МИНИСТЕРСТВО ОБЩЕГО И СПЕЦИАЛЬНОГО ОБРАЗОВАНИЯ
РОССИЙСКОЙ ФЕДЕРАЦИИ

САМАРСКИЙ ГОСУДАРСТВЕННЫЙ АЭРОКОСМИЧЕСКИЙ
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РАЗВИТИЕ НАВЫКОВ ЧТЕНИЯ, ПЕРЕВОДА И УСТНОЙ РЕЧИ НА МАТЕРИАЛАХ НАУЧНО-ПОПУЛЯРНОЙ ЛИТЕРАТУРЫ

методические указания
для дополнительного чтения
для студентов I – II курсов
дневного отделения
I – III факультетов

Часть 1

САМАРА 2000

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Методические указания предназначены для дополнительного чтения для студентов 1-2 курсов дневного отделения 1-3 факультетов и направлены на развитие умений и навыков поискового и изучающего чтения с элементами аннотирования и реферирования и устной речи по технической тематике. Методические указания включают в себя лексику для закрепления, тексты для взаимосвязанного обучения устной речи и чтению, грамматические упражнения на повторение основных грамматических явлений.

Печатается по решению редакционно-издательского совета Самарского государственного аэрокосмического университета имени академика С. П. Королева.

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Text 1. Metals. Historical Review.

Pre – reading.

I. Listen, read and memorize the following words.

extent[ik'stent] n – степень, мера
to a great extent – в значительной мере
jewelry [ ] – драгоценности, ювелирные изделия
B.C. – before Christ [kraist] – до нашей эры
tin n – олово
come into being - возникать
ancient [ ] a – древний, античный
exist [ ] v - существовать
undoubtedly [ ] adv - несомненно, бесспорно
contest [ ] n - соревнование, состязание
ore [ ] n - руда
cease [si:s] v – переставать, прекращать(ся)
precious [ ] a- драгоценный
standpoint [ ] n - точка зрения
lead [led] n – свинец
Bible [ˊbaibl] – Библия
mercury [ ] n - ртуть
solvent [ ] n - растворитель
a - растворяющий
medieval [ˌmediˊi:vl] a – средневековый
alchemy [ ] n - алхимия
constituent [ ] n – составная часть,
составляющий часть целого
brass [bra:s] n – латунь, желтая медь
novelty [ ] n - новинка, новшество
inscription [ ] n - надпись
clay [klei] n – глина
rust [ ] n - ржавчина
v - ржаветь
attempt [ ] n - попытка
investigate [inˊvestigeit] v – исследовать, изучать
lustre [ ] n - блеск
impure [ ] a - смешанный, с приместью
harness [ˊha:nis] v – обуздывать, покорять; использовать (в качестве источника энергии)

II. Read the international word and guess their meaning.

Historical, primitive, nature, combination, substance, material, human, general, object, prize, method, career, peak, role, principal, sensational, practical, isolate, electrolysis, element, electricity, produce.

III. Translate the derivatives and define their parts of speech.

Accident – accidental – accidentally
Vary – variable – variability – variant – variation – varied – variance – variety – various
Doubt – doubtable – doubtful – doubtless – doubter – doubting – doubtingly – doubtfulness – undoubted – undoubtedly – undoubtful – undoubting
Separate – separable – separability – separation – separatism – separatist – separator – separately – separating – separatistic
Isolate – isolated – isolation – isolating – isolable – isolationism – isolationist – isolator
Reason – reasonable – reasonably – reasoned – reasoning – reasonless
Value – valuable – valuation – valued – valueless – valuer
Alchemy – alchemist – alchemic (al) – alchemize
Exhibit – exhibition – exhibitional – exhibitioner – exhibitionist – exhibitor –exhibitory
Science – sciential –scientist – scientific – nonscientific
Satisfy – satisfaction – satisfactory – satisfactorily – satisfactoriness – satisfable – satisfied – satisfying – satisfyingly
Describe –description – descriptive – descriptively – describable
Distribute – distributing – distributable – distribution – distributive – distributor
Produce – producer – producible – product – production – productive – productivity

IV. Translate the sentences. Define the function of the infinitive and infinitive constructions

1. To foresee what the future will be like requires analysis of the past experience.
2. The new substance readily reacts with alkali, metals, to give rise, to alloys with predetermined characteristics.
3. We do not expect to solve all these problems by the turn of the century.
4. To determine the magnitude of anything it is necessary to make a measurement.
5. The original idea was to take advantage of the high temperature of the process.
6. A liquid is unable to maintain a particular share and it immediately assumes the shape of the container.

7. The ancients thought electricity to be invisible fluid.
8. Both instruments and human explorers are sure to find many surprises in the solar system.
9. These metals were found to possess many interesting and useful physical properties.
10. It is important for the model to be accurate but simple enough.
11. A metal may be considered to consist mainly of metal ions and free electrons of high mobility.
12. The question whether the atom can or cannot be split up is known to have interested scientists from ancient times.
13. Mars will probably be one of the first worlds to be reacted by men.
14. There are many things o be taken into consideration when designing a spaceship.
15. We consider nuclear energy to by the prime source of heat energy.
16. The technique of collecting information will differ according to the problem to be solved.
17. Science is known to affect the lives of people.

Reading

Read and translate the text carefully.

METALS. HISTORICAL REVIEW

As one might expect, the first metals to be used by primitive man were those that are found free in nature to the greatest extent. These are gold, silver, and copper. They seen to have been employed by the Egyptians in the manufacture of jewelry and dishes as early as 5000 B. C. Coins made from various combinations of these metals were also in use at an early time. Tin entered the metal picture when someone discovered, probably accidentally, that if it were mixed with copper the resulting substance was harder. So there come into being the alloy that we call bronze, a material which was so important in the ancient world that its name is given to one of the cultural stages in human development. The Bronze Age began in Egypt around 3000 B. C. And in Europe some 500 or 1000 year later.

Since almost no iron exists free in nature, undoubtedly came into general use somewhat later than those just mentioned. However, the Egyptians and Assyrians seem to have made some use of iron a number of centuries before the birth of Christ. Homer describes weight-throwing contests in Greece, in which a piece of iron served both as the object to be thrown and as the prize to be awarded to the winner.

As soon as methods were developed for separating iron from its ores in reasonable large quantities and at fairly low cost it ceased to be classed

as a precious material and began its career as the world's most valuable metal from the standpoint of actual use.

Lead, which is another metal mentioned in the Bible, was used in Rome in making water pipes. Greek writers refer to mercury and seem to have some knowledge of its power as a solvent for other metals.

By the time medieval alchemy reached its peak, gold, silver, copper, tin, iron, lead, and mercury were known as "The Seven Metals".

One over metal, zinc, seems to have been kno0wn long before the days of the alchemists in its role as one of the constituents of the alloy brass. Almost no metals other than these seven or eight were known until the eighteenth century and many that we use today, not until the nineteenth.

Post-reading

I. Complete the followed statements.

1. They seem to have been employed by the Egyptians in…
2. Tin entered the metal picture when someone discovered…
3. Since almost no iron exist free in nature…
4. By the time medieval alchemy reached its peak gold…
5. Almost no metals other than these seven or eight were known…

II. Reproduce the parts of the text in which these words and phrases are used. Use them in sentences of your own.

Free in nature; to the greatest extent; the resulting substance; one of the cultural stages in human development; before the birth of Christ; weight-throwing contests; to be classed as a precious material; a solvent for other metals; medieval alchemy; one of the constituents of the alloy brass.

III. Agree or disagree with the statements. Make use of the following words and phrases.

That's right; Certainly (not); Naturally; No doubt (about it); I quite agree here.

To my mind; In my opinion; As far as I know.

It's partly true; I doubt it greatly; I don't think so; I can't agree with you; I disagree here; That (greatly)depends (on); I am afraid you are mistaken.

1. The first metals to be used by primitive man were those that are found free in nature to the greatest extent.
2. Gold, silver and copper were employed by the Egyptians as early as 5000 B. C. for manufacturing jewelry, dishes, coins, weapon.
3. Bronze had no importance in the ancient world.
4. Iron was in general use as early as gold, silver and copper.

5. Iron ceased to be classed as a precious material as soon as methods of separating it from its ores were developed.
6. Another two metals famous in Rome and Greece were lead and mercury.
7. Many of metals that we use today were known in the ancient world.

IV. Answer the questions.

1. What were the first metals used by primitive man? Why?
2. What was the role of bronze in the ancient world?
3. Why did iron come into general use later than gold, silver, copper?
4. When did it become possible to use iron as the most valuable metal?
5. What metals were known as "The Seven Metals "?
6. What was the role of zinc?
7. When did most of metals used today become known?

V. Find in the text and translate the sentences containing the following grammatical forms:
   a) Passive Voice
   b) Infinitive. Define the function of the infinitive in the selected.

VI. Retell the text concentrating on the most important information you have learned from it.

VII. Write a brief summary of the text

Text 1A

Read and translate the text.

ALUMINIUM: ITS HISTORY

At the Paris Exhibition of 1855 aluminium was exhibited for the first time. It was regarded as one of the principal novelties of that year. The new metal was shown as a bar, bearing a very sensational inscription "Silver from Clay". It was regarded even at that time at the metal of the future with great practical possibilities. Scientific and non scientific press devoted long articles to its description. Special attention was paid to the advantages of aluminium – it is light it does not rust and is very strong especially when mixed with other metals.

The first attempts to isolate this metal from its oxide were made in 1807 by Davy and some years later by Berzelius. But both failed to obtain any satisfactory results. Nearly fifty years passed before French and German scientists isolated aluminium in 1854. It was isolated by electrolysis. Scientists also investigated the distribution of the metal in

nature. Aluminium is one of the most widely distributed of the chemical elements but it is never found in the free state. Metalic aluminium has a beautiful silver lustre, but when impure aluminium has a gray or a bluish colour. The isolation of aluminium became simple and cheap only when man harnessed electricity. Only then was it possible to produce aluminium and put to use.

Notes

Davy H. (1778-1829), an English chemist.
Berzelius J. J. [ ] (1779-1848), a Swedish chemist.

Post-reading

I. Give Russian equivalents of the following words and phrases.

To regard as; to investigate the distribution of; great practical possibilities; specially; to isolate; satisfactory results; to harness; to fail to do; to put the discovery to use; to show the advantages of; to rush.

II. Give English equivalents of the following phrases. Use them in sentences of your own.

Обращать внимание на преимущества; посвятить статью описанию; сделать попытку выделить что-то; металл будущего; получить удовлетворительные результаты; становиться простым и дешевым; использовать что-либо.

III. Restate the following sentences according to the pattern.

A. It was exhibited in Moscow.
   It will be exhibited in Moscow.

1. It was regarded as one of the principal novelties.
2. Spetial attention was paid to the advantages of the metal.
3. The first attempts to isolate the metal were made by a group of scientists.
4. It was put to use.
5. The metal was isolated by electrolysis.

B. They showed the new metal as a bar.
   The new metal was shown as a bar.

1. Scientific press devoted many articles to ots description.
2. They obtained satisfactory results.
3. We investigated the distribution of the metal.
4. A group of scientists isolated aluminium in 1854.
5. They made attempts to isolate the metal from its oxide.

C. It is regarded as an important discovery.
   It can be regarded as an important discovery.

1. It is never found in the free state.
2. The element is investigated in many laboratories.
3. Many articles are devoted to its description.
4. The results are shown in a table.
5. The element is isolated by electrolysis.

D. Aluminium was exhibited for the first time in 1855.
They exhibited aluminium for the first time in 1855.
1. It was regarded as one of the novelties of that year.
2. Aluminium was shown at the exhibition as a bar.
3. Special attention was paid to the advantages of the metal.
4. Some attempts to fined the metal in the free state were made ten years ago.
5. Interesting results were obtained after a number of experiments.

E. Change into negative.
1. They devoted many articles to this problem.
2. We shall make an attempt to put it to use.
3. It is possible it obtain satisfactory results.
4. They could investigate it without electrolysis.
5. It was regarded as one of the principal novelties.

IV. Choose the right form from the two given in brackets.

1. The new metal (showed, was shown) as a bar.
2. Scientific press (devoted, was devoted) long articles to its description.
3. Aluminium never (found, is found) in the free state.
4. Nearly fifty years (passed, were passed) before aluminium (isolated, was isolated).
5. The scientists also (investigated, were investigated) the distribution of the metal in nature.

V. Correct the wrong statements using the following as phrase-openings.

On the contrary. I don't believe that. To my mind. In my opinion. As far as I know. It seems to be wrong. I'm afraid you are mistaken. I can't agree with you. It seems unlikely that. As is known.

1. At the Paris Exhibition of 1855 aluminium was exhibited for the second time.
2. It was not regarded as the metal of the future.
3. Scientific press did not devoted any articles to its description.
4. Davy and Berzelius obtained satisfactory results.
5. Aluminium is one of the most rare chemical elements.
6. Nowadays the isolated of aluminium is very complicated.

7. It was possible to produce aluminium easily before man harnessed electricity.

VI. Ask questions to which the following could be answers.

1. They investigated the distribution of the element in nature.
2. Impure aluminium is grey or bluish.
3. It was first described in scientific articles.
4. The new metal was called “silver from clay”.
5. Nearly fifty years passed before scientists isolated aluminium.

VII. Comprehension check-up.

1. When and where was aluminium first exhibition?
2. Why was it regarded as the metal of the future?
3. When were the first attempts to aluminium made?
4. Did Davy and Berzelius obtain any satisfactory results?
5. When was aluminium isolated?
6. How was aluminium isolated?
7. Can aluminium be found in the free state?
8. What made the isolation of aluminium simple and cheap?

VIII. Retell the text briefly.

Text 2

Pre-reading

I. Listen, read and memorize the following words.

predict [pri´dikt] v – предсказывать
collapse [ ] v – крушение, гибель, падение, крах
white-dwarf [ ] – белый карлик (тип звезды)
immense [i´mebs] a – огромный, безмерный
squeeze [skwi:z] v – сжимать, сдавливать
~ out – выжимать, выдавливать
particle [ ] n – частица
coin [ ] v –создавать новые слова, выражения
confirm [ ] v – подтверждать, поддерживать, утверждать
burst [ ] n – взрыв, вспышка
precision [ ] n – точность, четкость
apparent [ ] a – явный, очевидный
exceed [ik´si:d] v – превышать, превосходить
ultimate [ ] a – последний, окончательный; элементарный, основной; максимальный, предельный
certainty [ ] n – несомненный факт; уверенность
escape [is´keip] v – уходить, ускользать, избегать граница
boundary [ ] n – граница
wink [ ] v – мигать, мерцать
exert [ ] v – оказывать давление, влиять; вызывать (напряжение)
evidence [ ] n – данные, признаки; доказательство, свидетельство
expand [iks´pænd] v – расширять (ся); увеличивать(ся); развивать(ся)
globule [ ] n – шар, шаровидная частица, глобула
condense [ ] v – сгущать (ся),конденсировать (ся)
onset [ ] n – начало
dilute [dai´lu:t] v – разжижать, разрежать
a – разведенный, разбавленный
venture [ ] v – рисковать, решиться, осмелиться
contract [ ] v – сжимать (ся), сокращать (ся)
collide [ ] v – сталкиваться
annihilation [ ] n – уничтожение, отмена
shrink (shrank, shrunk) [ ] v – сжимать (ся), сокращать (ся)

II. Match up.

1. the synonyms

a) to rotate, to exert, ordinary, to contain, dense, to increase, immense, to leave, precision, intense.

b) to consist, common, to raise, to revolve, thick, to escape, strong, accuracy, to influence, enormous.

2. the antonyms

a) collapse, to result in, to squeeze, slow, inside, to condense, invisible, to confirm, stable, to heat.

b) outside, to expand, to dilute, birth, fast, to result from, to cool, visible, to deny, unstable.

III. Translate the worlds formed by conversion.

burst – to burst; collapse – to collapse; coin – to coin; escape – to escape; evidence – to evidence; squeeze – to squeeze; venture – to venture; wink – to wink; influence – to influence; crash – to crash; form – to form; space – to space; mark – to mark.

IV. Translate the sentences defining ht part of speech of the underlined words.

1. Problem of this kind usually interest pure scientists.
2. Information theory aroused considerable interest among intellectuals.
3. This fact limits the scope of investigation.
4. In the same way the necessary limits can be found for these coefficients.
5. We note that figures are much more reliable than the previous ones.
6. The text is difficult to read, there being too many reference notes in it.
7. Thi9s argument will convince anyone who doubts this point.
8. There can be no doubt about it.

V. Translate the sentences paying attention to degrees of comparison to adjectives and comparative construction.

1. Physics is the most fundamental of the experimental sciences as it is the most precise and mathematical.
2. Iron is not so hard as steel.
3. We define an atom as the smallest particle of an element which can take part in a chemical change.
4. Acceleration occurs when thrust is greater than drag.
5. The nearer the earth is, the denser the atmo0sphere is.
6. Ultraviolet light is far more effective in production chemical reactions than visible light.
7. The higher the altitude of the balloon flight is the greater pressure is exercised against its inner walls.
8. Mars is a planet smaller and colder than our own and it can be recognized by its brilliant red colour.
9. The old device is not so powerful as the new one.
10. The more carbon the steel contains the harder it becomes.

11.Chemistry is as difficult as physics.

Reading

Read text 2 and suggest a title for it.

As far back as 1930 Robert Oppenheimer and others predicted that the co0llapse of a big star, several times the mass of our sun, could lead to a stable object very much smaller than a white – dwarf. The collapse of such a star would result in an extremely dense object about ten miles in diameter. The immense gravitational force would crush the very atoms themselves, squeezing out all the space and leaving chiefly nuclear particles called neutrons. For such an unusual body of ultradense matter, the term "neutron star" was coined.

In 1967 astronomers confirmed these speculations by the discovery of pulsars – pulsing stars whose intense bursts of radiation come with clock – like precision at as slow as every 4 seconds and as fast as 30 times a second.

Soon it became apparent that the pulsars must be rotating neutron stars. Only a body as small as a neutron star could rotate 30 times a second a not fly apart from centrifugal force.

Density of a neutron star (more that 100 have been discovered) far exceeds anything known in our ordinary world. A teaspoon of neutron star material for example, would weigh a billion tons – the equivalent of 200 million elephants.

There is something in the universe still smaller, still denser and still more mysterious than the neutron star: the so called black hole. A black hole is an end product of the catastrophic collapse of a really large star.

A black hole is the ultimate concentration of matter predicted by Einstein theory of relativity and only recently confirmed as a near certainty by X-ray telescopes on rockets and satellites.

Put simply, if a collapsing star is compressed enough, its gravity is so strong that not even light can ever escape its boundaries. Thus the star simply winks out and is never seen again. Yet this astrophysical fantasy, though permanently invisibly, exerts a powerful influence in the universe.

What is inside a black hole? It's impossible to tell. You can never know what has happened inside, since no energy in any form ever comes out to carry the information.

Post – reading.

I. Reproduce the parts of the text in which the following phrases are used.

The collapse of a big star; clock – like precision; rotating neutron stars; the ultimate concentration of matter; exerts a powerful influence in the universe.

II. Make up sentences out of the two parts.

1. The immense gravitational force…	1. …30 times a second and not fly apart from centrifugal force.
2. A teaspoon of neutron star material…	2. … its gravity is so strong that not even light can ever escape its boundaries.
3. Only a body as small a neutron star could rotate…	3. … would crash the very atoms themselves, squeezing out all the space and leaving chiefly nuclear particles called neutrons.
4. A black hole is an end product…	4. … since no energy in any form ever comes out to carry the information.
5. If a collapsing star is compressed enough…	5. … for example, would weigh a billion tons – the equivalent of 200 million elephants.
6. You can never know what has happened inside…	6. … of the catastrophic collapse of a really large star.

III. Complete the following sentences in Russian and then translate then into English.

1. Разрушение такой большой звезды привело бы к образованию…
2. Термин "нейтронная звезда" был создан для…
3. В 1967году астрономы подтвердили эти соображения открытием…
4. Плотность нейтронной звезды значительно превышает…
5. Во Вселенной существует нечто меньшее, тем не менее, более плотное и таинственное…
6. Тем не менее, эта астрофизическая фантазия, хотя…
7. Невозможно узнать, что происходит внутри черной дыры, поскольку…

IV. Divide the text into logical parts, define the main idea and suggest a title for each part.

V. Fill in the blanks with the proper word choosing it among the words a suggested in brackets.

1. Scientists predicted that the…(birth, collapse, collision) of a big star could lead to a stable object very much smaller than a …(planet, sun, white-dwarf)
2. The immense gravitational force would…(crash, rotate, create) the very atoms themselves squeezing out all the space and leaving chiefly nuclear…(electrons, particles, molecules) called neutrons.
3. Only a…(thing, earth, body) as small as a neutron star could rotate 30 times a second and not fly apart from…(centrifugal, longitudinal, axial) force.
4. A… (universe, meteorite, black hole) is an end product of the …(weak, catastrophic, quick) collapse of a really large stare.
5. If a collapsing star is …(destroyed, compressed, heated) enough, its gravity to so strong that not even light can ever…(enter, escape, affect) its boundaries.
6. A black hole though permanently…(bright, stable, invisible) exerts a powerful…(pressure, influence, impression) in the universe.

VI. Find in the text and translate the sentences with the following grammatical forms:

a) Degrees of comparison of adjectives and comparative constructions.
b) Modal verbs.

VII. Make up a dialogue discussing in it the most important ideas of the text.

VIII. Give a brief summary of the text.

Text 2A

Read and translate the text.

The Life of a Star

There is evidence that ten billion years ago the universe was a dense hot globule of gas expanding rapidly outward. At that time the universe contained nothing but hydrogen. There were no stars and no planets.

About one hundred million years later, stars began to condense out of the hydrogen and continued to form as the universe aged. The sun arose in this 4,5 billion years ago. Many stars came into being before the sun was formed; many others formed after the sun appeared. The process continues, and through telescopes we can now see stars forming out of compressed pockets of gas in outer space.

When a star begins to form as a dense cloud the individual atoms fall towards the center of the cloud under the force of the star's gravity. As

they fall they pick up speed and their energy increases. The increase in energy heats the gas and raises the temperature. After this process has continued for some millions of years the temperature reaches about 20 million degrees Fahrenheit. At this temperature the hydrogen within the star ignites and burns in a continuing series of nuclear reaction. The onset of these reactions marks the birth of the star.

Notes.

Fahrenheit [ ] (1686-1736), German physicist; the thermometer or the scale on which the boiling point of water is 212^o and the freezing point 32^o.

I. Give Russian equivalents of the following worlds and phrases.

There is evidence; to contain nothing but; to come into being; to expand outward; under the force of gravity; to pick up speed; a continuing series of nuclear reactions; to mark the birth; the onset of a reaction.

II. Paraphrase the following sentences.

Remember that	
instead of	we can say
anything except	nothing but
to appear	to came into being
to grow old	to age
to gain speed	to pick up speed
start	onset

1. Ten billion years ago the universe did nut contain anything except hydrogen.
2. Many stars appeared before the sun was formed.
3. Stars continued to form as the universe grew older.
4. Atoms gain speed as they fall towards the center of the cloud.
5. The start of nuclear reactions marks the birth of the star.

III. Correct the wrong statements using the phrase – openings.

1. All the stars and planets in our Galaxy came into being at the same time.
2. Scientists can't suggest any theory explaining the evolution of stars.
3. The force of gravity within the star has no effect on its evolution.
4. As far back as the 19^{th} century scientists knew all the details concerning nuclear reactions taking place within the star.
5. The telescope is the only instrument of studying the planets of the solar system.

IV. Fill in the blanks with prepositions or adverbs if necessary.

1. Ten billion years ago the universe was a dense, hot globule… gas expanding rapidly…
2. Then stars began to condense… … the hydrogen and continued to form as the universe aged.
3. …telescopes we can now see stars forming… … compressed pockets … gas in outer space.
4. As the atoms fall … the center of the cloud … the force of gravity they pick … speed.
5. The increase … energy heats the gas.
6. After this process has continued … some millions of years, the temperature reaches … 20 million degrees F.
7. … this temperature the hydrogen … the star ignites and burns … a continuing series … nuclear reactions.

V. Comprehension check-up.

1. What was the structure of the universe ten billion years ago?
2. What gases did it contain at that time?
3. What was happening as the universe aged?
4. When did the sun arise?
5. Why does the temperature within the star increase at a certain period of its formation?
6. What marks the birth of a star?

VI. Ask questions to which the following statements could be answers.

1. Through telescopes astronomers can see stars forming in outer space.
2. Many stars came into being before the sun was formed; many others formed after the sun appeared.
3. The individual atoms fall towards the center of the could under the force of the star's gravity.
4. The energy of atoms increases because while falling they pick up their speed.
5. When the temperature within the star reaches about 20 million degrees F the hydrogen ignites.

VII. Render the text in English using the words and phrases supplied below.

Эволюция звезд

Ученые считают, что солнце и планеты образовались из гигантского облака газа и пыли. Солнце постепенно разогревалось, благодаря огромной гравитационной энергии. Со временем эта протозвезда начала ярко сиять, и температура ее недр достигла

нескольких миллионов градусов. Ядра атомов водорода, движимые колоссальным теплом, сталкивались с такой силой, что могла начаться термоядерная реакция. Далее звезду в горячем состоянии поддерживала ядерная энергия.

Таков путь эволюции большинства звезд. Сегодня Солнце – заурядная звезда. Оно занимает промежуточное положение между самыми крупными и самыми маленькими звездами.

Эволюция звезд, которые намного массивнее Солнца, заканчивается катастрофическим взрывом. Со временем частицы вещества взорвавшейся звезды послужат строительным материалом для образования новых звезд. Такой звездой, звездой второго поколения, и является наше Солнце.

to shine brightly; the temperature of its interior; the nuclei … collided; an ordinary star; it occupies an intermediate position between; to end in an explosion; to serve as building material; the second generation.

Do you know that…

There are two current theories which explain the nature of the universe's evolution. The first is the "big bang" theory, the second is the "steady state" theory.

The "big-bang" theory assumes that the universe started from an "ylem", or extremely dense ball consisting only of what we know as ordinary matter. The steady-state theory is based on the concept of continuous creation of matter.

In its "initial state" the universe consisted of an extremely dilute cloud of gas, or rather a plasma of electrified particles. The scientists called it an ambiplasma, because it contained both particles and antiparticles.

We do not venture to say how the cloud of ambiplasma originated. For that matter, the big-bang theory does not attempt to explain how the original ylem came into being. We simply assume the existence of the cloud and go on to show that by gravitation it would begin to contract very slowly. When the cloud has contracted to a radius of a few billion light-years the particles begin to collide. Their mutual annihilation releases energy, mainly in the form of radiation. As the contraction proceeds the collisions become more and more frequent and the radiation pressure grows stronger. When the radius of the cloud has shrunk to about a billion light years, the radiation arising from particle-antiparticle annihilation is so strong that it overcomes the gravitational attraction. The cloud, including the galaxies that have condensed within it by that time, begins to expand. The result is the expanding universe we now observe with our telescopes.

Answer the following questions.

1. What are the two current theories which explain the nature of the universe's evolution?
2. What did the universe start from according to the "big-bang" theory?
3. What is the steady-state theory based on?
4. What is an ambiplasma?
5. Why is the universe expanding now?

Text 3. Contracts with Other Intelligent Societies.

Pre – reading.

I. Listen, read and memorize the following words.

ancestor [ ] n – предок
worm [ ] n –червяк
surpass [ ] a – превосходить; перегонять
wisdom [ ] n – мудрость; здравый смысл
assume [ ] v – предполагать, допускать
vice versa [ ] adv – наоборот; обратно
regrettable [ ] a – прискорбный; печальный
interstellar [ ] a – межзвездный
~ space – межзвездное пространство
threshold [ ] n – порог; предел, граница
inhabited [in´hæbitid] a – населенный
refine [ri´fain] v – повышать качество; облагораживать
усовершенствовать
extraterrestrial [ ] 1a – внеземной; вне пределов Земли
2n – инопланетянин, космический пришелец
exceptionally [ ] adv – исключительно
decipher [ ] v – расшифровывать
representative [ ] 1n – образец; представитель
2a – характерный; представляющий
circuitry [ ] n – схемы; схемотехника
attitude [´ætitju:d] n – позиция; отношение (к чему-либо)
hostile [ ] a – враждебный
respond [ ] v – отвечать; реагировать; отзываться (to)
stupid [´stju:pid] a – глупый, бестолковый
keen [ ] a – сильно желающий (чего-либо);
стремящийся (к чему либо); сильный, глубокий (о чувствах)
warn [ ] v – предупреждать; предостерегать (of)
dreadful [ ] a – ужасный, страшный
drawback [ ] n – препятствие; помеха; недостаток,
отрицательная сторона
gain [ ] v – получать, приобретать; извлекать
пользу, выгоду
humanity [ ] n – человечество, люди
obstacle [ ] n – препятствие, помеха
favourable [ ] a – благоприятный, благосклонный
ant n – муравей
alien [ ] a – чужой, чуждый
staircase [ ] n – лестница

II. Form nouns from the following verbs. Translate them.

to develop, to exist, to direct, to assume, to expect, to discover, to receive, to explore, to transmit, to require, to detect, to explain, to consider, to treat.

III. Define the original words from which the following derivatives are formed.

passage, imagination, extremely, comparison, achievement, regrettably, advanced, difference, communication, hopeless, systematically, remarkable, technological, dreadful, favourable.

IV. Translate the words formed by conversion. Make up your own sentences with some of these words.

circle – to circle, change – to change, blink – to blink, start – to start, contact – to contact, cover – to cover, a cross – cross – to cross, message – to message, search – to search, reply – to reply, a level – level – to level, gain – to gain, experience – to experience, estimate – to estimate.

V. Translate the sentences defining the part of speech of the underlined words.

1. The context is a guide to the meaning of the words. While one of the crew remains in orbit two astronauts guide the Lunar Module to a soft landing.
2. The astronauts were going to sample the rocks and minerals of the Moon surface. The recent failure of Appollo 13 means that investigators will have to wait for samples a little longer.
3. The sound was hardly audible. It sounds like a very good idea.
4. People living on other worlds may look quite different. In that novel the author peopled the planets with strange creatures.
5. Multistoreyed houses have a magnificent look. The spaceman was housed in a small cabin.
6. We can expect no favour from nature. They favour this approach.

VI. Read the texts. Point out modal verbs and choose the proper Russian equivalents from the lists below.

A. If we are to fly to other planets we shall have to design a gigantic spacecraft. The conditions there must be as close to those of the Earth as possible so that we will not have to worry about all the usual hardships of space travel.

The capability of man as a space researcher should be the subject of close examination. The problem of overload is to come first. Depending on its direction it is to be classified as longitudinal, transverse or perpendicular. Next the problem of weightlessness is to be considered.

Each spaceman must know the design of his own craft and he must be able to maintain the systems during the flight. It some unforeseen situation develops he should know where to look for the breakdown and should be able to remove its cause if the crew is to feel confident during the flight and experiments.

должен, должны; пришлось, придется; принято, захотим, стремимся, нужно; следует.

B. Planets like the Earth must be quite common. A question arises: what sort of life might exist within our own solar system other than that on the Earth? It is possible that simple forms of life may exist on Mars. Most astronomers would agree that they are not to find any intelligent life on the other planets that circle our sun. Intelligent life might exist on other words. If wonderful civilizations exist among the stars it is only natural that human beings would want to visit them or at least to communicate with them. But manking may never be able to journey there to meet the inhabitants because of the enormous distances involved. No wonder the problem of intelligent life on other worlds should be so exciting!

должно быть; не суждено; должна быть; возможно; могла бы; не исключено; не в состоянии; по-видимому; естественно.

Reading

Read the text carefully. Try to understand all details.

CONTACTS WITH OTHER INTELLIGENT SOCIETIES

The Earth was formed when our Galaxy had already existed for five billion years. Many stars in our Galaxy are billions of years older than our Sun and many are billions of years younger. Earth-like planets circle around many of these stars. On some of these planets, intelligent life may have developed.

On the Earth, the passage of 1,000 years has produced enormous changes in scientific knowledge. Yet, 1,000 years is the blink of an eye in the lifetime of a planet or a star. The changes that can occur in a billion years are beyond our imagination. Remember that a billion years ago man's ancestor was like a worm. Some societies that may exist on planets younger that the Earth would be extremely primitive in comparison with ours. But other societies, which had an earlier start, may have surpassed our achievements long ago. They may have reached great height of wisdom or great heights of scientific knowledge, or both.

If we assume that intelligent life has developed elsewhere, we should direct our attention to the planets surrounding stars older than the Sun. We can expect them to contain societies more advanced than ours,

societies which mastered the techniques of radio communication and harnessed the power for transmitting signals over great distances.

Just as Columbus discovered the Indians, rather than vice versa, we must expect these advanced societies to contact us before we reach them.

Regrettably, physical contact with societies on planets circling around other stars is an unlikely prospect for the time being, for the average distance between stars is 30 trillion miles. It would take a spacecraft moving at rocket speed about 100,000 years to cover this distance.

However, interstellar communication is possible. The threshold of radio communication, which we crossed 60 years ago, surely has been crossed on other planets thousands, if not millions, of years ago. We may expect that others, with radio communication far in advance of ours are already listening, and will hear us first. However, it is still too early for us to expect to receive a message from these intelligent societies if they exist. Our Earth is just a tin thing circling around a star, one among 100 billion similar stars in our Galaxy. It would be a hopeless task for any intelligent society to explore systematically every star in search of inhabited planets. We ourselves must make it clean that intelligent beings live on this planet.

We must do it by sending radio signals or in some other way, and only then will anybody look in our direction.

Contact can occur, when we are able to harness the power required for sending radio-signals over interstellar distances. We must also have refined techniques for detecting weak signals sent in reply.

It is unlikely that we will reach this state in our lifetime. We may reach it in the lifetimes of our children or grandchildren.

Post-reading

I. Give Russian equivalents of the following phrases.

to circle around; to produce enormous changes; it is beyond my imagination; in comparison with; to surpass one's achievements; to reach great heights of wisdom; to direct one's attention to; to master the techniques; for the time being; to explore systematically; to detect signals; in one's lifetime.

II. Use the phrases below in various combinations.

		developed elsewhere.
		reached great heights of knowledge.
Intelligent life		mastered the techniques of radio
Other societies	may have	communication.
They		tried to contact us.
		harnessed the power required for sending signals.

III. Restate the following sentences according to the pattern.

Pattern: It is quite probable that intelligent life has developed elsewhere. Intelligent life may have developed elsewhere.

1. It may be that our Galaxy has existed for five billion years.
2. It is possible that some societies have had an earlier start in comparison with ours.
3. It is likely that they have surpassed our achievements in many respects.
4. It is probable that these advanced societies have reached great heights of scientific knowledge.
5. It is likely that they have mastered the techniques of radio communication.
6. It is quite probable that they have already sent signals to our planet.

IV. Put up different types of questions to the following sentences.

1. On the Earth the passage of 1,000 years has produced enormous changes in scientific knowledge.
2. Physical contact with societies on other planets is not possible because a space voyage may take a million years.
3. Societies with radio-communication far in advance of ours will hear us first.
4. Our task is to harness the power required for sending signals over interstellar distances.

V. Paraphrase the following sentences

using	*instead of*
to circle around	to move around
to produce changes	to cause changes
in comparison with	as compared to
let us assume	let us suppose
to direct one's attention to	to turn one's attention to
to harness the power	to use the power
to explore	to study
to occur	to take place
to detect	to receive

1. Earth-like planets move around many of the stars in our Galaxy.
2. The passage of 1,000 years has caused enormous changes in scientific knowledge.
3. Societies that may exist on planets younger than the Earth would be extremely primitive as compared to ours.
4. Let us suppose that intelligent life has developed elsewhere.

5. We should turn our attention to the planets surrounding stars older than the Sun.
6. Contact can take place when we are able to use the power for transmitting signals over great distances.
7. It would be a hopeless task for any intelligent society to study every star in search of inhabited planets.
8. We must also have refined techniques for receiving weak signals sent in rely.

VI. Say if the following statements are true or false. Correct the wrong statements.

1. There are no intelligent societies existing in the Universe.
2. Many stars in our Galaxy are billions of years older than our Sun.
3. A thousand years ago man was as intelligent as he is in the 20^{th} century.
4. There are some Earth-like planets in the Universe on which intelligent life may have developed.
5. We should direct our attention to the planets surrounding stars older than the Sun because societies existing there may have surpassed our achievements in many respects.
6. The right way of searching for inhabited planets is to explore every star in the Galaxy.
7. We've harnessed the power required for sending radio signals over interstellar distances.
8. Interstellar communication is possible and we may expect that others with radio communication far in advance of ours will hear us first.
9. A cosmonaute is able to cover a distance between two stars in his lifetime.
10. Interstellar contact with societies on other planets is possible with the vehicles available.

VII. Put each word from the first group together with a suitable word from the second.

1) to receive, to detect, to master, to produce, to explore, to direct, to transmit, to cover
2) changes, a distance, attention, signals, space, techniques, a message.

VIII. Give answers to the following questions.

1. When was the Earth formed?
2. Where may intelligent life have developed?
3. What does the passage of 1,000 years mean for the Earth and for the Universe?

4. What level of the development may societies existing on planets of different ages have achieved?
5. What planets can be expected to contain societies more advanced than ours?
6. Why is physical contact with societies on other planets impossible for the time being?
7. Is interstellar communication possible?
8. Why is it hopeless to try to explore every star in search of inhabited planets?
9. Can we receive a message from an intelligent society living on the nearest inhabited planet?
10. What means are necessary for contact with other societies to occur?

IX. Find in the text the following grammatical forms.

a) modal verbs, explain their application
b) verbals, define their functions

X. Render the text in English using the words and phrases supplied below.

Существует ли цивилизация вне солнечной системы?

Возможность существования сознательных форм жизни во Вселенной реальна. Возможность установления связи с такими цивилизациями также вполне реальна. Даже та аппаратура. Которую мы имеем в настоящее время, позволяет обмениваться радиосигналами с самыми отдаленными частями Вселенной. Естественно, что мощность таких передач должна быть огромной. Были даже сделаны попытки получить кодированные сообщения с планет, которые, возможно, достигли нашего уровня развития. Однако до сих пор какой-либо связи с ними не установлено. Но это не означает, что ответ не был послан или даже, что посланные нами сигналы не были получены. Наши неудачи могут объясняться причинами чисто техническими – низкой чувствительностью нашей аппаратуры.

Intelligent forms of life; enables us to exchange; the most remote parts of the Universe; the power of such transmissions has to be enormous; coded messages; it may be purely a technical matter; threshold of sensitivity … is not sufficient.

XI. Discuss the following problems.

1) What is in your opinion an intelligent society? You may use the following: to reach great heights of wisdom; to achieve progress in

scientific knowledge; to be advanced in engineering and technology; to direct attention to education.

2) What is your personal opinion on the possibility of existing extraterrestrial civilizations? What point of view do you support: optimistic or pessimistic as for intelligent life on other planets and establishing contacts with other intelligent societies? Give your reasoning.

Text 3 A.

Read the text and entitle it.

To establish a contact with an extraterrestrial civilization is an exceptionally difficult problem. For the time being we've got neither a proper spacecraft nor proper fuel to travel beyond the solar system boundaries. There are tremendous difficulties in establishing radiocommunication as well.

Difficult as the problem of getting information from other worlds may prove, the problem of deciphering signals sent by representatives of other worlds is, perhaps, by far more complicated. Various civilizations may have reached different development levels. The difference in this respect may be so remarkable that it prevents any understanding altogether.

Suppose we try to explain to the people who lived in the stone age something about TV circuitry. Could they have understood our explanations? So far, we don't know how to solve the problem.

There is one more aspect of the problem to be considered: What might be the attitude of an extraterrestrial civilization to us, friendly or hostile?

To respond or not to respond to the signals of an extraterrestrial civilization in case we receive any? The answer to the question depends upon what are they who have transmitted the signal.

What's their development stage? What's their attitude towards us?

As to the development level most scientists believe it unlikely that we might contact a civilization whose representatives would be still more stupid than we, people, are. Suppose it would be a highly developed civilization that is far ahead of ours. In this case several versions are possible:

Version 1. They take a keen interest in us and their attitude to us is friendly (an ideal version). In this case they might provide us with valuable scientific, technological and cultural information, warn us against some dreadful mistakes (e.g. connected with following some wrong industrial development etc.)

Yet, there are certain drawbacks even in this ideal version too. First of all, to what extent can one gain from somebody's experience? People draw so few lessons from other persons' mistakes (take, for example, the smoking problem).

Besides, may be an easy progress would do humanity harm, since people might lose their interest in science, technology, art etc.

They say, only wolves make hares healthy. Overcoming obstacles – that's what makes people strong.

Another version will be if the civilization is advanced, their attitude to us is favourable but they take no interest in us.

What d'you think the age of the human race is? Some scientists estimate it to be less than a million years. Recent archeological data prove that human beings lived as far as two or even three million years ago. But when we speak about civilizations we should cut the period to several thousand years only.

Now imagine that the extraterrestrial civilization is a million or two years ahead of us development. In this case they might consider we had no intellect at all. They might treat us the way we treat ants. What could we teach ants or learn from them? What could we warn them about?

One more version is possible, and namely: they take a keen interest in us but their attitude to us is alien.

Even in this case it's necessary to establish contacts because it would help us to get a better understanding of our place in the evolution process.

We haven't yet reached the last step of the evolution staircase, and there can be no such a step.

I. Make up English-Russian pairs of the words and word combinations equivalent in meaning.

1. the solar system boundaries	установить контакт
2. a proper spacecraft	преодоление препятствий
3. representative	извлекать уроки
4. to establish a contact	соответствующий космический корабль
5. deciphering signals	границы солнечной системы
6. different development levels	отношение
7. to respond to the signals	представитель
8. attitude	лестница эволюции
9. to draw lessons	расшифровка сигналов
10. overcoming obstacles	различные уровни развития
11. the evolution staircase	отвечать на сигналы

II. Fill in the blanks with the proper word choosing it among the words suggested in brackets.

1. For the time being we've got neither a proper … (device, spacecraft, crew) nor proper … (compound, power, fuel) to travel beyond the solar system … (ceiling, region, boundaries).
2. The problem of … (transmitting, deciphering, coding) signals sent by … (flying object, representatives, station) of other worlds is by far more … (interesting, attractive, complicated).
3. The difference in development … (levels, scale, limitation) of civilizations may be so remarkable that it … (facilitates, enriches, prevents) any understanding altogether.
4. If a highly developed civilization is interested in establishing a contact with us it might provide us with … (unimportant, out-of-date, valuable) scientific, technological and cultural information, … (suggest, warn, describe) us against some … (useful, dreadful, powerful) mistakes.
5. Another version will be if the civilization is advanced, their … (attitude, opinion, tendency) to us is … (hostile, favourable, indifferent) but they take no interest in us.
6. It's necessary to establish contacts even with a civilization which is alien to us because it would help us to get a better … (reasoning, discussing, understanding) of our place in the … (Universe, evolution process, structure).

III. Find the statements corresponding to the content of the text.

1. It is very easy to establish a contact with an extraterrestrial civilization because now a days we have all necessary means for travelling beyond the solar system boundaries.
2. The difference in development levels reached by various civilizations may be an obstacle to deciphering and understanding signals sent by them.
3. The attitude of an extraterrestrial civilization to us is another important aspect to be considered in solving the problem to respond or not to respond to the signals of this civilization in case we receive any.
4. Any highly developed civilization that is far ahead of ours might be interested in establishing contacts with us to provide us with different valuable information.
5. It is not necessary to establish contacts with alien civilization because it would be quite useless for us.

IV. State the main idea of each logical part of the text and give some examples illustrating it.

V. Answer the questions.

1. Why is it so difficult to establish a contact with an extraterrestrial civilization?
2. What may be an obstacle preventing understanding between various civilizations?
3. What does the answer to the question to respond or not to respond to the signals of an extraterrestrial civilization depend upon?
4. What civilization would it be possible for people to contact?
5. What are advantages and drawbacks of the ideal version of interaction with a highly developed civilization?
6. What is another version of a possible attitude of the advanced civilization to people?
7. Why is it necessary to establish contacts even with the alien civilization?

VI. Give a brief summary of the text.

Text 4. The First Giant of the Air

Pre-reading

I. Listen, read and memorize the following words.

blueprint [ˊblu:print] n- наметка, проект, план
siege [ ] n- осада
naval [ˊneivl] a- (военно)-морской
armoured [ ] a- бронированный
~ car -бронеавтомобиль
observe [ ] v- наблюдать, следить;
вести научные наблюдения
soar [ ] v- парить, высоко летать; подниматься ввысь
arrest [ ] v- задерживать, останавливать;
приостанавливать, приковывать
swift [swift] -1) a- скорый, быстрый
2)adv- быстро, поспешно
suction [ ] n- всасывание; всасывающий
flap [flæp] v- взмахивать (крыльями); махать;
колыхать(ся)
bear [ ] v- терпеть, выносить
rugged [ˊrʌgid] a- прочный, массивный
trigger [ ] v- приводить в движение; начинать;
вызывать
drag [ ] v- неохотно, лениво делать что-либо;
затягиваться (о времени и т. п.)
kick [kik] v- противиться, проявлять недовольство
scream [skri:m] v- пронзительно кричать
drudgery [ ] n- тяжелая, нудная работа
rote [ ] n- механическое запоминание
frustrate [ ] v- расстраивать, срывать (планы);
делать тщетным, бесполезным

II. Practice reading the following.

Leonardo da Vinci [ ];
Submarine [ ];
Hydrodynamics [ ];
artillery [ ];
velocity [ ];
missile [ˊmisail];
pioneer [ ];
parachute [ ];
hydrostatics [ ];
pressure [ ];

mathematical [ ];
parabollic [ ];
hydraulics [ ];
hydrometer [ ];
mechanics [mi´kæniks].

III. Form derivatives with the help of the suffixes. Translate them.

a) nouns from the following verbs with the suffix – **tion** (- **ation**)

Model: to inspire – inspiration.

to determine – ; to concentrate - ; to collect - ;
to observe – ; to educate - ; to reduce - ;
to realize – ; to interact; to multiply - ;
to explore - ; to direct - .

b) adjectives with the suffix - **able** (- **ible**)

Model: to change – changeable
to respond – responsible

move - ; practice - ; remark - ; pronounce - ;
replace - ; imagine - ; reason - ; sense - ;
bear - ; compress - .

IV. Translate the words formed by conversion. Use some of them in your own sentences.

Balance – to balance; bank – to bank; blueprint – to blueprint; arrest – to arrest; check – to check; advance – to advance; drag – to drag; master – to master; flap – to flap; program –-to program; sample – to sample; touch – to touch; travel – to travel; scream – to scream; trigger – to trigger.

V. Give adequate Russian equivalents of italicized words.

1. to reason – размышлять, рассуждать логически, обсуждать.
   reason – разум, основание, соображение, причина.
   reasoning – рассуждение, аргументация.

In the days before Space Age astronomers **learned to reason out** an extraordinary amount of theories hypotheses and assumptions about the sun primary by studying the visible light that shines from it. These investigations were important **for tow principal reasons**. First, the sun is the heart of the solar system; second, the sun is the only star **near enough to permit reasonable close observation. T**herefore **it stands to reason that** astronomers should focus their attention on the study of the sun's characteristics, namely, on its temperature and energy balance. **For the reasons given above** modern astronomy research techniques were developed, modified and improved. These studies require a great variety

of computational work, new instrument, **let alone sound reasoning on the part of the space scientist**, to further unravel the mysteries of the sun.

2. to travel – путешествовать, двигаться, перемещаться, распространяться.
   travel – путешествие, движение, передвижение.

Sometime in the 21st century or maybe later **our conventional means of travel** over long distances will certainly seem slow to that generation. New types **of space travel vehicles** will be used like their prototype – the shuttle now under development **to carry travellers in special space travel suits** from thew earth to orbital station. There **one can observe comets or stars travel** across the Universe or listen in to X-ray stars **pluses travelling as waves** to radio receivers. Scientists of that generation will probable make spaceships reach the velocity of **particles travelling to the target** in the cyclotron.

VI. Find pairs of synonyms and antonyms.

Many-sided – versatile; heavy – light; practical – impractical; wonderful – astonishing; to hover – to fly; to forget – to remember; to gain – to lose; instrument – device; swift – quick; smooth – rugged; -to leave – to stay; to collect – amass; to hide – to discover; definite – indefinite; emote – distant; to affect – to influence; to multiply – to divide; cheap – expensive; enormous – tremendous; to agree – to disagree; possibility – feasibility; particular – peculiar.

VII. Translate thew sentences. Indicate the predicate and define its tense, voice and aspect.

1. The experiment has not been finished yet. It will have been finished by the end of the month.
2. Our century can be called “Space Age” because of the development of a new branch of science and technology-cosmonautics.
3. The rate of the reaction is affected by the change in such parameters as concentration, temperature and pressure.
4. The idea was subjected to severe criticism and rejected.
5. Several outstanding contributions have been made to the study of this phenomenon.
6. There are fields which cannot be dealt with on a national scale only, such as environmental protection, space exploration and so on.
7. On the Earth heat is received from the Sun largely at the equator.
8. So far experiments and theoretical studies have been carried on independently and have not interacted. The basis for further

development lies in the mutual interaction of experimental results and theoretical studies.

9. Such results could be obtained only with modern research techniques.
10. The exact nature of nucleus forces is not yet clearly understood.
11. More attention has been paid recently to developing new sources of energy, solar power is now regarded as a reality so is the geothermal energy.
12. The invention of the steam engine was soon followed by other useful inventions.

VIII. Translate the sentences. Explain the application of Subjunctive Mood in each case.

A. 1. It is necessary that the aircraft engine should combine efficiency and lightness.
   2. It is desirable that such power sources should be ideally suited for a number of present-day applications that require power in remote places.
   3. It is quite possible that a radio message from civilizations on some of the planets should reach the Earth.
   4. It has been suggested that new knowledge and experience recently obtained should provide a sound basis for further space exploration.
   5. It is important that the maintenance of the rocket should be easy.

B. 1. It would be much easier to compute satellite orbits if the Earth were perfectly spherical and had no atmosphere.
   2. But for the rapid development of computer techniques and automation in our scientific age space research would have never made such great progress.
   3. If the Earth were stationary the movement of the atmosphere would be controlled almost entirely by temperature differences.
   4. If Mars were to be a testing ground for our notions about the origin of life we should avoid using these same notions to conclude in advance that Mars is lifeless.
   5. If the distance to the star were known its light power would be judged from its apparent brightness.
   6. If man could just overcome the reactions of mass and inertia he would easily go to our nearest planets.
   7. For unmanned, planetary exploration the ideal guidance and control system would be one that could appreciate the environment and change the system's mode of operation to meet changing conditions.

Reading

Read the text carefully. Try to understand all details.

THE FIRST GIANT OF THE AIR

When most people hear the name of Leonardo da Vinci they think of the wonderful paintings the best world museums are justly proud of. Not everybody knows that his genius was as manysided as it was remarkable. He was one of the greatest artists and scientists in the history of the world. Among his blueprints are sketches for a submarine, heavy siege artillery, naval rocket missiles, armoured cars, the first practical parachute and helicopter and many other things.

Leonardo da Vinci was born in Italy in 1452. When he was a small child, an eagle flew over his bed. It hovered over the boy and then with a tremendous beating of the wings it rose and flew away. This was the boy's earliest memory. He never forgot it. Even as a boy, he was determined to master the air.

Leonardo da Vinci was the first man to make a scientific study of bird flight. "A bird is an instrument", he observed, "working to mathematical laws". He discovered many of these laws. He learnt how birds balanced themselves, soared in spirals to gain height, banked, flew with and against the wind. "The opening and lowering of the taill", he wrote, "the spreading of the wings at the same time to their full extent arrests the swift movement of birds". He was the first man to understand the main principles of flight control – by aileron, rudder and wind brakes. He realized that a bird's wing compresses air beneath it, which gives it lift. But what he did not realize was that 65% of the lift comes from the smooth suction of the air flow fore to aft above the wings.

Leonardo da Vinci might well have been the first man to fly, had he not made the mistake of concentrating on aircraft with wings that flapped like an eagle's. Those aircraft were quite impractical. They never left the ground.

When Leonardo da Vinci died, his blue-prints were lost, hidden or sold. They were not collected and published in one book until the end of the 19th century. But then other man had re-discovered all that he had known four hundred years before. But his work had at least one very definite result. It directly inspired Igor Sikorsky, a Russian, to make the first really successful helicopter.

Discussion

A. Now, I have a few questions to ask. What are the other contributions Leonardo da Vinci made to science?

B. Principally known as a painter, Leonardo da Vinci was also a pioneer in sciences of hydraulics and mechanics, and made extensive studies of human anatomy and the structure of heart.

C. As hydraulics is along my line I can say that Leonardo da Vinci developed a principle of hydrodynamics which says that with a given fall, the smaller the cross-section of the passage the greater will be the velocity of a flowing liquid.

In hydrostatics he recognized that liquids transmit pressure and that work done by the mover equals that done by the resistance.

B. Who would like to make any further comment?

A. I'd like to make a remark concerning instruments of measurement devised and improved by Leonardo da Vinci.

For example, he devised a parabolic compass, attempted to devise and improve such instruments as a clock, a hydrometer and anemometer, and developed the theory of lenses.

C. Why did his work have little practical effect upon the development of either science or technology?

A. It can be accounted for by only one thing. He did not publish his work and it did not become known until much later.

Notes.

aileron [´eil r n] – элерон, деталь самолета, подвижные поверхности у задних частей крыльев самолета, служат для управления самолетом

to bank – делать виражи, накреняться

lift – подъемная сила

wind brakes - тормоза, использующие силу и направление ветра

Learn to use:

to be determined to	to make extensive studies of
to the full extend	this is along my line
to make a contribution to	to account for
to gain height	to develop a theory

Post-reading

I. Give English equivalents of the following phrases. Use them in sentences of your own.

Подниматься по спирали; набирать высоту; сосредоточивать все внимание на чем-то; проводить обширные исследования; определенный результат; разрабатывать и совершенствовать приборы; разработать принцип; набросок подводной лодки; принять твердое решение; измерительные приборы; вносить вклад в науку.

II. Make up sentences using the phrases below.

It	he made a scientific study of bird flight	that	his works were collected and published.
was	the end of the 19th century		he understood its laws.
not	Sikorsky studied Leonardo's blueprints		his blueprints became known to scientists.
until	much later		he made a really successful helicopter.

III. Paraphrase the following sentences.

use	*instead of*
to be determined	to decide firmly
to gain height	to fly up higher
to arrest the movement	to bring the movement to a stop
to realize	to understand
to concentrate on	to fix one's attention on
to collect	to gather up
a remark concerning smth.	to remark about smth.
to account for	to explain

1. Even as a boy he decided firmly to master the air.
2. He learned how birds soared in spirals to fly up higher and higher.
3. The opening and lowering of the tail and the spreading of the wings to their full extent brings the movement of birds to a stop.
4. He understood that a bird's wing compresses air beneath it which gives it lift.
5. Leonardo da Vinci might have been the first man to fly had he not made the mistake of fixing his whole attention on aircraft with wings that flapped.
6. His blueprints were not gathered up and published in one book until the end of the 19th century.
7. We should make a remark about instruments of measurement devised and improved by Leonardo da Vinci.
8. This fact can be explained by only one thing.

IV. Arrange the sentences according to the logic of the text.

1. Leonardo da Vinci's work inspired Igor Sikorski, a Russian, to make the first really successful helicopter.
2. The boy's earliest memory was an eagle flowing over his bed.
3. Leonardo da Vinci was the first man to make a scientific study of bird flight.
4. His blueprint were not collected and published in one book until the end of the 19th century.
5. Leonardo da Vinci was born in Italy in 1452.

6. Leonardo da Vinci might well have been the first man to fly had he not made the mistake of concentrating on airctaft with wings that flapped.
7. Leonardo da Vinci's genius was as many-sided as it was remarkable. He was one of the greatest artists and scientists in the history of the world.

V. Put up different types of questions to the sentences.

1. in bird flight 65% of the lift comes from the smooth suction of the air flow fore to aft above the wings.
2. He observed that a bird was an instrument working to mathematical laws.
3. Leonardo da Vinci made the mistake of concentrating on aircraft with wings that flapped.
4. Leonardo da Vinci's blueprints were published at the end of the 19^{th} century.
5. Leonardo da Vinci developed a principle of hydrodynamics, devised and improved many measuring instruments.

VI. Agree or disagree with the following statements. Correct the wrong statements.

1. leonardo da Vinci is known only as a freat artist.
2. He devised and made sketches for different systems, devices, vehicles.
3. There were many scientists before Leonardo who made extensive studies of bird flight.
4. He was the first man to understand the main principles of flight control – by aileron, rudder and wind brakes.
5. Leonardo was quite right in concentrating on aircraft with wings that flapped. It helped him to build the first practical aircraft.
6. When Leonardo da Vinci died his blueprints were carefully collected and published.
7. Leonardo da Vinci's work inspired Igor Sikorsky to make the first successful helicopter.
8. His work as a scientist and inventor had great practical effect upon the development of science and technology.

VII. Give answers to the following questions.

1. What do most people think of when they hear the name of Leonardo da Vinci?
2. What did his blueprints contain?
3. What was Leonardo da Vinci's earliest memory?
4. What laws of bird flight did he discover?
5. What gives lift to a bird according to Leonardo da Vinci?

6. What really gives lift to a bird?
7. What was Leonardo da Vinci's mistake?
8. What happened to his blueprints after his death?
9. When were da Vinci's blueprints first published?
10. Who was inspired by Leonardo da Vinci's work?

VIII. Find in the text the following grammatical forms:

a) Passive Voice;
b) Subjunctive Mood;
c) adjectives in different degrees of comparison.

IX. Discuss Leonardo da Vinci's contribution to science in the form of a dialogue.

Skim through the interview and indicate the problems touched upon in it.

Text 4 A. A Conversation with Arthur C. Clarke*

Today we know how to do anything that is imaginable in communications. Such a thing as a doctor living in Hawaii and performing operations anywhere in the world through remote sensors and manipulators is perfectly possible. Remote manipulators have been used for decades in the atomic-energy industry. The Russians used them on moon, and so did our space probe on Mars, where a remote arm went out and dug up samples of the planet. So human beings have even used a tool on another planet.

Advances in communications will also affect the way people interact. On the one hand, technology enables us to be in touch will each other more. But, for some people, advances in communications mean a reduction in contact with others. We have kids who interact with their computers and not with other kids. In some of his books, Isaac Asimov has described a world in which humans literally couldn't bear to be in each other's presence; they communicated through TV screens.

I'm keen on the use of technology for education, particularly the development of the electronic tutor. This device would make it possible to teach almost anything. You could program it, and it could talk to you and teach you a language. It could even check your pronunciation. The possibilities are limitless. You could multiply the number of teachers in the world a millionfold. These machines would be rugged and cheap and work 24 hours a day. They could trigger an educational revolution.

In fact, videogames may have already started to do that. Children love to play with them. They have to be dragged kicking and creaming

from their electronic teachers, whereas they have to be sort of dragged kicking and creaming toward the human ones.

Nothing can replace a good human teacher, but much of the drudgery of education – the routine and the rote – could be taken over by electronic devices.

Space exploration is another area of virtually unlimited potential. Almost anything imaginable that people want accomplished could be done in the next century, with the exception of interstellar flight – and even there we could build probes that get to the nearer stars in a few decades. If we put a crash program into effect, we could have people travelling in our solar system within 10 years, though I can't see any reason for it. But the Russians have had a man in space for as long as it would take to send someone to Mars – or at least on a Venus mission.

As for life elsewhere in the universe, I assume it exists, but there isn't the slightest evidence for it. That's the frustrating thing. One feels in one's bones that in this enormous universe, perhaps 100,000 million suns in each of 100,000 million galaxies, there must be myriads of worlds like ours with life on them, though some scientists who used to agree now think intelligent life elsewhere is very rare, if it exists at all. This can be argued endlessly. We'll just have to wait until we have some gacts, which I hope we'll get from radioastronomy observations.

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* Arthur C.Clarke, who conceived of the communications satellite, is a world-renowned author and scientist. He was written some 50 books, including "2001: A Space Odyssey" and its sequel, "2010: Odyssey Two", now a best-seller.

I. Reproduce the parts of the interview in which the following phrases are used. Give their Russian equivalents.

remote sensors and manipulators; to be in touch with each other; a reduction in contact with others; the development of the electronic tutor; the drudgery of education; another area of virtually unlimited potential; the frustrating thing; radioastronomy observations.

II. Insert the proper words and word combinations in the sentences.

1. (Дистанционные манипуляторы) have been used for decades in the atomic-energy industry.
2. (Успехи в области связи) will also affect the way people interact.
3. In one of Isaac Asimov's book people communicated (с помощью телевизионных экранов).
4. Electronic devices would make it possible (обучать почти всему). They could (начать переворот в образовании).

5. Almost anything imaginable that people want accomplished could be done in the next century, (за исключением межзвездного полета) – and even there we could build probes (которые достигли бы ближайших звезд) in a few decades.
6. As for life elsewhere in the universe, I assume it exists, (хотя тому нет ни малейшего доказательства).
7. There must be myriads of worlds like ours with life on them (в этой громадной вселенной).

III. Divide the interview into logical parts. Select the statement that best expresses the main idea of each part.

IV. Discuss the interview with a friend. Find statements you possibly agree or disagree with and give your reasons.

V. Prepare and make a public speech on one of the topics.

1. Latest advances in communications and their influence in different spheres of social life.
2. The potential of space exploration for peaceful purposes.

Do you know that…

Today with revolutionary advance in science and technology we are getting ever better understanding of the origin and structure of the universe. Even the problem of life on some other planets, previously touched upon only by writers-fantasts, has become scientifical.

Numerous studies deal nowadays with the ways of establishing contacts with some extraterrestrial civilization. There were even attempts to put some ideas into life.

In Russia we have investigated two stars CTA-21 and CTA-102 emitting radiowaves that seemed to be signals of extraterrestrial life. Yet the experiment was not a success.

In the USA they tried to find out if the civilizations of two neibouring stars – Eridan and Whale – would not agree to communicate with them. Under the Project Ozma a powerful radiotransmitter was employed and during a whole month the 25 meter radiotelescope in Green Bank, West Vergini9a, was directed towards the two stars. However the experiment ended in failure either.

Answer the questions.

1. What facilitates better understanding of the origin and structure of the universe?
2. What task do numerous studies deal nowadays?
3. What has been investigated in Russia?

4. What was the purpose of the Project Ozma carried out by the USA?
5. Why did these experiments end in failure?
   What is your opinion?

Text5. Energy from space.

Pre-reading.

I. Listen, read and memorize the following words.

microwave [ ] a – микроволновый
beam [bi:m] n – луч
futuristic [ ] a- футуристический
diffuse [di´fju:s] a – рассеянный
consequently [ ] adv – следовательно; в результате
terrestrial [ ] a – земной, наземный
benign [ ] a – добрый; благотворительный, благоприятный
long-term [ ] a – долгосрочный; длительный
implication [ ] n – вовлечение; причастность, соучастие
thereby [ ] adv – таким образом, в связи с этим
revenue [ ] n – годовой доход
frontier [ ] n – граница
timely [´taimli] a – своевременный
vigorous [ ] a – сильный, энергичный
dwindle [´dwindl] v – уменьшаться, сокращаться; истощаться

II. Translate the words formed by conversion.

Beam – to beam; a terrestrial – terrestrial; state – to state; research – to research; claim – to claim; launch – to launch; cost – to cost; amount – to amount; face – to face; reach – to reach; aim – to aim; supply – to supply; challenge – to challenge; support – to support; aid – to aid; doubt – to doubt; a potential – potential; a desert – desert; a total – total – to total; a double – double – to double.

III. Indicate the words formed by conversion. Translate the sentences.

1. No toxic fallout has been recorded.
2. It was necessary to remotor the vehicle.
3. The light was focused with a lens.
4. It was impossible to doctor the device.
5. It took them an hour to empty the container.
6. The chemical make-up of a star can be determined by the light it emits.
7. His project got no support and he had to a band on it.
8. Special training is required to handle the device.
9. The aim of the research was to obtain additional date on the nature of these phenomena.
10. You'll benefit a lot if you sing the contract.

IV. Find pairs of synonyms and antonyms.

Frontier – boundary; to dwindle – to reduce; receiver – transmitter; effort – attempt; diffuse – compressed; efficiency – inefficiency; to propose – to suggest; to pollute – to clean; realistic – unrealistic; to show – to demonstrate; to create – to produce; terrestrial – extraterrestrial; to accumulate – to collect; implication – involvement; dangerous – benign; to compete – to rival; to confine – to expand; to permit – to forbid.

V. Find the roods of the following words and translate them.

a) mainly, approximately, economically, continuously, consequently, environmentally, readily.
b) exhibition, direction, production, transportation, reflection, transmission, expansion, storage, preference.
c) attractive, terrible, additional, commercial, rational, peaceful, successful, limitless, dangerous, vigorous.
d) Explain the formation of the following words and translate them.

large – scale, long – distance, long – term, ground – based, world – wide.

VI. Translate the sentences paying attention to the Verbals.

1) Translate and define the functions of Participles.

1. Another layer of the atmosphere that we must take into account when planning space communication is the ionosphere.
2. The results presented are quite different from those obtained at our laboratory.
3. The scientist theoretically predicted complicated interaction between the components involved in the process.
4. The subjects dealt with under this topic aroused a heated discussion.
5. The forces acting on the Moon are the same as those acting on other heavenly bodies.
6. Interplanetary flight will require many hundreds of days if flown with currently available vehicles.
7. Having challenged the established notion of a fixed Earth Copernicus put the Sun instead of the Earth at the centre of the solar system.
8. If the type of particle being detected can be identified then its energy can be calculated.
9. When comparing elements one notices the outstanding stability of some electronic structures.
10. An Earth satellite if launched into an orbit sufficiently distant from the Earth's surface can circulate for months or even years.

2) Translate and define the functions of the Gerund.

1. leaving the earth means moving upwards against gravity, and this requires work.
2. Airplanes and helicopters can become highly electrically charged either from flying through dust or snow or from encountering strong electric fields in clouds.
3. The idea of using hydrogen and oxygen as fuels for interplanetary rockets originated early in the 19th century.
4. After formulating the problem the scientist should choose, modify or design the procedures for the experiment.
5. Studying the earth alone does not afford much information about its origin, for the earth's atmosphere has changed considerably.
6. The velocity of a moving object can change by its speeding up, slowing down or changing its direction of motion.
7. In addition to being a staging base for equipment the space station will also be a transfer point for personnel.
8. On taking off from the Earth the rocket must get just as much acceleration as possible to work up the necessary speed.
9. The moon keeps moving around the earth without slowing down considerably.
10. Since the nuclear rocket is capable of producing greater thrust per pound of propellant it can produce thrust equal to that of the chemical rocket while using less propellant.

Reading

Read the text carefully. Try to understand all details.

ENERGY FROM SPACE

The concept of solar power satellites, or SPS, first put forward in the 1960s, is still not widely known by the general public. For example at many public exhibitions about Energy, SPS is not even mentioned. This is mainly because very little funding has been spent on SPS research to date - about 1/1000 of 1% of the approximately US$1 trillion that governments have spent subsidizing the development of nuclear power over the past 50 years. There are critics who claim that SPS is unrealistic – because launch costs are much too high today; or because microwave beams will set fire to cities; or because it's too futuristic. So why do we believe that it is important to continue to do research on SPS? The reason is very simple. Humans are going to need enormous amounts of electric power in coming decades. Within 50 years the world population is expected to double, while economic growth will continue around the world, especially in the poorer countries. But existing energy sources already face serious problems. They're limited; they're polluting; they're dangerous. So 50 years from now, 100 years from now, where is our power going to come from? Nobody knows. And so we believe that new

large-scale possibilities should be studied further. **A limitless source of energy** The solar energy that reaches the Earth is about 10,000 times total human energy production today, and the energy available in near-Earth space is limitless. Research is being done on many different ways of using solar power economically on Earth, and many of these will be successful. Terrestrial solar energy is going to become a colossal business. However, sunlight is diffuse and not available continuously at the Earth's surface. So one additional possibility is to collect solar energy 24 hours per day in space, and transmit it as microwave beams to receivers on Earth. Compared to solar power collected at the Earth's surface, SPS faces the extra costs of space transportation and microwave power transmission. But in order to supply continuous electric power, solar systems on Earth need much greater area for collection, large scale energy storage for supply during the night-time and when it's cloudy, and long-distance transmission from desert areas to population centers. Consequently, at the present state of knowledge we do not know that in future solar power from space could not complete with solar power collected on Earth. And so we believe that more research should be done on this possibility – and that SPS research should receive funding similar to other potential new energy sources. We support research efforts aimed at increasing the efficiency of energy use. But we also support efforts to demonstrate new, environmentally benign energy sources. **A change in policy** We must remember that humans have some choice concerning out future. To some extent we can choose the direction in which our civilization develops. And choices that are made in the coming decades – such as the energy sources that we will or will not use – will have major, long-term implications for human life on Earth. We believe that, provided that research continues to show that SPS is environmentally and economically attractive, SPS will open the door to a much more attractive future for human civilization than any ground-based energy source; and one that the public will support; and that young people will find challenging and exciting. Furthermore energy from SPS can be readily used in developing countries, as the SPS 2000 project will demonstrate, thereby aiding economic development world-wide. In addition, by creating large commercial revenues for space engineering, SPS will open the frontier of space to economic development, thereby creating a limitless new field for growth of the world economy, for these reasons we believe that for governments to continue to do almost zero research on SPS would be a terrible mistake. To continue to give most energy research funding to nuclear power and none to SPS, as happens in almost all countries to day, would be a narrow and dangerous policy which could close off the possibility of this attractive future. **A demonstration of power** And in order to advance SPS work we believe

that the SPS 2000 pilot plant project is now a timely step. The basic technologies of SPS have been developed and demonstrated. It is time to start to accumulate experience of operating a real SPS, and to show the electricity industry that this technology is ready for use. At the "SPS 91" international SPS conference a paper on SPS 2000 won the prize for the best proposal, and the project has made good progress since then. Building and operating the SPS 2000 system will be a major step towards SPS, and a major step towards an optimistic and exciting new era of peaceful growth for humans. Even if the SPS 2000 project cost US$1 billion, that would be just a small fraction of government subsidies to nuclear energy research, and the same scale as other government satellite and energy research projects. We believe that this would be a good investment, which would be popular with the public. We believe that the "space-future", the vigorous expansion of human activities into space to which this will lead-is much more attractive than a future in which humans are confined to the surface of the Earth, competing over dwindling energy resources. It's more likely to be peaceful; it's more likely to permit adequate economic growth throughout the world; and it will certainly be more fun. **It's our choice** Can anyone doubt that, given the choice, young people would choose a future involving large-scale space development than one confined to Earth? But they must be given the choice. And despite the concept of SPS being proposed nearly 30 years ago, no one has yet demonstrated it. Since it was proposed, hundreds of $ billions have been spent on space activities, and hundreds of $ billions have been spent on nuclear energy research and development. But apart from $20 million during the 1970s in the USA, the total spending on SPS work throughout the world has been no more than a few $ million, at most – and it's almost zero at present this does not reflect its potential; it does not reflect a rational balance of its potential relative to nuclear energy: and it does not reflect the preferences of the general public.

Post-reading

I. Make up English-Russian pairs of the word combinations and phrases equivalent in meaning.

1. to subsidize the development of nuclear power	стоимость запуска
2. solar power satellite	наземный источник энергии
3. existing energy sources	микроволновый луч
4. launch cost	недальновидная и опасная политика
5. long-distance transmission	выбор, касающийся нашего будущего
6. microwave beam	спутник с питанием от солнечных батарей
7. choice concerning our future	конкурировать из-за истощающихся

8. ground-based energy source	энергетических ресурсов
9. narrow And dangerous policy	передача на дальнее расстояние
10. to complete over dwindling energy resources	существующие источники энергии
	субсидировать разработку ядерной энергии

II. Reproduce the parts of the text in which the following phrases are used. Give their Russian equivalents.

about 10,000 times total human energy production; to need enormous amounts of electric power; new, environmentally benign energy sources; major, long-term implications for human life on Earth; to open the frontier of space to economic development; to start to accumulate experience of operating a real SPS; to reflect a rational balance of SPS potential relative to nuclear energy; the vigorous expansion of human activities into space.

III. Ask questions to which the following statements could be answers.

1. There are critics who claim that SPS is unrealistic because launch costs are too high today.
2. Existing energy sources face serious problems since they are limited, polluting and dangerous.
3. One additional possibility is to collect solar energy 24 hours per day in space and transmit it as microwave beams to receivers on Earth.
4. SPS research should receive funding similar to other potential new energy sources.
5. Energy from SPS can be readily used in developing countries thereby aiding economic development world-wide.
6. Building and operating the SPS 2000 system will be a major step towards an optimistic and exciting new era of peaceful growth for humans.

IV. Complete the following sentences in Russian and then translate them into English.

1. Концепция спутников на солнечной энергии широко не известна общественности из-за очень малого финансирования исследований, касающихся этих спутников, которое к сегодняшнему моменту составляет …
2. Для того, чтобы непрерывно вырабатывать электрическую энергию, солнечные системы на Земле требуют …
3. Мы полагаем, что при условии, если исследование продолжит демонстрировать привлекательность спутников с экономической точки зрения и точки зрения воздействия на окружающую среду, спутники откроют дверь …

4. Продолжать направлять основную долю финансирования исследований энергетических источников на ядерную энергию и ничего на спутники, как и происходит почти во всех странах сегодня, было бы …
5. На международной конференции «SPS 91» доклад о системе SPS 2000 удостоен …
6. Проект SPS 2000, весьма вероятно, является мирным, предоставляет возможность …
7. Может ли кто-либо сомневаться, что при наличии выбора, молодые люди выбрали бы будущее …

V. Find the statements corresponding to the content of the text.

1. The concept of solar power satellites is well-known for the general public because of good funding.
2. There is no necessity to continue doing research on SPS because existing energy sources are quite sufficient for economic growth.
3. Compared to solar power collected at the Earth's surface, SPS faces the extra costs of space transportation and microwave power transmission.
4. Choices of the energy sources that people are going to use will have no influence on future development of our civilization.
5. In order to advance SPS work we believe that the SPS 2000 pilot plant project is now a timely step.
6. The basic technologies of SPS have not been developed and are not ready for use nowadays.
7. Despite the concept of SPS being proposed nearly 30 years ago, no one has yet demonstrated it.

VI. Answer the following questions.

1. When was the concept of solar power satellites first put forward?
2. Why is not this concept known for the general public?
3. Why do critics consider SPS to be unrealistic?
4. What is the reason that research on SPS should continue?
5. What benefits does the solar energy provide?
6. What additional facilities of collecting solar energy are necessary for SPS and solar systems on Earth?
7. What attractive possibilities will SPS provide compared with ground-based energy sources?
8. What project is believed to advance SPS work?
9. What will building and operating the SPS 2000 system be able to demonstrate?
10. What energy sources would people prefer if given the choice?

VII. Find in the text the following grammatical forms

a) Verbals: Participles, Gerund, Infinitive;
b) Passive Voice;
c) Subjunctive Mood.

VIII. Retell the text concentrating on the most important information you've learned from it.

IX. Discuss with a friend the problem of the most promising energy sources for the future development of mankind.

X. Skim through the text and answer.

1. How many sections are there?
2. What is the main idea?
3. For whom do you think this text was written?

To speculate about the future is one of the most basic qualities of man. It involves two aspects: one is to forecast what the future development will be and the other is to determine in what approximate period of time it is going to take place.

To make such a prognosis means to learn from the past experience and to extrapolate the knowledge into the future. Recently, however the rate of change has been so great as to make it difficult to learn from experience, at least as far as the time factor is concerned. To take but one example, a prediction of man's possible landing on the Moon around the turn of the century was made as late as 1961, only 8 years before the actual event! So to be on the safe side, we had better leave time to take care of itself, and concentrate our attention on what the future may be like.

There is yet another problem involved: are we to accept submissively any possible course of events, or are we to work for a future most suited for most people? The choice is to be made, at different levels, by every individual and by every society.

Comprehension check-up.

1. What are the two aspects of speculation about the future?
2. What are the two steps of any prognosis?
3. Why has it been so difficult recently to make any predictions concerning the future development?
4. What example is cited to illustrate the difficulty?
5. What dilemma are we faced with and what choice is to be made by every individual and every society?

Методические указания
АНГЛИЙСКИЙ ЯЗЫК

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Text 6. A new Era for Aircraft

Aviation experts expect that today's aircraft will begin to be replaced with some new form of supersonic transport by the year 2000. A 21-st century hypersonic aircraft may open a new age of aircraft design.

The designers of this country displayed the project of such a supersonic passenger liner among the prospective models at the latest Aerospace Salon held on the old Le Bourget airfield[1] in Paris. An elongated fuselage with a sharp nose and without a horizontal stabilizer makes it look more like a rocket. The speed matches the looks[2]. This plane will fly at a speed five to six times above the speed of sound, e.g., it will cover the distance between Tokyo and Moscow in less than two hours. The diameter of the fuselage will be 4 meters and the overall length 100 meters, with the cabin accomodating 300 passengers. The future superplanes of such a class will have no windows, but the passengers can enjoy[3] watching the panorama of the Earth on the TV monitor at the front of the cabin. They will fly so fast that ordinary aircraft windows would make the structure too weak to withstand the stresses at such a speed. At night velocities the air resistance in the lower atmosphere is so great that the skin is heated to very high temperature, the only way out is to fly higher. Therefore, airliners' routes will mainly lie in the stratosphere.

In general, to build a reliable hypersonic plane one has to overcome a whole set of technological and scientific difficulties. Apart from creating highly economical combined engines and heat-insulating materials[4], designers have to make such an amount of thermodynamic computations that can't be performed without using supercomputers. One of the ways to make planes as economical as possible is lightening the aircraft by substituting new composite materials for conventional metal alloys. Accounting for[5] less than 5 per cent of the overall aircraft weight, the percentage of composite material parts will exceed 25 per cent in new generation models. An extensive use of new materials combined with better aerodynamics and engines will allow increasing fuel efficiency by one-third[6].

Because of the extreme temperatures generated by atmosphere friction, a hypersonic craft will also require complicated cooling measures. One possibility is using cryogenic fuels, such as liquid hydrogen, as both coolants[7] and propellants. The fuel flowing through the aircraft's skin, would cool the surfaces as it vaporizes before being injected into combustion chamber.

In addition, specialists in many countries are currently working on new propeller engines considered much more economical and less noisy than jets. The only disadvantage is that propeller planes fly slower than

yet planes. However, it has recently been announced that specialists succeeded in[8] solving this problem. As a result a ventilator engine with a propeller of ten fibre-glass blades has been build, each being five meters long. It will be mounted in the experimental passenger plane.

Notes to the Text:

1. Le Bourget airfield – аэропорт Ле Бурже
2. the looks – внешний вид
3. can enjoy – с удовольствием (зд.)
4. heat-insulating materials – теплоизолирующие материалы
5. accounting for – составляя
6. by one-third – на одну треть
7. coolant – охлаждающая жидкость
8. succeeded in – удалось

1. Read and translate following international words:

Aviation, airplane, project, passenger, liner, model, fuselage, horizontal stabilizer, rocket, distance, meter, diameter, cabin, technological, problem, thermodynamics, aerodynamics, percent, efficiency, extreme, temperature, cryogenic.

2. Read and memorize the words and words combinations.

amount – количество
to announce – объявлять, заявлять
to combine – сочетать, комбинировать
combined with – в сочетании с
efficiency – производительность; КПД, эффективность
e.g. (for example) – например
to expect – ожидать, предполагать
extreme – крайний, чрезвычайный
combustion – горение
complicated – сложный
conventional – обычный, стандартный
currently – в настоящее время
disadvantage – недостаток
measure – мера
noise – шум
overall – полный, общий
to overcome – преодолевать
resistance – сопротивление
stress – напряжение
friction – трение
to inject – впрыскивать, вводить

to vaporize – испаряться

3. Read the text in parts, name them. Translate the text.

4. Answer the following questions:
1) What is this text about?
2) What aircraft was displayed in Paris?
3) What are the characteristics of the new liner?
4) What are the difficulties in building a hypersonic plane?

5. Correct wrong statements:
1) Today's aircraft will be replaced with a new from of supersonic transport by the year 2000.
2) The new hypersonic aircraft that looks line a rocket will cover the distance between Tokyo and Moscow in less than tow hours.
3) The future superliner of this class will have large windows that will allow passenger to watch the panorama of the Earth.
4) Airliner's routs will mainly lil in the stratosphere because the air resistance in the lower atmosphere is too great.
5) Designers can easily make all the necessary thermodynamic calculations to build a reliable hypersonic plane.
6) It is possible to lighten the aircraft by substituting conventional metal alloys by new composite materials.
7) Cryogenic fuels are used as both coolants and propellants.
8) The great advantage of propeller planes is that they fly faster than jet planes.

6. Find Gerund in the text.

7. Translate the sentences, paying attention to Gerund's functions.
1) Flying from Los Angeles to Tokyo on board a new supersonic craft, will take two hours.
2) On examing the care before starting on a long journey a driver can be sure that he will get to his destination without accidents.
3) By summing up the information about the speed and distance of various objects on the road, the computer defects all possible danger.
4) A superliner of a new kind will be capable of flying at five times above the speed of the sound.
5) The only way of overcoming the great air resistance at high velocities is flying higher.
6) At low speeds the engine can use turbines for compressing the air before mixing it with fuel in the combustion chamber.

7) In future in switching over to the new Earth satellite a driver can be sure of coming safely to his destination.
8) Cryogenic fuels will vaporize before being injected into combustion chamber.
9) In flowing over the aircraft's surface the fuel cools its skin.
10) On reaching its cruising speed the supersonic liner will fly at 100000 feet above the earth.

8. Make Adjective from the following Nouns or Verbs according to example: move – двигать, двигаться – movable – подвижный

Comfort, change, compare, control, program, measure.

9. Determine, what part of the speech belong the following words to:

Reliable, elongate, percentage, stabilizer, stabilize, prospective, carrier, brilliant, relativity, intelligent, intelligence, assistance, fuselage, mainly, encircle, departure, statement, hypersonic, liner, horizontal, powerful.

10. Determine if the following words pairs are synonyms or antonyms.

Advantage – disadvantage; to remain – to stay; reliable – unreliable; fast – slow; apart from – besides; capable – in capable; to begin – to start; liquid – solid; to cool – to heat; possible – impossible; weak – strong; to build – to break; aircraft – plane; engine – motor.

11. Answer thew questions using the words in brackets.

1) What kind the aircraft may begin a new age in aviation? (a hypersonic passenger liner)
2) What is the shape of a new liner? (an elongated fuselage with a sharp nose)
3) What distance can a new liner cover in less than two hours? (the distance between Tokyo and Moscow)
4) What are the main problems of building a reliable hypersonic liner? (developing an economical engine and new heat insulating materials combined with better aerodynamics)
5) What combined engine was developed for a new liner? (a ventilator propeller engine)
6) What is one of the ways to make a hypersonic liner as economical as possible? (using new composite materials)
7) What will be used for cooling a new liner? (cryogenic fuels)

12. Retell the text.

Text 7. Environment Protection must be Global.

That the problem of pollution and ecology has become the most important one for mankind is evident to all. The more civilization is developing, the greater the ecological problems are becoming. Air and water pollution by industry is now reaching tremendous proportions. In our era it is changing from a national to an international problem, especially in territories where rivers cross several countries. The seas and oceans are also becoming seriously polluted. A similar situation is developing in the atmosphere. It is known that many cities throughout the world suffer from air pollution.

However, our scientific knowledge and technological advancement make it possible to eliminate it, if people use good will[1] and make considerable investments for that purpose. The development of natural resources on a global scale is already possible from a scientific and technical standpoint[2]. Large-scale experimental work in this area is successfully being carried out.

At present scientists in industrially developed countries are working on the theory of interaction of all the atmospheric and oceanic global processes that determine the climate and weather of the world. Increasing growth of population, industrialization and the use of resources are slowly but surely changing the global climate and water balance. This can be described as a great experiment, one that may bring about changes in the environment more serious than ever before.

The essential feature in the environment protection is that many problems can be solved only on the level of world community[3]. Therefore the planning of protection against pollution by human society as a whole[4] is imperative today and in the nearest future. It is necessary to develop an international program to study data on land, forest, atmospheric and oceanic resources, both renewable and non-renewable. It is the joint efforts of many scientists and special public organizations that can deal with the problem and take necessary measures to protect the environment.

It is still a big job and much remains to be done[5]. However scientists are confident that planned actions of all countries can eliminate pollution and achieve successes in purifying air, water and soil and in safeguarding natural resources. At the same time one must realize that social and political circumstances may stand in the way of further progress in this field.

Notes tot he Text

1. good will – добрая воля

2. standpoint – точка зрения
3. community – сообщество
4. as a whole – в целом
5. much remains to be done – еще многое предстоит (остается) сделать

1. Read and translate following international words:

Global, resources, problem, ecology, proportion, era, territory, ocean, oceanic, situation, atmosphere, process, climate, balance, experiment, social.

2. Read and memorize the words and words combinations.

achieve – достигать
advance – продвижение вперед, успех, прогресс
bring about - вызывать
carry out – проводить, выполнять
deal with – иметь дело с
evident – очевидный
purpose – цель, название
remain – оставаться
scale – масштаб, размер
similar – подобный
solve – решать
joint efforts – совместные усилия
take measures – принимать меры
throughout the world – по всему миру

3. Read the text “Environment Protection must be Global” using a dictionary if necessary. Translate the text.

4. Answer the following questions:

1) What is this text about?
2) What is ecology?
3) How does water (air) become polluted?
4) Why is the problem of water pollution becoming a global problem?

5. Translate the sentences paying attention to the <u>continuous Form.</u>

1) Water and air are becoming more and more polluted.
2) At present computers are more widely used in the sphere of education.
3) Where were you at six o’clock? We were studying in the reading-room.

4) There are government and public organizations that are studying data on the land, the forest and the air.
5) New courses of education such as management are being organized in many institutes.
6) What well you be doing in the laboratory tomorrow morning? We shall be watching the operation of a new device.
7) Measures are being taken to save Lake Baikal.
8) The situation at Lake Baikal is remaining very serious.
9) Much attention is being paid at present to the developing of international scientific contacts.
10) Science is becoming a leading factor in the progress of mankind.

6. Find the sentences in Continuous Passive, translate them.

1) Cambridge University was formed in the 12th century.
2) Solution of ecological problems may be achieved only by joint efforts of all countries.
3) Great changes in people's lives and work were brought about by the scientific and technological progress.
4) The theory of interaction of atmospheric and oceanic processes is being developed to determine the weather of the planet.
5) The teachers at Cambridge are called "dons" or "tutors.
6) Computers and lasers are being widely introduced at plants and factories.
7) The most important ecological problems must be considered at the government level.
8) The training at Cambridge and Oxford is carried out by tutorial system.

7. Define the meanings of "one" and "that", translate the sentences.

1) the problem that has become the most important one is the problem of pollution.
2) One can easily understand why the profession of an engineer requires a special college training.
3) The new technologies that are being developed must be connected with traditional ones.
4) That air and water pollution by industrialization is reaching dangerous levels is realized by everyone.
5) It is the invention of an engine that started the first industrial revolution.
6) The main purpose of education is that graduates must be able to work with the technology of tomorrow.

7) The education in Oxford and Cambridge is different in many ways from that in other universities.
8) We discussed the first industrial revolution, the one that took place some centuries ago.

8. Explain, what part of speech the following words be long to:

radioactivity, measurement, interaction, society, nervous, elimination, basic, proportion, serious, symbolic, anxious, ecological, organize.

9. Name the Verbs made from the following Nouns, translate them:

advancement, investment, measurement, achievement, improvement, fulfillment.

10. Find among the following words:

a) Antonyms:

slowly, old, at present, small, quickly, in the past, new, large;

b) Synonyms:

tremendous, epoch, realize, several, work, progress, great, field, era, understand, make it possible, different, achieve, some, advance, enable, area, various, reach, essential, job, important.

11. Answer the questions of the text “Environment Protection must be Global”.

1) What problem is becoming a global problem?
2) What makes it possible to eliminate air and water pollution?
3) What are scientists in industrially developed countries currently working on?
4) What factors are slowly changing the global climate and water balance?
5) What actions are necessary to take to deal successfully with the problem of protecting the environment throughout the world?

12. Translate into English.

1) Проблема охраны окружающей среды является сейчас одной из самых важных проблем для человечества.
2) Воздух во многих городах загрязняется благодаря транспорту и промышленности.
3) Загрязнение воды стало серьезной проблемой для многих рек в Англии.
4) Увеличивающийся рост населения, индустриализация и использование ресурсов медленно, но непременно меняют глобальный климат и водный баланс.

5) Многие научные и общественные организации принимают меры, чтобы защитить окружающую среду.
6) Проблема защиты окружающей среды может быть решена только на уровне мирового сообщества.

13. Retell the text.

Text 8. The Mars Programme.

In 1962 the first automatic station – the USSR's Mars-1 – was launched. It was followed by more than a dozen Soviet and US space vehicles. Then came a lengthy interval starting in 1975. Now the time has come for mankind to carry out detailed studies of Mars which is known to be a planet in many respects similar to the Earth. It is necessary that man should understand the origin and development of the Solar System in order to understand the history of our own planet and the reasons of the appearance of life on it.

New knowledge about Mars might help us to explain the multitude of natural phenomena occuring on earth and enable us to predict these phenomena, as well as control them. This would help mankind begin exploring the Solar System's resources is the not so distant future.

The importance of Mars studies is aknowledged by all. Thus the working programmes of the United States' National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA) envisage flights to Mars in the 1990s. The most representative community of space research – the International Astronautical Federation (IAF), now incorporating some eighty space agencies, institutes and industrial enterprises in 36 countries – considers the preparation of manned and unmanned expeditions to Mars to be one of its main priorities.

Russia has proposed that a broad international programme of detailed study of Mars and its natural satellites should be carried out. Scientists and space experts suggested that automatic stations for Mars' expeditions should be designed and produced by Russia, and the scientific instruments for them should be jointly prepared by ten countries: six East and four West European. It was reported that the programme would enable us to deliver to Mars the automatic station for global studies of the planet from the orbits of its artificial satellites, determine the most promising areas for detailed investigations and study the planet's atmosphere by landing special vehicles as well as balloons.

A new generation of the Phobos space probes has been developed for this purpose in Russia. It should be noted that these proves are sophisticated programmed space robots. They are believed to be the basic

means for the expedition to Phobos, Mars satellite, and hence for carrying out the Mars programme in 1998 and 1999. It is planned to launch six unmanned spacecraft's – two each in 1992, 1994, and 1996. The Mars Sample Return Mission, now being planned for the late 1990s should be the most important part in the space programme for the period ending in 2000. The spacecraft to be launched to Mars is to make a soft landing on the planet and send a self-propelled vehicle, so-called rover, to gather soil samples and specimens of Mars rock. It is to travel several hundred kilometers on Mars' surface, encountering storms, frosts and heat. Then about 2 lbs. of materials would be returned to earth for detailed analysis. The U.S. is supposed to supply the rover plus advanced electronics to guide this rover from orbiting spacecraft.

NASA experts are studying a quicker, simpler alternative that would allow to visit Phobos, one of the two Mars main moons. They wish the USA were the first to send people towards Mars. And NASA officials predict that a U.S. spacecraft carrying four crew members could reach Phobos' surface by 2003, more than four years earlier than it could reach Mars. The Phobos mission is similar to that of a Mars flight. It, too, would require two space vehicles, a cargo ship followed by a manned spacecraft. And it, too, would last 14 months. But the Phobos rockets would need only half the fuel, since they wouldn't have to overcome Martian gravity to get back.

Besides being a major step in the progress of space science, the implementation of the programmes described may serve as a transitional stage from the study of space to its exploration for the benefit of earth.

1. Read and translate following international words:

automatic, station, dozen, natural, national, resources, aeronautics, European, Mars expedition, gravity, satellite, atmosphere, analysis, alternative, exploration.

2. Read and memorize the words and words combinations.

acknowledge – признавать
deliver – доставлять
implementation – выполнение, осуществление
enterprise – промышленное предприятие
gather – собирать
guide – направлять
predict – предсказывать, прогнозировать
promising – перспективный, многообещающий
incorporate – включать, объединять
multitude – множество, большое число, масса
self-propelled – самоходный, самодвижущийся

specimen – образец, экземпляр
supply – снабжать, обеспечивать

3. Read the text “The Mars Programme” using a dictionary if necessary. Translate the text.

4. Answer the following questions.

1) What planet is in many respects similar to the Earth?
2) What can help mankind explain natural phenomena occurring on Earth and predict them?
3) What organization are working at the programmes of Mars expeditions?
4) What programme of Mars investigation was proposed by Russia?
5) What was the purpose of this programme?
6) What are the Phobos space probes?
7) What is the most important part of this space programme?

5. Define what parts of speech the following words belong to.

Gravity, peaceful, permanent, consequence, subatomic, dominant, relative, relativity, flexible, apparently, celebrity, novelty, connection, complicate, desirable, significant, utilize, pressure, famous, involvement, significance, weightlessness, eaten, recorder, supression, dense, density, depth, damage, shorten.

6. Make Nouns from the following words.

Appear, explore, prepare, prior, important, implement, transit, propose, create, lighten, encode, structural, useful, discuss, grow, store, differ, electronic.

7. Make a sentence out of the two parts.

1. NASA has proposed	1. a cargo ship followed by a manned spacecraft
2. NASA experts predict that a US spacecraft	2. they wouldn’t have to overcome Martian gravity to get back.
3. It would be more	3. a quicker simpler programme of visiting Phobos, one of the two tine Mars satellites
4. The Phobos flight would require two space vehicles	4. to last 14 months
5. It is believed	5. could reach Phobos surface by 2003
6. The Phobos rockets would need	6. than four years earlier than such

only	a spacecraft could reach Mars.
7. It can be explained by the fact than	7. half of the fuel necessary for a Mars flight.

8. Define the meaning of the Verb “should”.

1) It should be said that the importance of Mars studies is acknowledged by all.
2) Reliable of every vehicle should be paid great attention to during the production progress.
3) It is required that an airplane should be well balanced dynamically.
4) Should there be even a small deviation in the velocity, the space vehicle would pass the planet.
5) K. E. Tsiolkovsky suggested that man-made rockets for the future space flights should use liquid-propelled engine.
6) We were told that we should take part in the discussion.
7) One should nit forget that electricity is the most important source of energy at present.

9. Translate the sentences in Passive Voice.

1) In mechanics the study of kinematics is followed by the study of dynamics.
2) A gas may be looked upon as the vapour of a liquid with a very low boiling point or very great vapour pressure.
3) Lead is very slightly acted upon by the oxygen of the air.
4) The works of Tsiolkovsky were followed by a number of very important works in the field of astronautics.
5) The production of special metallurgical alloys is seldom influenced by gravity.
6) This article describes design characteristics which are followed by the description of the results of the experiments.
7) This description is followed by a discussion of non-technical aspects of the lunar programme proposed.

10. Read and translate this text without a dictionary.

Exploration experts suggest that the tiny moon Phobos should be used as a perfect place for gas refilling station. Some scientists think Phobos rocks to contain crystalline ice. If one heats them, it will be possible to produce water. The letter could be devided into hydrogen and oxygen which are necessary components for rocket propulsion. Such a fuel would greatly reduce the amount of weight that must be delivered from the Earth for manned missions to Mars. Thus it might be possible for spacecraft to leave the Earth for Mars carrying no return fuel. To get home, they should simply fill up at Phobos.

11. Translate into English.

1) Новые знания о Марсе помогли бы нам объяснить природные явления, возникающие на земле, и позволили нам предсказать и управлять ими.
2) Это помогло бы человечеству начать освоение ресурсов солнечной системы в ближайшем будущем.
3) Важность изучения Марса признана всеми.
4) Ученые и эксперты в области космического пространства предложили, чтобы автоматические станции для экспедиций на Марс конструировались и производились Россией.
5) Эксперты НАСА изучают более быстрый и простой способ, который бы позволил посетить Фобос – одну из двух лун Марса.
6) Они бы хотели, чтобы США первыми послали людей на Марс.

12. Retell the text.

Text 9. Flood Defence system.

In October 1980 the first stone with the words "Let's protect Leningrad from floods" was thrown into the waves of the Gulf of Finland near Gorskaya – that was the beginning of the construction of a flood defence system that by 1990 will protect Leningrad from floods.

In its more than 280 years of existence the city has had nearly 300 floods. Three of them, in 1777, 1824 and 1924 were catastrophic. Ever since the foundation of the city by Peter the Great in 1703 various schemes for its protection were offered by specialists. But only due to modern technology such a giant hydro-engineering project was made possible.

The starting point was the adoption of the General Plan of Leningrad development (1966) which provided for the construction of a flood defence system. 52 scientific, designing and other organizations were working out this scheme for six years.

How does the hydro-engineering complex look like?

Eleven giant dams of rock and soil (each 8 metres high above mean sea level) cross the Gulf of Finland from Gorskaya in the north to Lomonosov in the south of the Gulf through Kotlin Island (Kronstadt Fortress). Along the length of the dams there are six spillways to let the water through in normal conditions.

Ships will pass through two deep-water channels which are located on each side of the island, the 200 metres wide southern channel will be the main.

When a rise in the water level is forecast the whole automatic system will be put in action. The gates which are located over the spillways will go down to close the "windows" and the gates which slide

along special rails on the bottom of the channels will come out of the dock chambers and bar the way to the sea wave. It will take only 30 minutes to perform all the operations.

It should be said that the construction of such gates is a sort of revolution and has no analogy in modern world practice.

Motor-car highway – 24.4 kilometres long and 35 metres wide – runs along the top of the dams and bridges over the spillways and twice it "dives" into the tunnels under the bottom of the channels. The length of the sothern tunnel is some 2,000 metres and that of the northern one is 1,400 metres.

The construction of the highway is paid great attention to as according to the General Plan for the development of Leningrad it is to become the outer part of the 150 km ring motor-road which will be built around the city.

The complex will allow to solve the problem of Leningrad protection from floods.

1. Read and translate following international word.

Analogy, catastrophic, specialist, construction, general, operation, organization, practice, protection, scheme, technology, tunnel.

2. Read and memorize following words.

adopt – принимать
bridge – мост
channel – канал
cross – пересекать
defence – защита, оборона
flood – наводнение
forecast – предсказание
foundation – основание
level – уровень
locate – располагать, определять место
mean – средний
pass – проходить, проезжать
protect – защищать, ограждать
rise (rose, risen) – подниматься
various – различный, разнообразный
wave – волна
spillway – водопропускные ворота, водослив
bar – преграждать

3. Read the text "Flood Defence System". Translate it.

4. Translate into English the words groups using words combinations, given below.

1) предложить проект нового цеха; 2) предусмотреть строительство дороги; 3) пройти через глубоководный канал; 4) защитить от наводнения; 5) выполнять важные операции; 6) разработать новый проект; 7) работать над проблемой; 8) предсказать повышение уровня; 9) уделять внимание строительству.

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to forecast the rise; to pass through; to perform; to offer a scheme; to protect from; to provide for; to work at; to work out; to pay attention to.

5. Translate into English the following words having the same root:

наука – научный – ученый; оборудовать - оборудование; проект – проектировщик (конструктор); направлять (руководить) – направление – руководитель (директор); защищать - защита; строить – строитель - здание; существовать - существование; основывать – основание - основатель; учить (преподавать) – обучение – учитель.

6. Make the words according to the example:

1) существительное + ful = прилагательное
   use – польза – useful – полезный
   power; skill; success.
2) существительное + less = прилагательное
   use – польза - useless - бесполезный
   change; noise; water; help; end.
3) прилагательное + ness = абстрактное существительное
   weightless – невесомый – weightlessness – невесомость
   useful; dark; hard; weak.
4) существительное/прилагательное + ist = существительное
   science – наука – scientist - ученый
   special; art; motor; biology.
5) существительное с ance/ence
   resistance – сопротивление
   consequence; distance; appearance; difference; absence; presence.

7. Translate the sentences into Russian, paying attention to the predicate:

a) 1. This equipment should be tested in various conditions.
   2. Nowadays floods can be forecast beforehand.
   3. When sea waves rise over the normal level all the gates are to be closed.
   4. The control system had to be provided with the most perfect automatic devices.
   5. All these mechanisms should be protected from corrosion.

b) 1. Such questions can not be answered by an engineer.
2. This design was to be worked out by some body from your laboratory.
3. As the metal part was not heavy, it could be mounted on a work bench by anybody.
4. These planes can be changed by on one.

8. Translate the following sentences.
1) It should be noted that the technical documentation of hydro-engineering project contained 199 volumes.
2) We know who took part in the design of flood defence system.
3) We understand what gigantic experimental work was made before the adoption of the project.
4) Foreign delegations are often explained how the construction of the protective complex was started.
5) Visitors always ask if the flood defence system will be put into operation in time.
6) The programme of future work was worked out precisely.
7) Our laboratory will continue to work at the problem of automatic of production processes.

9. Make Adjectives from Adverbs. Translate them.
a) slowly, suddenly, usually, usefully, uselessly, precisely, widely, easily, simply, probably, possibly.
b) Largely, mainly, highly, hardly.

10. Make Verbs from Nouns; translate them.

Building, understanding, improvement, equipment, foundation, located, protection, adoption, production, explanation, development, existence, designer, builder, reader, reflector, founder.

11. Answer the question to the text “Flood Defence System”.
1) Who was the General Plan for the development of Leningrad adopted?
2) How long were designers and engineers working at the scheme of the defence system?
3) In what year was the construction of the hydro-engineering project started?
4) What is the aim of this project?
5) Where is the dam located?
6) How many channels for the passage of ships are there in the system?
7) Where does the motor-car highway run?
8) How long is it?

9) Where are the tunnels for motor cars located?
10) When must the flood defence system be put into operation?

12. Translate into English.

1) С момента образования Петербурга специалистами были предложены различные схемы защиты города от наводнения.
2) Генеральный план развития Ленинграда предусматривал сооружение системы защиты от наводнения.
3) 52 научных, конструкторских и прочих организаций разрабатывали эту схему в течение 6 лет.
4) По всей длине дамб располагаются шесть водопропускных ворот.
5) Корабли будут проходить через два глубоководных канала.
6) Этот комплекс позволит решить проблему защиты Петербурга от наводнений.

13. Retell the text.

Text 10. Astronomical capital of the world.

Two great observatories, Greenwich and Pulkovo, occupy a leading place among the observatories of the world. Some scientists call Pulkovo the astronomical capital of the world.

Pulkovo is situated in a hilly area some kilometres from Leningrad. You can't get to Pulkovo by train – when the railway was being built the astronomers specially asked that it should be kept several kilometres away so that there be no vibration to affect the sensitive instruments.

The work started in 1839, when the observatory was opened, is being continued now. This is the eternal work of astronomers – to define the precise co-ordinates of the stars, to find out the exact "addresses" of heavenly bodies.

But today the scientists also conduct a time service, they study activity of the Sun, follow the flights of the Earth sputniks and calculate their orbits. The scientists of the observatory have made a valuable contribution[1] tot he study of the cosmos by observing Soviet artificial Earth satellites, man-made moons. The study of their orbits is very important for the flights of manned spaceships.

Thew Pulkovo observatory has a radio-astronomy department equipped with modern apparatus. The big radio-telescope installed there is stronger than any other telescope in the world. With the help of this powerful device the scientists of the Pulkovo observatory carry out a number of observations of Venus, Jupiter and other planets. It is

necessary that before flying to other planets scientists should get the greatest possible information about the heavenly bodies.

The astronomers have obtained extremely surprising results due to radio-astronomical observation. By means of[2] radio-telescope some remarkable studies of the surface of the Sun and of solar activity have been made and a method of investigating the movement of planets has been worked out.

Astronomical observation and cosmic experiments are spheres of scientific research in which broad co-operation of scientists of various countries would be most effective. Soviet scientists, workers and technicians have produced and launched space rocked in the direction of the Moon, Venus and Mars and are fulfilling the noble dreams of mankind. May there be peaceful ships flying the space routes and may serve the interests of all the people of the world!

Notes on the Text

1. have made a contribution – внесли склад
2. by means of – посредством

1. Read and translate following international words.

Contribution, co-operation, astronomical, observatories, vibration, sputniks, orbits, calculate, radio-astronomy, apparatus, planet, radio-telescope.

2. Read and memorize following words.

to affect – воздействовать
dream – мечта
exact – точный
extremely – чрезвычайно
to find out – узнать
to fulfil – выполнять
to observe – наблюдать
remarkable – выдающийся
sensitive – чувствительный
to make a contribution – вносить вклад
to man – укомплектовывать личным составом
noble – благородный

3. Read the text “Astronomical capital of the world”. Translate it.

4. Put four General and four Special Questions to the text. Make it in written form.

5. Make a sentence out of the two parts.

1. Two great observatories, Greenwich and Pulkovo	1. in a hilly area some kilometres from Leningrad.
2. The work started in 1839	2. to define the precise co-ordinates of the stars.
3. Pulkovo is situated	3. occupy a leading place among the observatories of the world
4. This is the eternal work of astronomers	4. when the observatory was opened, is being continued now.
5. The scientists have made a valuable contribution	5. is very important for the flights of manned spaceship.
6. The study of their orbits	6. to the study of the cosmos by observing artificial Earth satellites, man-made moons.

6. Correct wrong statements.
   1) There are three biggest observatories in the world one of them is Pulkovo.
   2) Scientists call Pulkovo the astronomical capital of the world.
   3) Pulkovo is situated in a plain area some kilometres from Leningrad/
   4) This is the eternal work of astronomers – to define the precise co-ordinates of the stars.
   5) The Pulkovo observatory has no radio-astronomy department.
   6) The big radio-telescope is stronger than any other telescope in the world.
   7) By means of the radio-telescope some remarkable studies of solar activity have been made.

7. Memorize the meanings of the words “mean” and “means”. Translate the sentences.

to mean – значить
mean – средний
means – средство
by means of – посредством
by all means – обязательно
by no means – ни в коем случае

1) Utilizing solar power on a large scale means getting possession of an immense source of power.
2) The energy by means of solar batteries.

3) This problem of science is by no means a new one.
4) We must by all means complete this work in time.
5) Men have tried to use solar energy since the earliest times but no means existed to generate useful power from the Sun's heat until steam engines were invented.
6) A mean solar day is the mean time during which the Earth makes one revolution the Sun.

8. Define the part of the speech in the following words.

Impression; artificially; sensitivity; substitution; observation; exactness; situate; completely; realize; growth; simplify.

9. Answer the questions to the text "Astronomical capital of the world".
   1) What two observatories occupy a leading place in the world?
   2) What do some scientists call Pulkovo?
   3) Where is Pulkovo situated?
   4) Why did the astronomers ask to keep the railway away from Pulkovo?
   5) What is the eternal work of astronomers?
   6) What other kinds of work do astronomers conduct now?
   7) Why is important to study the orbits of man-made satellites?
   8) How do scientists at the Pulkovo observatory carry out observations of Venus, Jupiter and other planets?

10. Translate into English.

1) Вечная работа астрономов – определять точные координаты звезд, узнавать точные «адреса» небесных тел.
2) Некоторые ученые называют Пулково астрономической столицей мира.
3) Сегодня астрономы изучают активность солнца, следят за полетами спутников Земли и рассчитывают их орбиты.
4) Наши ученые внесли ценный вклад в изучение космоса.
5) Большой радиотелескоп, установленный в Пулково, мощнее любого другого телескопа в мире.
6) Астрономы достигли удивительных результатов, благодаря радиоастрономическому наблюдению.
7) Научные явления в космосе являются той сферой, в которой широкое сотрудничество разных стран было бы наиболее эффективным.