and, besides, studied the oxidation of various bodies.

Up to the 90-ties of the 18-th century it was only immovable distribution of electrical charges in bodies that was known. In 1791 Luigi Galvani discovered the electrical current, i. e., the motion of electrical charges through conductors. Galvani was succeeded by Volta who carried out a good deal of investigations in the field of Galvanic electricity. In 1800 Volta constructed an apparatus known to everybody at present as the voltaic pile.

Petrov's attention was immediately drawn to the first generator of electric current and he built a gigantic voltaic pile of his own. Having constructed the generator of Galvani electricity of unusual size, the Russian investigator was able to make many discoveries of great importance. Petrov's book (1802) in which he clearly described his battery made him an innovator in his field of science and enabled everybody to make a battery and to carry on experiments with it.

Only electrical sparks jumping between two electrodes were known before Petrov's time. In 1802 something entirely different was discovered by him, namely – the permanent flame, setting up between two char-coals under current. He pointed out the possibility of using the electric arc lighting. Three years before the famous London voltaic pile was constructed his own one having 100 Galvanic couples more than that presented by Davy.

The electric arc discovered by Petrov became later the first source of electric lighting put to service. Another Russian innovator F. Yablochkov used this idea in his electrical lighting known abroad under the name of the "Russian Light".

Petrov was the first to discover the possibility of getting metals out of ores by means of electricity. The very fact of these discoveries gives the right to call Petrov a pioneer of modern electrical engineering and electrical metallurgy.

Ex. 7.

Key:

A. Popov was born in 1858. By the time he graduated from the Petersburg University in 1883 he had already possessed a broad knowledge of electrical theory as well as a wide experience in that field.

Working both as scientist and teacher, he always carried on some practical work, solving many practical problems such as the introduction of electricity into the Navy and others. Popov was one of the first to pay attention to the works of Hertz who proved by experiments the existence of electromagnetic waves.

After many experiments carried out together with his assistant Ribkin the device they constructed began receiving electromagnetic waves at a long distance.

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On April 25, 1895 Alexander Popov demonstrated his device at the Russian Physico-Chemical Society.

In summer 1895, Popov's invention was successfully tested and in the same year attached to the device an apparatus previously used for recording telegrams over the wire telegraph.

In the following year his receiver was used at the electric power station in Nizhny Novgorod for warning about approaching thunderstorm. In the same year he demonstrated the transmission of words over a wireless telegraph.

In this way the future wireless communication between the continents was been prepared. The year 1998 witnessed a new important invention made by Popov together with his assistants Ribkin and Troitsky, namely the reception of audible signals by means of a receiver.

Popov was offered immense profits from commercial use of his invention in case he leaves Russia. But the Russian patriot refused the wealth offered to him, preferring to stay in his native country.

The tsarist government did nothing to provide the training of specialists for the newly born branch of science and engineering. Neither was home production of devices for wireless telegraphy organized in Russia. Instead it was handed over to foreign companies.

At the end of 905 police was sent to the Petersburg Electrotechnical Institute, where Popov was elected director. On December 31, 1905, the great inventor died at the age of 47.

By 1914, the beginning of the First World War, the results of Popov's work had been concentrated in foreign hands. Even the supply of the Russian army with radio devices depended upon a German concern in Berlin.

Ex. 8.

Key:

Are these statements true or false?

- 1) Atomic research was conducted in Russia in 1830s. (F)*
- 2) I. Kurchatov with his father B. Kurchatov led the works of fast particles capable of inducing a nuclear reaction. (F)*
- 3) I Kurchatov launched Europe's first cyclotron at the Radio Institute. (T)*
- 4) Igor Kurchatov made a discovery in the isomerism of artificial radio-active nuclei.(T)*

- 5) *The main, the most important objective to release the power of atomic nucleus was solved by the American scientists. (F)*
- 6) *I. Kurchatov discovered a way of protecting ships from mines. (F)*
- 7) *The war was drawing to close in 1944 and I.Kurchatov was already dreaming of using the atom to make the victory of our people nearer. (F)*
- 8) *In 1956 he was accompanied by the First Secretary of the Communist Party of the Soviet Union L. Brezhnev on his visit of peace and friendship to Britain.(F)*

ADDITIONAL TEXTS for reading and discussing



K.E.Tsiolkovsky

Konstantin Eduardovich Tsiolkovsky was born in 1857, in the village of Izhevsk in Ryazan region. When he was 10 he had scarlet fever, and was left permanently deaf. This had a great influence on his life.

Only when Tsiolkovsky reached the age of 15 he began to study elementary mathematics. At about this time he first thought of constructing of a large balloon with a metallic envelope. Realizing that his knowledge was not enough, he began to study higher mathematics. The result was that he became a mathematics and physics teacher and remained so for nearly forty years.

Tsiolkovsky carried out experiments on steam engine for a time, but then he returned to the theoretical study for the metallic dirigible. In 1887, his first published paper on the dirigible appeared. Mendeleyev was interested in this work

and helped Tsiolkovsky. The account of this aeronautic work was submitted to the Academy of Science who regarded it favourably and made Tsiolkovsky a grant of 470 roubles.

He had not given up the idea about space travel. A popular report on this subject was first published in 1895, Tsiolkovsky's idea of a spaceship was based on the use of liquid fuels.

During the next fifteen years Tsiolkovsky worked over other designs for spaceships. They were not meant to be working drawings for the construction of the vessels but as a rough guide to the equipment. Some of them are now standard practice in the guided missile field.

Kurchatov published several articles and books with the mathematical theory of rockets and space travel. His calculations were used in modern theory of cosmonotics and practical space flights. They showed that it would be possible to travel into space in rockets and even to set up manned space stations around the Earth.

Tsiolkovsky's contribution to science is so great that he is considered to be "Father of Cosmonotics" into controlled fusion.



Sergey Pavlovich Korolev the Founder of Practical Cosmonautics.

Academician Korolev is a famous scientist and a founder of practical cosmonautics. He was the chief constructor of the first Earth sputniks and spaceships. Korolev was born in 1906 in the small Ukrainian town of Zhitomir into a family of teachers. He spent his childhood with his grandparents in the town of Nezhin where he studied at home with a teacher. He was interested in mathes, literature and he read a great deal. In 1923 Sergey Korolev joined a Glider Pilots' Club where he learned to construct gliders and to fly them. In 1925 Korolev entered the Kiev Polytechnical Institute where he studied aviation and maths, but

in the evening he had to work for money. After two years in Kiev Korolev came to Moscow and entered the Moscow Higher Technical School. During the Great Patriotic War Korolev constructed a jet engine for aeroplanes and rockets. The first man-made sputnik of the Earth was a result of hard work of hard work of scientist Korolev. S. P. Korolev died in 1966. For his brilliant work in the name of science and progress he was awarded two Gold Stars of the Hero of Socialist Labour. People will always remember the names of those who opened a new era in the conquest of outer space, and the name of S.P. Korolev is one of them.

Although Korolyov was trained as an aircraft designer, his greatest strengths proved to be in design integration, organization and strategic planning. A victim of Stalin's 1938 Great Purge, he was imprisoned for almost six years, including some months in a Kolyma gulag. Following his release, he became a rocket designer and a key figure in the development of the Soviet ICBM program. He was then appointed to lead the Soviet space program, made Member of Soviet Academy of Sciences, overseeing the early successes of the Sputnik and Vostok projects. By the time he died unexpectedly in 1966, his plans to compete with the United States to be the first nation to land a man on the Moon had begun to be implemented.

Before his death he was often referred to only as "Chief Designer", because his name and his pivotal role in the Soviet space program had been held to be a state secret by the Politburo. Only many years later was he publicly acknowledged as the lead man behind Soviet success in space.



Statue of Mstislav Keldysh in Moscow.

Mstislav Keldysh

Keldysh was born in 1911 in Riga. When he was four the family evacuated to Moscow during the First World War. In the first years of the Soviet Union he was refused entrance to an Institute of Civil Engineers because of his attachment to a noble family (1927). In the next years he managed to enter and graduate from the Physics and Mathematics department of the Moscow State University (24 July 1931). He obtained employment at the Central Aerohydrodynamic Institute (TsAGI) under Mikhail Lavrentyev and Sergei Chaplygin.

In 1937 Keldysh became Doctor of Science (his dissertation's title was Complex Variable and Harmonic Functions Representation by Polynomial Series) and a

Professor of Moscow State University. In 1943 he became a Corresponding Member of the USSR Academy of Sciences. He got his first Stalin Prize in 1946 for his works on aircraft auto-oscillations. In 1943 he also became a full member of the Academy and the Director of NII-1 (Research Institute number 1) of the Department of the Aviation Industry. He also headed the Department of Applied Mechanics of the Steklov Institute for Mathematics (in 1966 the department became Institute for Applied Mechanics, named after Keldysh).

During the 1940s Keldysh became the leader of a unique group of applied mathematicians involved in almost all large scientific projects of the Soviet Union. He created the Calculation Bureau that carried most of the mathematical problems related to the development of nuclear weapons. The bureau is also credited with design of the first Soviet computers.

Keldysh's main efforts were devoted to jet propulsion and rockets including supersonic gas dynamics, heat and mass exchange, heat shielding etc. 1959 saw successful testing of the Soviet first cruise missile, which displayed better performance than the Navajo missile being designed in USA at the time.

In 1954 Keldysh, Sergey Korolyov and Mikhail Tikhonravov submitted a letter to the Soviet Government proposing development of an artificial satellite to orbit the Earth. This letter began the effort that culminated in the world's first satellite, Sputnik in October 1957, which marks the beginning of mankind's Space Age. In 1955 Keldysh was appointed chairman of the Satellite Committee at the Academy of Science. In recognition of his contribution to the problems of defense Keldysh was awarded the Hero of Socialist Labor (1956) and the Lenin Prize (1957). In 1961 he received a second Hero of Socialist Labor medal for his contribution to Yuri Gagarin's flight into space, the first person to orbit the earth.

In 1961 Keldysh was elected Chairman of the USSR Academy of Sciences and kept this position for 14 years. Among his achievements were rehabilitation of genetics and cybernetics and support of dissident scientists including Andrei Sakharov. His last scientific works were devoted to creation of the Shuttle Buran. Keldysh was 67 when he died. He was honoured with a state funeral and his ashes were buried in the Kremlin Wall Necropolis on Red Square.



S.Korolev, I. Kurchatov, M. Keldysh

Space Exploration

Exploration of outer space in the 20th century produced discoveries and inventions that will forever change the way people live and interact.

After the WW II, the superpower opposition between the USA and the Soviet Union stimulated rocket research and development. Both nations realized that large rockets can be used to attack an enemy from thousands of miles away and that satellites put onto orbit around the Earth by rockets could transmit messages.

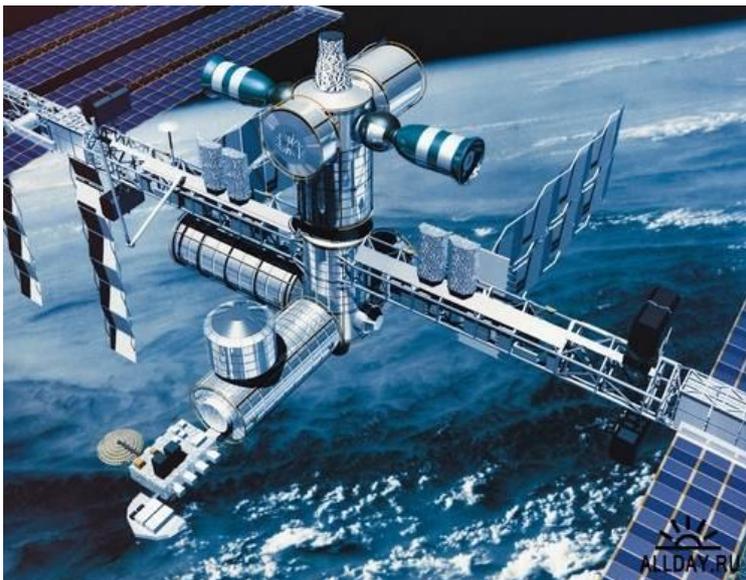
The first launch of sputnik, the first man-made object to overcome gravity, began the space age. The Soviet Union soon achieved many other firsts. In 1961, the first man, Yuri Gagarin was put into space. The first long space flights, a woman in space, a space walk were all our achievements. In its 'Salut 6', our country investigated such vital matters as the cause of cancer, since cells are studied in gravity-free space. The construction of metals that can resist gravity resulted in tools of incredible hardness; improved seeds were developed in 'Salut'.

In early 60s the United States organized the Appolo apace programme. This research concentrated on landing a man on the Moon. Two Americans, Neil Armstrong and Edwin Aldrim, walked on the lunar surface in July 1961.

Since the first moon landing, many nations have developed programmes of space exploration. A network of communication satellites made worldwide television and telephone service possible. Space shuttles allowed regular trips between Earth and space. Scientific satellites were put in the Earth's orbit.

Voyages to Venus, Mars, Jupiter, Saturn were made by the Russian and American spaceships.

This scientific progress has since resulted in hundreds of benefits for mankind, from the weather satellites whose information we see in our daily newspapers and on TV, to determining from outer space where fish is, and where natural resources are hidden in the earth and in discovering areas which are becoming deserts.



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