ФЕДЕРАЛЬНОЕ АГЕНТСТВО ЖЕЛЕЗНОДОРОЖНОГО ТРАНСПОРТА
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АНГЛИЙСКИЙ ЯЗЫК

Учебно-методические указания к практическим занятиям

для обучающихся по специальности

08.02.10 Строительство железных дорог, путь и путевое хозяйство

3 курса и преподавателей

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Данные учебно-методические указания к практическим занятиям предназначены для студентов 3х курсов СПО, обучающихся по специальности 08.02.10 Строительство железных дорог, путь и путевое хозяйство.

Данная разработка состоит из заданий, упражнений и текстов по темам История строительства железных дорог, Строительные материалы, Железнодорожные строительные профессии, Операции на железной дороге, Типы поездов и вагонов, Строительство мостов и тоннелей, Строительство метро. В заключительной части учебно-методической разработки предложен краткий грамматический справочник.

Тексты заимствованы из учебной литературы.

Content

UNIT 1. The history of railway building.

1. a). Study information.

Types of affixes.

1. **Affixes of nouns:**
- ion / - sion /-tion; -ure / -ture; -ment; -ance / -ence - *abstract nouns*;
- er / -or - *denotes a job*;
-ing - *process*;
-ty / -ity; -ness - *property, attribute*.

2. **Affixes of adjectives**:
-ic; -able / -ible; -ant / -ent ; -ive; -ous; -al; -ful – *presence of the characteristic expressed by stem*;
-less - *lack of quality*;
-un / -in / -ir / -il / -im - *opposite, not*.

3. **Affixes of verbs:**
- ize – from noun, to acquire the features of noun;
re- (prefix) *again or back*.

b). Find in the dictionary all meanings of the words. Construct all possible words adding any affixes.

*Example: research – research**er** (noun), construct – construct**ive** (adjective), write - **re**write (verb).*

1. Engineer _____
2. Build _____
3. Application _____
4. Construct _____
5. Utilize _____

2. Use the table to construct statements about buildings and builders.

Her father	is are have has	a builder.
Builder		an honorable profession.
The builder's profession		many old bridges in our town.
There		pads to protect their hands.

3. Read and translate the following word combinations into Russian.

1. Profession of civil engineer_____
2. Branches of civil engineering _____
3. Utilization of materials and forces of nature_____
4. To protect oneself against the elements _____
5. Civil engineering_____

6. Mechanical engineering _____
7. Electrical engineering _____
8. Nuclear engineering _____
9. Mining engineering_____
10. Military engineering _____
11. Marine engineering_____
12. Sanitary engineering _____

4. Read and translate the text.

Civil Engineering

The word "engineering" means the art of designing, constructing, or using engines. But this word is now applied in a more extended sense. It is applied also to the art of executing such works as the objects of civil and military architecture, in which engines or other mechanical appliances are used. Engineering is divided into many branches. The most important of them are: civil, mechanical, electrical, nuclear, mining, military, marine, and sanitary engineering. While the definition "civil engineering" dates back only two centuries, the profession of civil engineer is as old as civilized life.

In order to understand clearly what civil engineering constitutes, let us consider briefly the development of different branches of engineering. Some forms of building and utilization of the materials and forces of nature have always been necessary for man. Man had to protect himself against the elements and sustain himself in the conflict with nature.

Up to about the middle of the 18th century there were two main branches of engineering - civil and military. The former included all those branches of the constructive art not directly connected with military operations and the construction of fortifications, while military engineering concerned itself with the application of science and the utilization of building materials in the art of war. But later there came a remarkable series of mechanical inventions, great discoveries in electrical science and atomic energy. It led to the differentiation of mechanical, electrical, nuclear engineering, etc.

Architecture, which up to the 18th century had been considered a branch of engineering had become a profession by itself. The term "civil engineering" has therefore two distinct meanings. In the widest and oldest sense it includes all non-military branches of engineering as it did two centuries ago. But in its narrower and at the present day more correct sense civil

engineering includes mechanical engineering, electrical engineering, metallurgical, and mining engineering.

5. Answer the following questions.

1. What are the main branches of engineering?
2. What is civil engineering?
3. How old is the profession of civil engineer?
4. What are the fields of civil engineering?

6. Put these items of the plan in the order according to the content of the text above.

1. Two main branches of engineering.
2. The age of the profession of civil engineer.
3. The meaning of the word "engineering".
4. The widest and oldest sense of the term "civil engineering".
5. The consequences of inventions and discoveries.

7. Use these clichés to retell the text.

I'm going to retell…….
In the beginning of……
I've known that……
It was interesting to know that……..
Speaking of….. it turned out that……
The fact that …… was new for me.....
It goes without saying that .....
Moreover (Furthermore).....
To sum up .....
In conclusion .....
However .....

8. Read, translate and complete the dialogue.

Teacher: Today we are going to discuss the development of different branches of engineering. Can you name any?
Student: Yes, certainly. The most important of them are: civil, mechanical, electrical, nuclear, mining, military, marine and sanitary engineering.
Teacher: Let's remember the fields of civil engineering.
Student: In the whole, civil engineering makes housing, industrial construction; the construction of highways, city streets and railroads.
Teacher: Explain, please, the fields of mechanical and military engineering.
Student:……

9. Read and translate the text.

From the history of communications

Most people think of communications only when they want to get from one place to another. But communications are important to the national economy of a country. Without good roads and railways a country cannot develop its resources and industry. Without roads it is impossible to market agricultural produce.

Early man probably used the river as his first means of travel and communications. Here he was safe from the wild animals in the forests. Later, man began to develop roads. These at first would be no more than tracks across the mountains and paths through the forests. But very early in Europe we find the development of the amber trade, from the Baltic coast via the great rivers, such as the Rhine, Elbe and Danube, to the Mediterranean.

In Roman times, roads became important for military reasons. Today we have increased the ways of communication. Roads are still important, water, in the form of either rivers or seas, is useful for carrying bulky materials.

But to these we have added the railway and the airplane. Airplanes cannot carry a great deal in weight, and are used mainly for carrying mail, people, or important goods.

Although the future belongs to air transport the railways today still carry the bulk of passenger and goods traffic. Railway transport is still one of the cheapest ways of hauling freight over long distances.

Modern Soviet railways run a transcontinental passenger service. It rushes the traveler across two continents - Europe and Asia - in most convenient all-metal carriages. The dining-car will cater for all appetites. The luggage-van and the then existing machines could not cope with the ever increasing demands of the mines. The stationary steam engine invented by I. Polsunov in 1763 and installed at some plants paved the way for the introduction of steam as tractive power on railways.

The first steam locomotive in Russia was constructed by the Cherepanovs, father and son, who were considered to be the most skilled and most talented workmen of their time.

The first railway in Russia using steam traction was put into operation at the Nizhni Tagil metallurgical works. It was a short distance line covering only 854 m. It is to the

Cherepanovs that Russia owes the right to be placed among the countries which were the first to use steam as tractive power.

Some four years later, in 1837, the inauguration of the St. Petersburg - Tsarskoye Selo railway took place.

That very important railway line, which was 27 km, was soon followed, in 1851, by the construction of the St. Petersburg - Moscow line, 644 km in length. That was a first-class double-track railway line, which linked two large industrial and cultural centers - Moscow and St. Petersburg; 185 bridges and 19 viaducts were erected to make the line as straight and level as possible. P. P. Melnikov and N. O. Kraft, prominent engineers, were in charge of the construction work.

Notes

1. may be traced — можно проследить
2. as far back as — уже, еще
3. tram-ways — вагонеточные пути
4. who suggested that cast iron rails should be used instead of trams - который предложил использовать чугунные рельсы вместо деревянных (лежней)
5. to meet the needs — удовлетворять потребности
6. to be superior — превосходить
7. to time train movements — составлять расписание поезда
8. to gain ground — распространяться, усиливаться
9. the then existing — существовавшие тогда
10. paved the way — (зд.) проложил путь
11. the Cherepanovs — Черепановы

10. Complete each sentence with right variant.

1. Early man used _____ (*trees, rivers, bridges*) as his first means of communications.
2. In Roman times, roads became important for _____ (*economical, traveling, military*) reasons.
3. The future belongs to _____ (*air transport, railways, sea transport*).
4. The first railway in Russia with steam traction was put into operation at the _____ (*Tsarskoye Selo, Nizhni Tagil, Moscow*) metallurgical works.
5. The inauguration of the St. Petersburg - Tsarskoye Selo railway took place in _____ (*1851, 1763, 1837*).

11. Complete the sentences.

1. Without good roads and railways a country cannot _____
2. Airplanes cannot carry _____
3. Railway transport is still _____
4. It is to the Cherepanovs which were the first _____

12. Answer the following questions.

1. What does the communication system include?
2. Why do railways still stay one of the most important ways of communications today?
3. Who was the constructor of the first steam locomotive in Russia?
4. What do you prefer to travel by?

13. Use correct forms of adjectives.

1. Civil, mechanical, electrical, nuclear, mining, military engineering branches are (*important*) _____ ones.
2. Civil engineering is (*old*) _____than nuclear one.
3. Railway transport is still one of (*cheap*) _____ ways of hauling freight over long distances.
4. The line covering 854 m. is much (*short*) _____ than distance line in 644 km. Nowadays air transport is (*fast*) _____ way of communication.

14. Choose the correct forms of verbs.

1. During the last hundred years many new methods of building _____.
a) has been discovered, b) have been discovered, c) will has been discovered

2. One of the most recent discoveries _____ the usefulness of steel as a building material.
a) is, b) were, c) be

3. Nowadays it _____ often necessary to have a very fast transport.
a) is, b) are, c) were

15. Read and translate the text.

The railway is a good example of a system evolved in various places to fulfill a need and then developed empirically. In essence it consists of parallel tracks or bars of metal or wood, supported transversely by other bars — stone, wood, steel and concrete have been used — so that the load of the vehicle is spread evenly through the substructure. Such tracks were used in the Middle Ages for mining tramways in Europe;

railways came to England in the 16th century and went back to Europe in the 19th century as an English invention.

The **history of rail transport** dates back nearly 500 years and includes systems with man or horse power and rails of wood or stone. Modern rail transport systems first appeared in England in the 1820s. These systems, which made use of the steam locomotive, were the first practical forms of mechanized land transport, and they remained the primary form of mechanized land transport for the next 100 years.

Ancient world

The earliest evidence of a railway found thus far was the 6 to 8.5 km long "Diolkos" wagonway, which transported boats across the Isthmus of Corinth in Greece since around 600 BC. Wheeled vehicles pulled by men and animals ran in grooves in limestone, which provided the track element, preventing the wagons from leaving the intended route. The Diolkos was in use for over 650 years, until at least the 1st century AD. The first horse-drawn wagonways also appeared in ancient Greece, with others to be found on Malta and various parts of the Roman Empire, using cut-stone tracks.

Wagonways or tramways are thought to have developed in Germany in the 1550s to facilitate the transport of ore tubs to and from mines, utilizing primitive wooden rails. The technology spread across Europe and had certainly arrived in Britain by the early 1600s.

By the eighteenth century, such wagonways and tramways existed in a number of areas. Ralph Allen, for example, constructed a tramway to transport stone from a local quarry to supply the needs of the builders of the Georgian terraces of Bath.

Because rails were smoother than roads, a greater quantity and tonnage of bulk goods such as coal and minerals could be carried, and without damage to highways. Naturally, a great deal of inventiveness was focussed upon improving the rails and reducing the degree of friction between wheel and rail. In the late 1760s, the Coalbrookdale Company began to fix plates of cast iron to the wooden rails. These (and earlier railways) had flanged wheels as on modern railways, but another system was introduced, in which unflanged wheels ran on L-shaped metal plates - these became known as plateways.

Steam power introduced

James Watt, a Scottish inventor and mechanical engineer, was responsible for improvements to the steam engine. This raised the possibility of a smaller engine, that might be used to power a vehicle, and he actually patented a design for a steam locomotive in 1784. The first railway steam locomotive was built in 1804 by Richard Trevithick, an English engineer born in Cornwall.

The Birth of the Railway

In 1812 Oliver Evans, a United States engineer and inventor, published his vision of what steam railways could become, with cities and towns linked by a network of lo for personal travel and for transport of goods. Evans specified that there should be separate sets of parallel tracks for trains going in different directions. Railways quickly became essential to the swift movement of goods and labour that was needed for industrialization.

The first Russian railway

Russia was in need of improved transportation and geographically suited to railroads, with long flat stretches of land and comparatively simple land acquisition. The first steam locomotive in Russia was constructed by the Cherepanovs, father and son, who were considered to be the most skilled and most talented workmen of their time.

The first railway in Russia using steam traction was put into operation at the Nizhni Tagil metallurgical works. It was a short distance line covering only 854 m. It is to the Cherepanovs that Russia owes the right to be placed among the countries which were the first to use steam as tractive power.

Some four years later, in 1837, the inauguration of the St. Petersburg - Tsarskoye Selo railway took place.

That very important railway line, which was 27 km, was soon followed, in 1851, by the construction of the St. Petersburg - Moscow line, 644 km in length. That was a first-class double-track railway line, which linked two large industrial and cultural centers - Moscow and St. Petersburg; 185 bridges and 19 viaducts were erected to make the line as straight and level as possible. P. P. Melnikov and N. O. Kraft, prominent engineers, were in charge of the construction work.

16. Translate the word combinations

parallel tracks or bars of metal or wood _____

load of the vehicle is spread _____

steam locomotive _____

mechanized land transport _____

wheeled vehicles pulled by men and animals _____

horse-drawn wagonways _____

cut-stone tracks _____

ore tubs _____

tonnage of bulk goods _____

to fix plates of cast iron to the wooden rails _____

long flat stretches of land _____

the most skilled and most talented workmen _____

inauguration _____

double-track railway line _____

17. Choose the correct variant and complete the sentences

1. it consists of _____ (crossing, parallel, formless) tracks or bars of metal or wood, supported transversely by other bars.

2. _____ (the St. Petersburg - Moscow line, the St. Petersburg - Tsarskoye Selo railway, the London – Manchester line) was a first-class double-track railway line, which linked two large industrial and cultural centers.

3. _____ (Melnikov, Evans, Watt) specified that there should be separate sets of parallel tracks for trains going in different directions.

4. The first railway steam locomotive was built in _____ (1851, 1837, 1804) by Richard Trevithick, an English engineer born in Cornwall.

5. The first horse-drawn wagonways also appeared in ancient _____ (Greece, Egypt, Rus).

18. Complete the sentences

1. _____, a United States engineer and inventor, published his vision of what steam railways could become, _____.

2. _____ were erected to make the line as straight and level as possible.

3. Russia was _____ geographically suited to railroads, with long flat stretches of land and comparatively simple land acquisition.

4. Railways quickly became essential to the swift _____ that was needed for industrialization.

5. By the _____, such wagonways and tramways existed in a number of areas.

6. The first railway steam locomotive was built in _____, an English engineer born in Cornwall.

19. Unscramble the words

nengei, tsmea, gwanayow, rtakc, wryalia, occnrtee, ivoenintn

20. Write out all the ed-forms and define their function

21. Answer the following questions

1. What does any railway consist of?

2. What tracks were used in the Middle Ages for mining tramways in Europe?

3. What systems does the history of rail transport include?

4. How long was the earliest railway found in ancient Greece?

5. Why could a greater quantity and tonnage of bulk goods be carried?

6. Who specified that there should be separate sets of parallel tracks for trains going in different directions?

7. Why was Russia in need of improved transportation and geographically suited to railroads?

22. Explain the following dates

600 BC, 1550s, 1784, 1804, 1812, 1820s, 1837, 1851

23. Write the following words in the correct order to make sentences

1. began, plates, wooden, company, fix, iron, of, to, rails, cast, to, the.

2. developed, tramways, to, in, thought, are, have, Germany.

3. provided, the, vehicles, element, men, wheeled, by, in, pulled, and, ran, limestone, in, grooves, animals, which, track.

UNIT 2. Building materials.

1. Read and translate the text.

Building materials.

Building materials - natural and artificial material and products, used at the construction and building repair. Differences in the purpose and conditions to erecting and usages the buildings define varied requirements to the building materials and their extensive nomenclature.

Building materials are distinguished on strictly building materials and building products - ready details and elements, assembled in the building on the place of construction.

The list of building materials is extensive and varied. Alongside with traditional materials - ceramic, natural stone, glass and other - in the modern construction broadly use new building materials on the base of metal.

At the building activity and erecting it is necessary in the first place to use local building materials (sand, gravel, lime, brick and others) that shorten transport expenses, forming much of the material cost. The greater value for cheapen building materials has a salvaging the departures of industry.

Requirements to the building material and products are kept in states information on the building material, given its determination, specified raw material application, categorization, and division by the sort and marks, methods of test, condition of keeping and transporting.

Official document for builders is also “Building rates and rules”, where are kept nomenclature and sizes of main building materials, requirements to their quality, instructions upon their choice and using depending on conditions of usages of raising building standards, standard specifications and other normative documents.

2. Read the sentences from the text with the verbs in Passive Voice, paraphrase them using Active Voice.

Example: This bridge *is made* of concrete.
1). It is the concrete bridge.
2). They made this bridge of concrete.

_____
_____
_____

3. Write out the names of natural and artificial building materials.

1. natural building materials: _____
2. artificial building materials: _____

4. Read and translate the text.

Properties of materials.

Density (specific weight) is the amount of mass in a unit volume. It is measured in kilogram per cubic meter. The density of water is 1000 kg/m^3 but most materials have a higher density. Aluminium alloys, with typical densities around 2800 kg/m^3 are considerably less dense than steels, which have typical densities around 7800 kg/m^3. Density is important in any application where the material must not be heavy.

Stiffness (rigidity) is a measure of the resistance to deformation such as stretching or bending. The Young modulus is a measure of the resistance to simple stretching or compression. It is the ratio of the applied force per unit area (stress) to the fractional elastic deformation (strain). Stiffness is important when a rigid structure is to be made.

Strength is the force per unit area (stress) that a material can support without failing. The units are the same as those of stiffness, but in this case the deformation is irreversible. The yield strength is the stress at which a material first deforms plastically. For a metal the yield strength may be less than the fracture strength. It is the stress at which it breaks. Many materials have a higher strength in compression than in tension.

Ductility is the ability of a material to deform without breaking. One of the great advantages of metals is their ability to be formed into the shape that is needed, such as car body parts. Materials that are not ductile are brittle.

Toughness is the resistance of a material to breaking when there is a crack in it. For a material of given toughness, the stress at which it will fail is inversely proportional to the square root of the size of the largest form present. Toughness is different from strength. For example, the toughest steels are different from the ones with the highest tensile strength. Brittle materials have low toughness. For example, glass can be broken

along a chosen line by first scratching it with a diamond. Composites can be designed to have considerably greater toughness than their constituent materials.

Creep resistance is the resistance to a gradual permanent change of a shape, and it becomes especially important at higher temperatures. A successful research has been made in materials for machine parts that operate at high temperatures and under high tensile forces without gradually extending. For example, they can be the parts of plane engines.

5. Name all properties of materials.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

6. Match the following words with their Russian equivalents:

1	density	a	вес
2	weight	b	количество
3	a volume	c	объем
4	an amount	d	плотность
5	stiffness	e	жесткость
6	rigidity	f	твердость
7	a force	g	сила
8	strength	h	прочность

1 ____, 2 ____, 3 ____, 4 ____, 5 ____, 6 ____, 7 ____, 8 ____.

7. Make up your own sentences with the words from above.

8. Find out 8 words:

x	s	t	i	f	n	e	s	s	i
u	d	e	f	0	r	m	s	t	d
w	i	z	u	r	0	0	a	r	g
p	e	e	r	c	w	z	y	e	e
x	i	s	t	e	e	1	0	n	h
w	y	0	0	1	1	a	z	g	g
s	s	e	n	h	g	u	0	t	n

f r a c t u r e h c

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

9. Read the text and answer the following questions.

1. Is density (specific weight) the amount of mass in a unit volume?
2. Is it measured in kilograms per cubic meter?
3. Is density important in any application where the material must not be heavy?
4. Is stiffness (rigidity) a measure of the resistance to deformation such as stretching or bending?
5. Is strength the force per unit area (stress) that a material can support without failing?
6. Is toughness the resistance of a material to breaking when there is a crack in it?
7. Is creep resistance the resistance to a gradual permanent change of shape?

10. Read the text again and complete the following sentences:

1. Aluminium alloys, with typical densities around.....are considerably less dense than steels, which have typical densities around.....

2.....is important in any application where the material must not be heavy.

3.The Young modulus is a..... to simple stretching or compression.

4. It is the ratio of the applied force per unit area (stress) to the.....

5.The yield strength is the stress at which a .....

6. For a metal the yield strength may be which the stress at which it breaks is; many materials have a..... tension.

7. One of the great advantages of metals is..... such as car body parts.

8. Materials that are not ductile are.....

9.Toughness is the..... of a material to breaking when there is a crack in it.

10. .....is a measure of the resistance to deformation such as stretching or bending.

11. Read the following statements and tell whether they are true or false. Correct all false statements.

1. Density (specific weight) is not the amount of mass in a unit volume.

2. Aluminium alloys, with typical densities around 3000 kg/m^3 are considerably less dense than steels, which have typical densities around 7800 kg/m^3.

3. Density is not important in any application where the material must not be heavy.

4. The Young modulus is a measure of the resistance to simple stretching or compression.

5. It is the ratio of the applied force per unit area (stress) to the fractional elastic deformation (strain).

6. Strength is the force per unit area (stress) that a material can support without failing.

7. Many materials have not a higher strength in compression than in tension.

8. Ductility is the ability of a material to deform without breaking.

9. Toughness is the resistance of a material to breaking when there is a crack in it.

10. It is measured in a kilogram per cubic meter.

12. Put the following sentences in negative and interrogative form:

1. Density (specific weight) is the amount of mass in a unit volume._____
2. Stiffness (rigidity) is a measure of the resistance to deformation such as stretching or bending._____
3. Toughness is the resistance of a material to breaking when there is a crack in it._____
4. Ductility is the ability of a material to deform without breaking._____
5. Strength is the force per unit area (stress) that a material can support without failing. _____

13. Make up sentences.

1. any, in , density, important, application, is _____
2. important, a, is, stiffness, rigid, structure, is, to, when, mad, be _____
3. from, toughness, is, strength, different_____
4. low, brittle, have, materials, toughness _____

5. a, many, in, materials, have, higher, strength, in, tension, than, compression._____

14. Read and translate the text.

Brick

A brick is best described as "a building unit". It may be made of burnt clay, of concrete, of mortar or of a composition of sawdust and other materials; in shape it is a rectangular solid and its weight is from 6 1/2 to 9 pounds.

The shape and convenient size of a brick enables a man to grip it with an easy confidence and, because of this, brick-building has been popular for many hundreds of years. The hand of the average man is large enough to take a brick and is able to handle more than 500 bricks in an eight-hour working day.

It is necessary, therefore, for the "would-be" bricklayer to practice handling a brick until he can control it with complete mastery and until he is able to place it into any desired position.

15. Answer the following questions.

1. What materials is brick made of?
2. Why brick-building has been popular for many hundreds of years?
3. What is the shape of a brick?
4. What is the brick's weight?

16. Find English equivalents from the text above.

1. форма и размер кирпича _____,
2. ширина кирпича _____,
3. строительство из кирпича _____,
4. из обожженной глины _____,
5. практиковаться в укладке _____,
6. достаточно большая _____,
7. с полным мастерством _____,
8. лучше всего характеризуется _____.

17. Make sentences using the words below.

1. clay, a brick, of, can, made, be, burnt._____
2. Brick-building, popular, has, years, of, been, hundreds, for, many._____

_____

3. A "would-be", a brick, must, bricklayer, until, practice, mastery, handling, control, with, he, complete can, it._____
_____
4. able, a bricklayer, is, any, a brick, to place, position, into_____
_____
5. pads, the bricklayer's, with, and, thumb, the fingers, be, protected, must, leather._____

18. Read and translate the text.

Prestressed concrete.

Prestressed concrete is not a new material. Its successful use has been developed rapidly during the last four decades, chiefly because steel of a more suitable character has been produced.

Concrete is strong in compression but weak when used for tensile stresses. If, therefore, we consider a beam made of plain concrete, it will at once be realized that the beam's own weight will cause the beam to "sag" or bend. This sagging at once puts the lower edge of the beam in tension, and if the cross-sectional area is small, causes it to break.

If, on the other hand, we use a beam of similar cross-section, but incorporate steel bars in the lower portion, the steel will resist the tensile stress derived from the sag of the beam, and thus assist in preventing it from breaking.

In prestressed concrete steel is not used as reinforcement, but as a means of producing a suitable compressive stress in the concrete. Therefore any beam (or member) made of prestressed concrete is permanently under compression, and is consequently devoid of cracks-under normal loading, or so long as the "elastic limit" is not exceeded. Prestressed concrete is not only used for beams but is now employed extensively for columns, pipes, and cylindrical water-towers, storage tanks, etc.

19. Choose correct variant and complete the sentences.

1. Prestressed concrete is ...
a) a completely new building material, b) not really a new material

2. The successful use of prestressed concrete has been developed rapidly ...
a) long ago, b) during the last four decades

3. Plain concrete is ...
a) strong in compression, b) weak in compression

4. Plain concrete is ...
a) weak when used for tensile stress, b) strong when used for tensile stress

5. Prestressed concrete is used ...
a) only for beams, b) for beams, columns, pipes, etc.

20. Complete the sentences.

1. Prestressed concrete has been used during ... .
2. Plain concrete is strong in ... .
3. The sagging of a beam made of plain concrete may cause it to ... .
4. Incorporated steel bars in the lower portion of a beam prevent ... .
5. A beam made of prestressed concrete is permanently under ... .
6. Prestressed concrete is now employed extensively for ... .

21. Answer the following questions.

1. Is prestressed concrete a new building material?
2. How long has prestressed concrete been used in construction?
3. What disadvantages has plain concrete?
4. What is steel used in prestressed concrete for?
5. What will happen if "elastic limit" of a beam is exceeded?
6. What is prestressed concrete used for?

22. Read and translate the text.

Ferrous and non-ferrous metals.

In general metals are used in various constructions and different industries. For example, thousands of miles of railway track. All metals are divided into ferrous and non-ferrous metals. Ferrous metals are iron and its alloys (steel, cast iron etc.). Especially ferrous metals are of great importance. Machine tools and machinery, steamships and locomotives, automobiles and airplanes, rails and bridges, razor blades are turned out by the steel industry.

Non-ferrous are metals and alloys the main component of which is not iron but another element. It may be copper, aluminum, and zinc. That's why copper and aluminum are belonged to as non-ferrous metals. Non-ferrous metals are extracted from

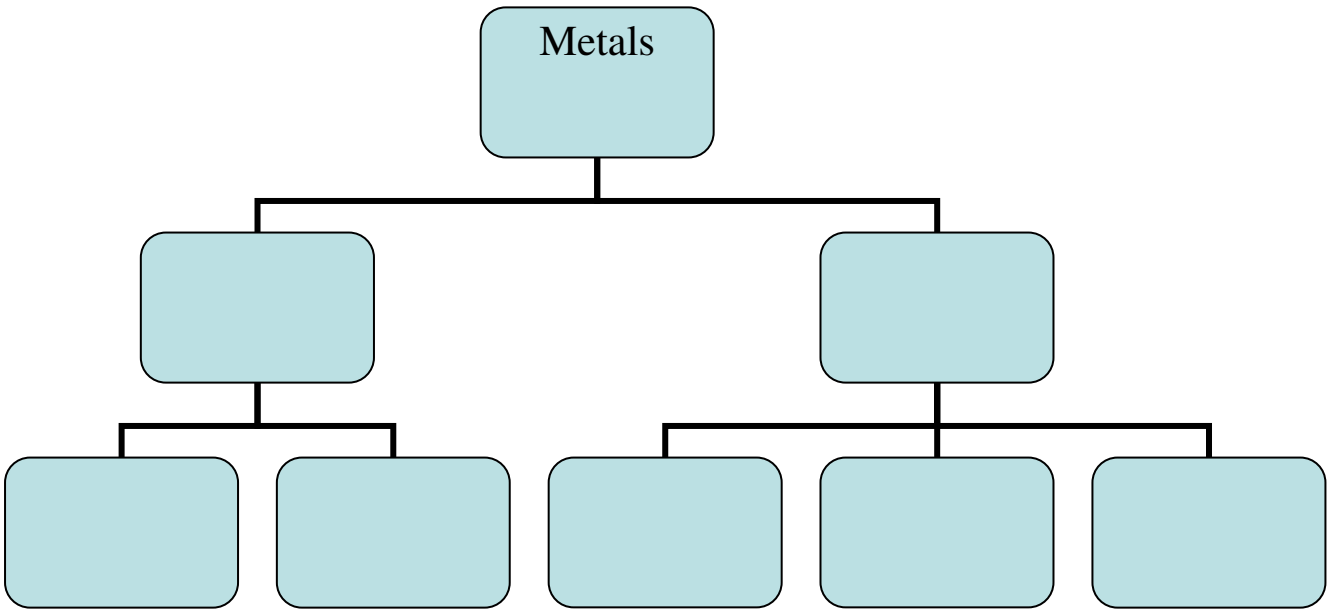
minerals such as magnesite (magnesium carbonate), tinstone (tin oxides) etc. Non-ferrous metals have some characteristics. They are: high electric and heat conductivity, high corrosion resistance, non-magnetic qualifies, light weight and easiness to fabrication.

23. Match the following words with their Russian equivalents:

1	non-ferrous metal	a	медь
2	an alloy	b	инструмент
3	a railway	c	мост
4	a network	d	цветной металл
5	a tool	e	сплав
6	a bridge	f	железная дорога
7	copper	g	сеть

1. ____, 2. ____, 3. ____, 4. ____, 5. ____, 6. ____, 7. ____.

24. Read the text again and complete the spidergram.



25. Complete the following sentences:

1. Ferrous metals _____.
2. _____, steamships and locomotives, automobiles and aeroplanes _____.
3. _____are referred to as non-ferrous metals.
4. _____are divided into _____.
5. In general, _____.

6. _____have some characteristics.

26. Read the following statements and say whether they are right or wrong. Correct false statements.

1. Thousands of miles of railway track form an intricate network of steel over the world, helping to carry daily billions of freight for different industries.
2. Copper, aluminium and some other metals are not referred to non-ferrous metals.
3. All metals are divided into ferrous and non-ferrous metals.
4. Metals in general and especially ferrous metals are of great importance in various constructions.
5. Ferrous metals are iron and its alloys.
6. Non-ferrous metals are extracted from minerals such as magnesite, tinstone etc.

27. Put the following sentences in negative and interrogative form.

1. All metals are divided into ferrous and non-ferrous metals._____
_____
2. Ferrous metals are iron and its alloys. _____
_____
3. Ferrous metals are of great importance in various constructions. _____
_____
4. Ferrous are metals and alloys the main component of which is iron. _____
_____
5. Copper, aluminium and some other metals are referred to as non-ferrous metals. _
_____

UNIT 3. Railway professions.

1. Read and translate the text.

Types of jobs relating to the railroad industry.

There are many different jobs that fall under the umbrella of the railroad industry. It is possible to secure a job in any of these areas as long through you have the right qualifications. There is plenty of paperwork to be completed in the railroad industry. Everything from securing contracts to haul materials to payroll has to be completed. Office jobs like these are generally found at the central office for the railroad. Crackerjack are also those who operate machinery to load and unload the materials to be transported by train. They often work long and hard hours to ensure everything is securely in place and that the trains are able to leave on time. The tracks for the trains obtain to be kept in full condition to help prevent accidents from occurring.

Many employees that work on the tracks have a specific area of specialty. It may be laying railroad ties, welding, supervising a gang of workers, cleaning the tracks, and hauling the necessary materials. Unfortunately, accidents do never cease to take place involving trains, and so there are inspectors that work for the railroads to identify the reasons why such accidents occur. This information allows them to make changes to their operations and to provide additional training. Each accident involving a train should be viewed in that a learning experience. It is and an opportunity to be able to prevent other train accidents from happening due to the same types of circumstances.

The better trained each employee is that works pull the train industry, the more efficient operations will flow and the fewer accidents will result. Since engineers and other crew are only allowed a permit amount of hours of operation, it may be necessary for a driver to deliver a new crew to a location and pick up the other crew. These drivers need to be reliable and willing to work any hours or drive in any type of weather conditions.

The pay for the different jobs in the train industry varies by skills and education. Entry level positions generally start at minimum wage or higher. As you are able to show your stress abilities you should be eligible for periodic raises. Many railroad

companies offer their employees the chance for advancement and even offer to salary for the training they need drag order to have the right qualifications. The specifics of how to apply for any railroad jobs and the job description can be found by contacting the railway organization or visiting their websites. Operating a train or working in another area of this industry can offer you a good paying career.

Qualifications to operate a train.

Being in charge of operating a train is a huge responsibility, and one that requires plenty of training before it is possible. The specific requirements depend on the type of train that is being operated. It may be a cargo train, passenger train, or one that carries hazardous materials. There are commuter trains as well in various cities to help reduce the amount of traffic on the roads. There are some specific requirements though that applies to all types of trains. To help prevent the risk of problems while navigating a train, those on board must pass written testing, continue to engage in training offered by their employer, and pass a complete health exam annually. Those reputation charges of operating a train must have very good view and hearing in symmetry to fill the requirements of the job.

It is now required for integral personnel operating a train to pass a background check and to show that they are a citizen of the United States in an effort to reduce the chances of terrorism involving trains. Many employers are also requesting an unreduced mental evaluation as sound. A full understanding of English both in the written and verbal forms is required. There are many different types of clot members on a train with the engineer being the individual in charge. It takes more training, education, and credentials to hold such a position. Various tests may be reliable to determine if someone is a good just for a job operating a train. These tests are designed to evaluate their ability to make quick decisions, their navigational skills, and their ability to follow instructions, leadership, and communication skills. All of these are very important for being successful at operating a train properly.

There are plenty of areas of the undertaking that need to be taken seriously when operating a train as a crew section or as an engineer. The train needs to be carefully inspected prior to taking a trip. The crew has to understand how to manipulate the train in response to the load and weather conditions. A great deal of the training for operating

a train has to do with technology. Most of the controls are in place with the best possible technology unpunctual them.

Roles of the train crew.

1. The engineer sits on the right side of the train's cab and runs the locomotive.

2. The fireman on a passenger locomotive sits on the left side of the cab's seat. The fireman and the engineer watch signals, dials, and gauges on the control panel of the train.

3. The conductor is in charge of the train. He sees that the crew members carry out their responsibilities for the safety of the passengers and crew members. The conductor of a freight train works at his desk in the caboose to keep track of the train's cargo.

4. The brakeman assists the conductor. On freight trains there are two brakemen. One ride in the engine cab and the other rides in the caboose where he helps the conductor watch over the train. On passenger trains, he helps the conductor collect fares.

5. The crew of a long-distance passenger train includes a baggage man, express messengers, railway postal clerks, a special conductor for sleeping cars, Pullman porters, coach porters, club-car attendants, dining-car stewards, waiters and cooks.

2. Answer the following questions.

1. What is the function of the brakeman on freight trains?

2. Do crackerjack operate machinery to load and unload the materials to be transported by train?

3. What are inspectors needed for on railroad transport?

4. Who has to understand how to manipulate the train in response to the load and weather conditions?

3. Read the text again and complete the following sentences:

1. It may be _____ of workers, cleaning the tracks, and hauling the necessary materials.

2. The _____ sees that the crew members carry out their responsibilities for the safety of the passengers and crew members.

3. There are plenty of areas of the undertaking that _____ as a crew section or as an engineer.

4. _____ need to be reliable and willing to work any hours or drive in any type of weather conditions.

5. The pay for the different jobs in the train industry varies by _____.

6. The tracks for the trains obtain to be kept in full condition to _____occurring.

7. It is now required for integral personnel operating a train to pass _____ in an effort to reduce the chances of terrorism involving trains.

4. Read the following statements and tell whether they are true or false. Correct all false statements.

1. The engineer sits on the left side of the train's cab and runs the locomotive.

2. The crew has to understand how to manipulate the plane in response to the load and weather conditions.

3. Being in charge of operating a train is a huge responsibility, and one that requires plenty of training before it is possible.

4. Many building companies offer their employees the chance for advancement and even offer to salary for the training they need drag order to have the right qualifications.

5. There is plenty of paperwork to be completed in the railroad industry.

5. Put the following sentences in negative and interrogative form:

1. There are many different jobs that fall under the umbrella of the railroad industry.

2. Office jobs like these are generally found at the central office for the railroad.

3. Many employees that work on the tracks have a specific area of specialty.

4. The better trained each employee is that works pull the train industry, the more efficient operations will flow and the fewer accidents will result.

5. The specific requirements depend on the type of train that is being operated.

6. The fireman on a passenger locomotive sits on the left side of the cab's seat.

6. Unscramble the words.

aliquficonsati	

brmanake	
hnotecgylo	
omoloctive	
nalsigs	
crarjackcke	

7. Make summary of the text above.

8. Translate the word combinations.

1. railroad industry _____.
2. right qualifications _____.
3. transported by train _____.
4. laying railroad ties _____.
5. welding _____.
6. supervising a gang of workers _____.
7. cleaning the tracks _____.
8. hauling the necessary materials _____.
9. operating a train _____.
10. navigational skills _____.
11. in charge of the train _____.
12. safety of the passengers _____.
13. desk in the caboose _____.
14. a baggage man _____.
15. railway postal clerks _____.
16. coach porters _____.
17. club-car attendants _____.
18. dining-car stewards _____.

UNIT 4. Rail transport operations.

1. Read and translate the text.

Signaling.

One of important factors contributing to safe rail travel is the system of signaling. Originally railways relied on the time interval to ensure the safety of a succession of trains, but the defects rapidly manifested themselves, and a space interval, or the block system, was adopted, although it was not enforced legally on British passenger lines until the Regulation of Railways Act of 1889. Semaphore signals became universally adopted on running lines and the interlocking of points [switches] and signals (usually accomplished mechanically by tappets) to prevent conflicting movements being signaled was also a requirement of the 1889 Act. Lock-and-block signaling, which ensured a safe sequence of movements by electric checks, was introduced on the London, Chatham and Dover Railway in 1875.

Track circuiting, by which the presence of a train is detected by an electric current passing from one rail to another through the wheels and axles, dates from 1870 when William Robinson applied it in the United States. In England the Great Eastern Railway introduced power operation of points and signals at Spitaifields goods yard in 1899, and three years later track-circuit operation of powered signals was in operation on 30 miles (48 km) of the London and South Western Railway main line.

Day color light signals, controlled automatically by the trains through track circuits, were installed on the Liverpool Overhead Railway in 1920 and four-aspect day color lights (red, yellow, double yellow and green) were provided on Southern Railway routes from 1926 onwards. These enable drivers of high-speed trains to have a warning two block sections ahead of a possible need to stop. With track circuiting it became usual to show the presence of vehicles on a track diagram in the signal cabin which allowed routes to be controlled remotely by means of electric relays.

Other signaling developments of recent years include completely automatic operation of simple point layouts, such as the double crossover at the Bank terminus of the British Rail's Waterloo and City underground railway. On London Transport's underground system a plastic roll operates junctions according to the timetable by means of coded punched holes, and on the Victoria Line trains are operated automatically once

the driver has pressed two buttons to indicate his readiness to start. He also acts as the guard, controlling the opening of the doors, closed circuit television giving him a view along the train. The trains are controlled (for acceleration and braking) by coded impulses transmitted through the running rails to induction coils mounted on the front of the train.

Train control.

In England train control began in l909 on the Midland Railway, particularly to expedite the movement of coal trains and to see that guards and enginemen were relieved at the end of their shift and were not called upon to work excessive overtime. Comprehensive train control systems, depending on complete diagrams of the track layout and records of the position of engines, crews and rolling stock, were developed for the whole of Britain, the Southern Railway being the last to adopt it during World War 2, having hitherto given a great deal of responsibility to signalmen for the regulation of trains. Refinements of control include advance traffic information (ATI) in which information is passed from yard to yard by telex giving types of wagon, wagon number, route code, particulars of the load, destination station and consignee. In l972 British Rail decided to adopt a computerized freight information and traffic control system known as TOPS (total operations processing system) which was developed over eight years by the Southern Pacific company in the USA.

Wagons must be sorted on their journey. In Britain there are about 600 terminal points on a 12,000 mile network which is served by over 2500 freight trains made up of varying assortments of 249,000 wagons and 3972 locomotives, of witch 333 are electric. This requires the speed of calculation and the information storage and classification capacity of the modern computer, which has to be linked to points dealing with or generating traffic throughout the system. The computer input, which is by punched cards, covers details of loading or unloading of wagons and their movements in trains, the composition of trains and their departures from and arrivals at yards. The computer output includes information on the balance of locomotives at depots and yards, with particulars of when maintenance examinations are due, the numbers of empty and loaded wagons, with aggregate weight and brake force, and whether their movement is on time, the location of empty wagons and a forecast of those that will become available, and the

numbers of trains at any location, with collective train weights and individual details of the component wagons.

Switchyards.

Groups of sorting sidings, in which wagons [freight cars] can be arranged in order so that they can be detached from the train at their destination with the least possible delay, are called marshalling yards in Britain and classification yards or switchyards in North America. The work is done by small locomotives called switchers, which move 'cuts' of trains from one siding to another until the desired order is achieved.

As railways became more complicated in their system layouts in the nineteenth century, the scope and volume of necessary sorting became greater, and means of reducing the time and labor involved were sought. Chain drags were used for braking the wagons. A shunter uncoupled the wagons in 'cuts' for the various destinations and each cut was turned into the appropriate siding. Some gravity yards relied on a code of whistles to advise the signalman what 'road' (siding) was required.

An entirely new concept came with White moor yard at March, near Cambridge, opened by the London & North Eastern Railway in l929 to concentrate traffic to and from East Anglican destinations. When trains arrived in one of ten reception sidings a shunter examined the wagon labels and prepared a 'cut card' showing how the train should be sorted into sidings. This was sent to the control tower by pneumatic tube; there the points [switches] for the forty sorted sidings were preset in accordance with the cut card; information for several trains could be stored in a simple pin and drum device.

British Rail built a series of yards at strategic points; the yards usually had two stages of retarders, latterly electro pneumatically operated, to control wagon speed. In later yards electronic equipment was used to measure the weight of each wagon and estimate its rolling resistance.

An automatic telephone exchange links all the traffic and administrative offices in the yard with the railway control office, Sheffield Midland Station and the local steelworks (principal source of traffic). Two-way loudspeaker systems are available through all the principal points in the yard, and radio telephone equipment is used to speak to enginemen. Fitters maintaining the retarders have walkie-talkie equipment. The information from shunters about the cuts and how many wagons in each, together with

destination, is conveyed by special data transmission equipment, a punched tape being produced to feed into the point control system for each train over the hump.

2. Answer the following questions.

1. Did railways rely on the time interval to ensure the safety of a succession of trains?

2. What did British Rail build at strategic points?

3. How many stages of retarders did the yards usually have?

4. The computer output includes information on the balance of locomotives at depots and yards, doesn't it?

5. When were day color light signals, controlled automatically by the trains through track circuits, installed on the Liverpool Overhead Railway?

3. Read the text again and complete the following sentences:

1. Semaphore signals became universally adopted on running lines and the interlocking of _____to prevent _____ being signaled was also a requirement of the _____.

2. When trains arrived in one of _____ a shunter examined the wagon labels and prepared a _____- should be sorted into sidings.

3. The computer input, which is by punched cards, covers _____-, the composition of trains and their departures from and arrivals at yards.

4. In England train control began in _____, particularly to expedite the movement of _____ were relieved at the end of their shift and were not called upon to work excessive overtime.

5. As railways became more complicated in their system layouts in _____.

6. In England the Great Eastern Railway introduced _____ at Spitaifields goods yard in 1899.

4. Explain the following data:

1889, 1875, 1870, 1899, 1920, 1926, 1909, 1972, 1929.

5. Unscramble the words.

sherunt	
tardreers	
wistardchy	
sannaligm	
ineengmen	
aphsemore	

6. Make summary of the text above.

UNIT 5. Types of trains and cars.

1. Read and translate the text.

The coming revolution in transportation.

You ride toward the city at 90 miles an hour, glancing through the morning newspaper while your electrically powered car follows its programmed route on an automated "guideway". You leave your car at the city's edge - a parklike city without streets - and enter a small plastic "people capsule". Inside, you dial your destination on a sequence of numbered buttons and settle back. Smoothly, silently, your capsule accelerates to 80 miles an hour. Guided by a distant master computer, it slips down into the network of tunnels under the city and takes precisely the fastest route to your destination.

Far-fetched? Not at all. Every element of this fantastic system is already within range of our scientists' skills. Indeed, the system utilizes only a few of the exciting new people-moving machines that have reached or passed the experimental stage.

Automated highways - engineers call them guideways - are technically feasible today. General Motors successfully demonstrated an electronically controlled guidance system. A wire was embedded in the road, and two pick-up coils were installed at the front of a car to sense its position in relation of that wire. The coils sent electrical signals to the steering system, to keep the vehicle automatically on course. They tested a system that also controlled spacing and detected obstacles. It could slow down or stop an overtaking vehicle until the road was clear.

Other companies are also experimenting with guide ways. In some systems, the car's power comes from an electric transmission line built into the road. In others, vehicles would be carried on a high speed conveyer, or perhaps in a container.

Computer-controlled highways will almost surely become a reality, for when the human element is removed, vehicles can travel with greater safety at faster

speeds, closer together. In fact, most experts believe that each lane of automated highway could move the traffic of three or four of today's uncontrolled lanes.

"People Places". And when all this comes true, will we drive into even more nightmarish traffic tangles on city streets? The answer to this was found in Sweden. As you stroll across a fountain-dotted plaza lined with attractive shops, you don't hear any traffic noise here; this is "a walking plaza", "a people place", and the key to its success is the network of tunnels beneath it. Down there, trucks are supplying the stores with merchandise, and a subway carry people to and from nearby Stockholm.

Underground Highways? Most transportation experts don't consider them extravagant at all. Improved boring methods laser beams, chemicals, water or flame jets - will make tunneling cheaper. Moreover, underground highways are not affected by weather, and they do not provoke the bitter debates that have erupted in many cities over the displacement of people by surface construction.

Many of the transportation authorities are enthusiastic about Stockholm's "walking plaza" concept. The idea is to provide for most of the people's needs in a more concentrated area, so that they have less reason to travel outside their own community.

Still, people must travel to their place of work - which is not necessarily near where they live - and this causes an almost universal problem in our cities. Some recent studies point toward solution. For example, a bus line picks up passengers practically at their doors (for a monthly charge) and carries them, directly to their place of work. In the future, such personalized computer services may be provided by mini-buses. One proposal calls for special metal plates connected to a central computer, installed throughout a neighborhood. When someone pushes a plate, it signals the computer which orders the nearest mini-bus to pick him up.

2. Answer the following questions.

1. What will the city of the future look like?
2. Can you explain what an automated "guide way" mean?
3. What is a "people capsule"? Is it fantasy?
4. What is a small computer in the automated autos used for and where is it placed?
5. What are the advantages of automated highway lanes as compared with uncontrolled lanes?

6. How did the specialists in Sweden solve the transportation problem in the busy centre of the city?
7. What are the advantages of the underground highways as compared with the surface highways?
8. What services may be provided by mini-buses in the future city?

3. Unscramble the words.

edawyugi _____
stediotaion _____
leuscpa _____
hielvec _____
vorkepo _____
ghdoonobrhie _____
telericc _____

4. Make the following interrogative.

1. You leave your car at the city's edge and enter a small plastic "people capsule".
2. You dial your destination on a sequence of numbered buttons.
3. Other companies are also experimenting with guide ways.
4. Vehicles would be carried on a high speed conveyer or in a container.
5. You don't hear any traffic noise here.
6. Trucks are supplying the stores with merchandise.
7. This causes an almost universal problem in our cities.
8. A bus line picks up passengers practically at their doors.
9. Personalized computer services may be provided by mini-buses.
10. The computer orders the nearest mini-bus to pick him up.

5. Translate sentences into English.

1. Просматривая утреннюю газету _____
2. Вы оставляете свою машину на окраине города _____
_____
3. Достигать 80 миль в час _____
4. Посылать электрический сигнал _____
5. Подземные шоссе не зависят от погоды _____
6. Установленный в окрестностях _____
7. Персональные компьютерные службы _____

6. Complete the sentences.

1. You leave your car at the city's edge - a parklike city without streets – and
_____
2. Guided by a distant master computer, it slips _____
3. The system utilizes only_____

4. The coils sent electrical signals to _____
5. When the human element is removed, vehicles can _____
_____
6. The key to success of "a people place" is _____
7. Underground highways do not provoke _____

7. Read and translate the text.

Wagonways and tramways.

The earliest evidence of a wagonway, a predecessor of the railway, found so far was the 6 to 8.5 km long *Diolkos* wagonway, which transported boats across the Isthmus of Corinth in Greece since around 600 BC. Wheeled vehicles pulled by men and animals ran in grooves in limestone, which provided the track element, preventing the wagons from leaving the intended route. The Diolkos was in use for over 650 years, until at least the 1st century AD. The first horse-drawn wagonways also appeared in ancient Greece, with others to be found on Malta and various parts of the Roman Empire, using cut-stone tracks. They fell into disuse as the Roman Empire collapsed.

The earliest known record of a railway in medieval Europe is a stained-glass window in the Minster of Freiburg in Breisgau dating from around 1350.

In 1515, Cardinal Lang wrote a description of a funicular railway in Austria. The line originally used wooden rails and a hemp haulage rope, and was operated by human or animal power, through a tread wheel. The line still exists, in updated form, and is probably the oldest railway still to operate.

Wagonways (or '**tramways'**) are thought to have developed in Germany in the 1550s to facilitate the transport of ore tubs to and from mines, utilizing primitive wooden rails. Such an operation was illustrated in 1556 by Georgius Agricola. These used "Hund" carts with unflanged wheels running on wooden planks and a vertical pin on the truck fitting into the gap between the planks, to keep it going the right way. Such a transport system was used by German miners at Caldbeck, Cumbria, perhaps from the 1560s. The first true railway is now suggested to have been a funicular railway made at Broseley in Shropshire at some time before 1605. This carried coal for James Clifford from his mines down to the river Severn to be loaded on to barges and carried to riverside towns. Though the first documentary record of this is later, its construction probably preceded the Wollaton Wagonway, completed in 1604, regarded as the earliest

British installation. This ran from Strelley to Wollaton near Nottingham. Another early wagonway is noted onwards. Huntingdon Beaumont (who was concerned with mining at Strelley) also laid down broad wooden rails near Newcastle upon Tyne, on which a single horse could haul fifty or sixty bushels (130–150 kg) of coal.

By the 18th century, such wagonways and tramways existed in a number of areas. Ralph Allen, for example, constructed a tramway to transport stone from a local quarry to supply the needs of the builders of the Georgian terraces of Bath. The Battle of Prestonpans, in the Jacobite Rebellion, was fought astride a wagonway. This type of transport spread rapidly through the whole Tyneside coal-field, and the greatest number of lines were to be found in the coalfield near Newcastle upon Tyne. Their function in most cases was to facilitate the transport of coal in chaldron wagons from the coalpits to a staithe (a wooden pier) on the river bank, whence coal could be shipped to London by collier brigs. The wagonways were engineered so that trains of coal wagons could descend to the staithe by gravity, being braked by a brakesman who would "sprag" the wheels by jamming them. Wagonways on less steep gradients could be retarded by allowing the wheels to bind on curves. As the work became more wearing on the horses, a vehicle known as a dandy wagon was introduced, in which the horse could rest on downhill stretches.

8. Translate the word combinations

wagonway _____

limestone _____

intended route _____

stained-glass window _____

funicular railway _____

hemp haulage rope _____

unflanged wheels _____

vertical pin _____

to be loaded on to barges _____

collier brigs _____

to bind on curves _____

dandy wagon _____

downhill stretches _____

9. Choose the correct variant and complete the sentences

1. The earliest evidence of a _____ (wagonway, tramway, wooden rails), a predecessor of the railway, found so far was the 6 to 8.5 km long *Diolkos* wagonway.

2. In 1515, Cardinal Lang wrote a description of a funicular railway in _____ (Germany, Austria, the USA).

3. The first true railway is now suggested to have been a funicular railway made at Broseley in Shropshire at some time before _____ (1607, 1604, 1605).

4. _____ (James Clifford, Ralph Allen, Cardinal Lang), for example, constructed a tramway to transport stone from a local quarry to supply the needs of the builders of the Georgian terraces of Bath.

5. The wagonways were engineered so that trains of _____ (coal, oil, wood) wagons could descend to the staithe by gravity.

10. Complete the sentences

1. This carried coal for _____ to the river Severn to be loaded on to barges and carried to riverside towns.

2. Wagonways (or '**tramways**') are thought _____ to facilitate the transport of ore tubs to and from mines, utilizing primitive wooden rails.

3. The Battle of Prestonpans, in the Jacobite Rebellion, was _____.

4. Wheeled vehicles pulled by men and animals ran in _____, which provided the track element, preventing the wagons from _____.

5. Wagonways on less steep gradients could be _____ to bind on curves.

6. Though the first documentary record of this is later, its construction probably preceded the Wollaton Wagonway, completed in _____ installation.

11. Unscramble the words

meestlion, gowan, nifucarul, aamtrwy, owdnilhl, hlaaeug

12. Write down 4 forms of the underlined verbs

13. Explain the following dates

the 1st century AD, 1350, 1515, 1556, 1605, by the 18th century

14. Write the following words in the correct order to make sentences

1. are, to, have, from, wagonways, utilizing, Germany, developed, in, in, rails, to, facilitate, the, transport, of, ore, tubs, thought, to, and, mines, primitive, the 1550s, wooden.

2. the, horse-drawn, also, ancient, appeared, in, with, others, found, on, first, tracks, Malta, and, various, parts, wagonways, of, the Roman, Greece, Empire, using, to be, cut-stone.

3. work, as, the, rest, became, the, downhill, horses, wearing, dandy, was, introduced, on, a wagon, in, which, the horse, could, more, on, stretches.

15. Read and translate the text.

Streetcars - Cable Cars.

On January 17, 1871, San Franciscan Andrew Smith Hallidie patented the first cable car, ultimately sparing many horses the excruciating work of moving people over that city's steep roadways. Using metal ropes he had patented, Hallidie devised a mechanism by which cars were drawn by an endless cable running in a slot between the rails which passed over a steam-driven shaft in the powerhouse. After gathering financial backing, Hallidie and his associates constructed the first cable railway.

The track ran from the intersection of Clay and Kearny Streets along twenty-eight hundred feet of track to the crest of a hill 307 feet above the starting point. At five o'clock on the morning of August 1, 1873, a few nervous men climbed aboard the cable car as it stood on the hilltop. With Hallidie at the controls, the car descended and arrived safely at the bottom. Given San Francisco's steep terrain, the cable car came to define the city. Writing in 1888, Harriet Harper declared: "If any one should ask me what I consider the most distinctive, progressive feature of California, I should answer promptly, its cable-car system. And it is not alone its system which seems to have reached a point of perfection, but the amazing length of the ride that is given you for the chink of a nickel. I have circled this city of San Francisco, I have gone the length of three separate cable lines (by means of the proper transfers) for this smallest of Southern coins."

The success of the San Francisco line led to the expansion of that system and the introduction of street railways in many other cities. By the 1920s, most United States municipalities had abandoned horse drawn cars for electrically powered cars.

History of the Streetcar

The first mass transportation vehicle in America was called an omnibus. It looked like a stagecoach and was pulled by horses. The first omnibus to operate in America began running up and down Broadway in New York City in the year 1827. It was owned by Abraham Brower, who also helped organize the first fire department in New York. There had long been horse-drawn carriages in America to take people where they wanted to go.

What was new and different about the omnibus was that it ran along a certain designated route and charged a very low fare. People who wanted to get on would wave their hand in the air. The driver sat on a bench on top of the omnibus at the front, like a stagecoach driver. When people who were riding inside wanted to get off the omnibus, they pulled on a little leather strap. The leather strap was connected to the ankle of the person who was driving the omnibus. Horse-drawn omnibuses ran in America cities from 1826 until about 1905.

The first important improvement over the omnibus was the streetcar. The first streetcars were also pulled by horses, however, instead of riding along a regular street, the streetcars rolled along special steel rails that were placed in the middle of the street. The wheels of the streetcar were also made out of steel, carefully manufactured in such a way that they would not roll off the rails. A horse-drawn streetcar was much more comfortable than an omnibus and a single horse could also pull a streetcar that was much larger, and carried more passengers, than an omnibus. The first streetcar ran along Bowery Street in New York, and began service in the year 1832. It was owned John Mason, a wealthy banker, and built by Irishmen, John Stephenson. Stephenson's New York company would become the largest and most famous builder of horse-drawn streetcars.

The second American city to have streetcars was New Orleans, Louisiana, in the year 1835. The typical American streetcar was operated by two crew members. One man, a driver, rode up front. His job was to drive the horse, controlled by a set of reigns. The driver also had a brake handle that he could use to stop the streetcar. When streetcars got bigger, sometimes two and three horses would be used to haul a single car. The second crew member was called the conductor, who rode at the back of the car. His job was to help passengers get on and off the streetcar, collect their fares, and give a signal to the driver when everyone was on board and it was safe to proceed. He gave this signal by pulling on a rope that was attached to a bell at the other end of the car that the driver could hear.

The first major attempt to develop a machine that could replace horses on America's streetcar lines was the cable car in 1873. Cable cars were hauled by a long cable that moved slowly under a city's streets. To convert a streetcar line from horse cars to cable cars required digging a ditch between the rails and building a chamber under the track from one end of the line to another. This chamber was called a vault. When the vault was finished, a small opening was left at the top of the vault. Then a long cable was placed inside the vault. The cable ran under city streets from one end of the streetcar line to the other. The cable was spliced into a big loop and was kept moving by a huge steam engine with massive wheels and pulleys that was located in a powerhouse at the side of the street. The cable cars themselves were equipped with a device that extended down below the car into the vault and allowed the operator of the car to latch onto the moving cable when he wanted the car to go, or let go of the cable when he wanted the car to stop. There were many pulleys and wheels inside the vault to make sure the cable was able to go around corners, as well as up and down hills.

The first cable cars ran in San Francisco. The largest and busiest fleet of cable cars in America were in Chicago. Most large American cities had one or more cable car lines by the year 1890. Frank Sprague installed a complete system of electric streetcars in Richmond, Virginia, in 1888. This was the first large scale and successful use of electricity to run a city's entire system of streetcars. Sprague was born in Connecticut in 1857. In 1878 he graduated from the United States Naval Academy in Annapolis,

Maryland, and began a career as a naval officer. He resigned from the navy in 1883 and went to work for Thomas Edison. After 1888, many cities turned to electric-powered streetcars. To get electricity to the streetcars from the powerhouse where it was generated, an overhead wire was installed over city streets. A streetcar would touch this electric wire with a long pole on its roof. Back at the powerhouse, big steam engines would turn huge generators to produce the electricity needed to operate the streetcars. A new name was soon developed for streetcars powered by electricity; they were called trolley cars.

16. Unscramble the words

trseetrca**,** gerenorat, pleyul, peatnt, pceerod, stacogeach, niombsu, gnrei, pohouwerse.

17. Translate the words into Russian

Streetcars, cable cars, trolley cars, excruciating, ropes, devised, slot, steam-driven shaft, powerhouse, intersection, crest, hilltop, cable-car system, chink of a nickel, expansion, stagecoach, horse-drawn carriages, fare, leather strap, ankle, ride up, a set of reigns, brake handle, to proceed, bell, ditch, chamber, vault, loop, pulleys, latch, fleet of cable cars, wire, generators.

18. True or false?

- On January 17, 1771, San Franciscan Andrew Smith Hallidie patented the first cable car,

- The track ran from the intersection of Clay and Kearny Streets along thirty-eight hundred feet of track to the crest of a hill 307 feet above the starting point.

- Omnibus looked like a stagecoach and was pulled by horses.

- The leather strap was connected to the ankle of the person who was driving the omnibus.

- The first streetcars were also pulled by men, however, instead of riding along a regular street, the streetcars rolled along special iron rails that were placed in the middle of the street.

- The first streetcar ran along Bowery Street in New York, and began service in the year 1932.

- The typical American streetcar was operated by two crew members.

- The second crew member was called the conductor, who rode at the front of the car.

- A vault was a chamber under the track from one end of the line to another.

- The largest and busiest fleet of cable cars in America were in New York.

- A new name was soon developed for streetcars powered by electricity; they were called trolley cars.

19. Explain the following dates

1826, 1827, 1832, 1835, 1857, 1871, 1873, 1878, 1883, 1888, 1890, 1905, 1920s

20. Write down 4 forms of the underlined verbs

21. Define the tense

had patented, constructed, shall ask, have reached, is given, have circled, had abandoned, was called, will have pulled, were owned, had been, will wave, were riding, was connected, is driving, are pulled, will be placed, will roll, began, become, will be used, give, was born, will be generated, were touched.

22. Turn the Active Voice into the Passive

had patented, draw, constructed, ask, have reached, give, called, pulled, will organize, will take, were riding, has connected, have placed, carried, is controlling, are using,

collect, develop, replaced, have convert, finished, kept, located, has installed, is generating

23. Define the degree of comparison

less nervous, the safest, more progressive, amazing, the smallest, lower, regular, more comfortable, larger, the largest, the most famous, bigger, slower, long, huge, the busiest, complete, the least successful

UNIT 6. Bridges and tunnels construction.

1. Read and translate the text.

Early bridges.

Bridges are structures built over a river, railroad track, road, lakes, ravines, canyons, highways or some other obstacle. They allow people or vehicles to cross from one side to another.

Bridges must be built strong enough to safely support their own weight as well as the weight of the people and vehicles that pass over it. The bridge must also withstand natural occurrences that include weathering, earthquakes, strong winds, and freezing and thawing.

There's no doubt you've seen a bridge, and it's almost as likely that you've traveled over one. If you've ever laid a plank or log down over a stream to keep from getting wet, you've even constructed a bridge. Bridges are truly ubiquitous -- a natural part of everyday life. The type of bridge used depends on various features of the obstacle. The main feature that controls the bridge type is the size of the obstacle. How far is it from one side to the other? This is a major factor in determining what type of bridge to use.

In ancient times the first bridges made by humans were probably spans of wooden logs or planks and eventually stones, using a simple support and crossbeam arrangement.

Some early Americans used trees or bamboo poles to cross small caverns or wells to get from one place to another. A common form of lashing sticks, logs, and deciduous branches together involved the use of long reeds or other harvested fibers woven together to form a connective rope which was capable of binding and holding in place materials used in early bridges.

The greatest bridge builders of antiquity were the ancient Romans. The Romans built arch bridges and aqueducts that could stand in conditions that would damage or destroy earlier designs. The Romans built long, arched spans, many of which are still standing. The Romans also used cement, which reduced the variation of strength found in natural stone. Brick and mortar bridges were built after the Roman era, as the technology for cement was lost then later rediscovered.

Rope bridges, a simple type of suspension bridge, were used by the Inca civilization in the Andes Mountains of South America, just prior to European colonization in the 1500s.

Bridges built during the Middle Ages usually rested on crude stone arches with heavy piers (intermediate supports) that were a great obstruction to river traffic, and their roadways were often lined with small shops.

The best known early American design is the New England covered bridge. Colonial American bridge builders were willing to run the risk of rot or fire in exchange for such savings in time and manpower. Beginning with Abraham Darby's bridge at Coalbrookdale in 1779, most bridges began to be built of cast and wrought iron. Robert Stephenson, an English engineer, designed and built a bridge of this type across Menai Strait in North Wales (1850). Another is Victoria Bridge across the St. Lawrence at Montreal. The disadvantage of cast iron for bridges is its low tensile strength. During the 18th century there were many innovations in the design of timber bridges by Hans Ulrich, Johannes Grubenmann, and others.

With the Industrial Revolution in the 19th century, truss systems of wrought iron were developed for larger bridges, but iron did not have the tensile strength to support large loads. With the advent of steel, which has a high tensile strength, much larger bridges were built, many using the ideas of Gustave Eiffel.

2. Put a question tag.

1. The bridge must withstand natural occurrences that include weathering, earthquakes, strong winds, _____?
2. The main feature that controls the bridge type is the size of the obstacle, _____ _____?
3. The greatest bridge builders of antiquity were the ancient Romans, _____?
4. Cement reduced the variation of strength found in natural stone, _____?
5. Since 1779 most bridges began to be built of cast and wrought iron, _____?
6. Robert Stephenson designed and built a bridge of this type across Menai Strait, _____?
7. During the 18th century there were many innovations in the design of timber, _____?

8. Iron did not have the tensile strength to support large loads, _____?
9. Steel has a high tensile strength, _____?

3. Translate the following words.

1	ravine		14	fiber	
2	obstacle		15	rope	
3	withstand		16	mortar	
4	span		17	suspension	
5	log		18	crude	
6	plank		19	pier	
7	ubiquitous		20	rot	
8	crossbeam		21	wrought iron	
9	reed		22	cast iron	
10	bamboo poles		23	tensile	
11	cavern		24	truss system	
12	deciduous		25	lashing	

4. Match the parts of word combinations.

1	railroad	a	weight
2	to support	b	a plank
3	natural	c	civilization
4	to lay	d	track
5	to cross	e	bridges
6	mortar	f	caverns
7	Inca	g	occurrences

5. Make up your own sentences with them.

6. Write out from the text above the events which took place in the indicated period of time.

1. The Roman era
2. The Middle Ages
3. Since 1779

4. The Industrial Revolution

7. Answer the following questions.

1. What is a bridge by definition?
2. Why must bridges be strong enough?
3. Were bridges a natural part of antique people's life?
4. Why were the Romans different in building bridges?
5. What civilization used rope bridges?
6. What were Darby's bridges made of?
7. Was low tensile strength of cast iron for bridges advantage or disadvantage?
8. Did iron have the tensile strength to support large loads during the Industrial Revolution?

8. Fill in the blanks using the words below.

Romans, obstacle, humans, century, wooden, wet, cement, stone, plank, feature, timber, bridges, many, ancient.

1. _____are structures built over a river, railroad track, road etc.
2. They laid a _____ or log down over a stream to keep from getting _____.
3. The main _____ that controls the bridge is the size of the _____.
4. In _____ times the first bridges made by _____ were probably spans of _____ logs.
5. The _____ also used _____, which reduced the variation of strength found in natural _____.
6. During the 18th _____ there were _____ innovations in the design of _____ bridges by Hans Ulrich and others.

9. Read the text again. Entitle each part.

10. Retell the text above.

11. Translate the text into English.

В России первые железные мосты появились в 1780-е г.г. и отличались от европейских тем, что были большей частью именно железными, а не чугунными. Один из них был сделан по проекту Дж. Кваренги для парка в Царском селе. Затем последовала серия мостов, изготовленная на Сестрорецком оружейном заводе. Два железных моста 1793-1794 находятся в Таврическом саду в Петербурге. Эти памятники инженерного искусства лишь по случайности удалось спасти от сноса -

совершенство их конструкции таково, что долгое время их считали произведениями значительно более позднего времени.

В начале XIX в. в Петербурге появляется новый тип мостов - "из полых чугунных ящиков", первым из которых был "Бердов мост" (1805-1806) на одном из притоков Невы. В 1807 г. Гесте составил для Петербурга первый в мире образцовый проект чугунного моста и в 1810-20-е гг. в городе появилось около десяти этих сооружений, казавшихся в то время необычно легкими.

Первое десятилетие XIX в. стало временем возникновения мостов вантовой конструкции (или американо-европейской системы); начало их строительству было положено американцем Джоном Фидлеем, юристом по образованию, рассматривавшим строительство мостов как дополнительное средство заработка. В это же время идея вантового моста пришла в голову архитектора Витберга. Интересен факт отсутствия точных расчетов конструкции в первых железных мостах. До 1820-х гг. расчеты заменялись моделью в 1/3 величины реальной постройки, что объясняется неустойчивостью качества выплавки железа в ранний период.

12. Come up with the best title for the text above.

13. Read and translate the text.

The mystery of the tunnels of South America.

Recently, Erick von Daniken reported that he had been in a network of tunnels that run for thousands of miles beneath the South American continent. He saw immense rooms filled with metallic plaques. They constitute a possible record of the ancient world. The first knowledge about these immense underground tunnels came when the Conquistadores invaded ancient South America.

It is believed by some treasure hunters that the llama loads of gold were hidden in these ancient tunnels. Indian legends say the gold was secreted "in such a place that even we do not know the location."

Among the artifacts that vanished were the mummified bodies of thirteen Inca emperors. They had sat on golden chairs in the Temple of the Sun, the chairs resting on a huge slab of gold. The mummified remains of Inca rulers were placed around the temple decorated with

golden jewelry and precious stones. Near the mummies were large gold plates engraved with a picture of the Inca as they appeared during life.

The important buildings in the Coricancha were connected by underground tunnels with the fortress. Entrances to these tunnels started at the Chincana, "the place where one gets lost." Too many adventurous treasure hunters were going in to the caverns and disappearing.

The masonry is for the most part, as solid as if built only a few years ago, and the passages are so extensive that we were able to spend the whole day exploring the recesses of this building which must have been reared three thousand years ago. No such walls are built in that region today. In a place where four corridors meet stands the famous idol of Chavin.

Rumors of these massive tunnels were so persistent during the 1850's that a viceroy of Peru decided to find the entrance. An expedition was outfitted and sent to find an entrance into the subterranean passages.

The tunnels started at Cuzco and ran underground to Lima, a distance of around 380 miles by air. At Lima the tunnels turn southward into what is now modern Bolivia. This is a distance of some thousand miles!

We can assume that the ancient builders of the tunnels anticipated possible grave robbers. They probably created a deadly trap for unwary ghouls.

The concept of vast underground passages is enough to boggle the mind. That such tunnels could be constructed indicates a science in pre-Inca or Inca days. It means there was a technology capable of building a labyrinth beneath the earth.

And for what purpose? It is one thing to construct an underground shelter in the event of a catastrophe. Such a cavern, man-made or naturally formed, would provide safe refuge against an impending disaster. To construct tunnels that run for a hundred or a thousand miles beneath the South American continent is beyond the boundaries of present knowledge. Exactly who built the tunnel and why, remains a mystery.

Perhaps the mystery of the tunnels will be solved someday in the future. Until then, we might consider that these structures were probably in South America prior to the reign of the Incas. Some scholars have suggested that the tunnels were built by the Atlaneans. Others have speculated that an unknown race that existed before the flood constructed the tunnels.

14. Transcribe the following words.

1. tunnel
2. beneath
3. ancient
4. treasure
5. mummified
6. precious
7. adventurous
8. subterranean
9. southward
10. assume
11. ghoul
12. science
13. labyrinth
14. catastrophe
15. boundaries

15. Answer the following questions.

1. What is your impression of the text?
2. Why is the text called as the mystery of tunnels?
3. What remained in the tunnels?
4. What do the scientists say about the manner of building and decorating of these tunnels?
5. Is it known exactly now what purpose did the ancients have to build the tunnels?
6. What points of views exist among the scientists on the subject of purpose of building tunnels?

16. Put the verbs in brackets in suitable tense-form.

A tunnel _____ (*to be*) an underground passageway for trains or automobiles, through or under an obstruction, as a city, mountain, river, harbor, or the lake. It _____ (*to be*) also an approximately horizontal gallery or corridor in a mine.

The definition of what constitutes a tunnel ____ (*to be*) not universally agreed upon. However, in general tunnels _____ (*to be*) at least twice as long as they _____ (*to be*) wide. In addition, they should be completely enclosed on all sides, save for the openings at each end. Some civic planners _____ (*to define*) a tunnel as 0.1 miles (0.16 km) in length or longer, while anything shorter than this should be called an underpass or a chute.

A tunnel may ____ (*to be*) for pedestrians or cyclists, for general road traffic, for motor vehicles only, for rail traffic, or for a canal. Some _____ (*to be*) aqueducts, constructed purely for carrying water — for consumption, for hydroelectric purposes or as sewers — while others _____ (*to carry*) other services such as telecommunications cables. There _____ (*to be*) even tunnels designed as wildlife crossings for European badgers and other endangered species. Some secret tunnels ____ also _____ _____ (*to make*) as a method of entrance or escape from an area. Some tunnels ____ (*to be*) not for transport at all but are fortifications.

In the United Kingdom a pedestrian tunnel or other underpass beneath a road _____ (*to call*) a subway. This term _____ (*to use*) in the past in the United States, but now _____ (*to refer*) to underground rapid transit systems.

The central part of a rapid transit network ___ usually _____ (*to build*) in tunnels. To allow non-level crossings, some lines _____ (*to run*) in deeper tunnels than others. Rail stations with much traffic usually _____ (*to provide*) pedestrian tunnels from one platform to another, though others _____ (*to use*) bridges.

UNIT 7. Tube construction.

1. Read and translate the text.

The use of underground space in big cities.

At a conference held in Tokyo in 1974 leading representatives of New York, London, Paris, Moscow and Tokyo met to discuss the problems of the World's Great Cities.

The representatives spoke of the extremely rapid intensification of urban space density, of the absolute shortage of services, sewers, roads and other urban facilities as well as new urban problems.

In this connection the exploration of urban subspace for the movement of goods, freight, persons has become vitally important.

Moscow has a total and comprehensive view of the subsurface: the use of underground space in cities like Moscow, where there is a considerable number of historical architectural structures of value, especially in the central part, is the way towards solving the transportation problem.

The complex scheme of utilizing underground space which has been worked out, involves an underground network of tunnels for cars under the central part of the city, duplicating the surface transportation network as well as underground garages.

New York too has a vast and expanding transport system carrying some 7.5 million people each business day.

The simple statistics that the subways of New York alone carry more passengers than all US domestic airlines combined show the great importance of transportation underspace.

2. Find the explanation of these words in vocabulary.

1. representative _____
2. intensification _____
3. density _____
4. sewer _____
5. facility _____
6. exploration _____
7. freight _____

8. network _____
9. duplicate _____
10. expand _____
11. domestic _____

3. Make up your own sentences with them.

4. Fill in the table.

Noun	***Verb***
leader	
	to discuss
intensification	
	to serve
shortage	
	to move
connection	
	to expand
exploration	
	to combine

5. Write out all ing-forms and tell what part of speech they are.

6. Answer the following questions.

1. Who met in Tokyo to discuss the problem of big cities?
2. What was the problem discussed by the representatives?
3. Has the exploration of urban space or subspace become vitally important?
4. Why does the use of underground space in big cities seem the real way out of the problem?
5. How do the scientists present us the scheme of utilizing subsurface?
6. Do the New York subways carry fewer passengers than all US airlines?
7. Do you suppose the underground tunnels are important for nowadays cities and why?

7. Choose the right variant.

1. A conference was held in _____
a. Tokyo; b. Moscow; c. New York; d. London.

2. There weren't any representatives of _____ at the conference.
a. Paris; b. Washington; c. Moscow; d. Rome.

3. The discussed topic was the exploration of _____.
a. urban airspace; b. urban subspace; c. urban subwaterspace.

4. The complex scheme of utilizing subspace involves _____.
a. underground houses; b. underground pubs; c. underground garages.

5. Each day New York transport system carries more _____.
a. 7,5 million people; b. 7,5 thousand people; c. 7,5 billion people.

8. Tick (✓) the sentences which are true.

1	The presidents of New York, London, Paris, Moscow and Tokyo met at the conference to discuss the problems of big cities space.	
2	The representatives spoke of the extremely rapid intensification of urban space density.	
3	The absolute shortage of services, sewers, roads is old and unimportant urban problems nowadays.	
4	The use of underground space in big cities is the real way towards solving the transportation problem.	
5	The New York subways carry much more passengers than all international airlines combined.	

9. Make up sentences.

1. freight, in this, of goods, the exploration ,vitally, subspace, the movement, for, become, persons, has, connection, important, of urban. _____
_____
2. the, Moscow, in cities, like, use, is, towards, solving, space, the, of, transportation, the way , problem, underground. _____
_____
3. the, the, statistics, great, underspace, importance, simple, of, transportation, show.
_____

10. Read and translate the text

Moscow metro.

More than 40 years ago, in June 1931, it was decided to start preparations for the building of the Metro in Moscow. In the spring of 1932 the project drawn up by Soviet engineers and architects was endorsed. Thousands of young specialists and mine workers, construction workers from the Donbas and from Moscow Region, from the Urals, and Dneprostroi went underground into Metro shafts and tunnels. In a short time (it was called a record time by the world press) the first line was constructed. More than eleven kilometers of track connected the Sokolniki district with the Gorky Park district. There were ten stations on this line. The construction work was done in difficult

geological conditions, of a kind never encountered by European or American Metro builders.

So this day saw the first section of a double track line 8 miles long put into operation.

The Metro was opened on May 15, 1935. Since then building work on the Metro has not stopped for a single day. Even at the time when the fascist hordes were near Moscow, the Metro builders continued their work.

After the war the scale of construction increased considerably. The construction of the belt line was completed and it connected all the radial routes. The new routes and stations began appearing in new housing districts. Some of the lines go overland, across new bridges and aqueducts.

Moscow's rapidly increasing population, the growth of its industrial enterprises and cultural institutions required the capital to have efficient and convenient means for accommodating passenger traffic.

The Soviet people wanted the Metro to be the best in the world.

There are many stations in the Metro; their surface buildings and underground halls are spacious, well ventilated and well lit. They differ widely in architectural design and are decorated with marble, bronze, aluminium and glass. The present Metro coaches are much better than the early ones. They are -considerably lighter in weight, and the seats are soft. Muscovites and the visitors to the city do not have to wait long for trains, for the interval between them is always short. "Clever" machines have appeared in the Metro recently. An experimental automatic driver conducts trains according to the time-table and stops precisely as required.

The Moscow Metro is developing rapidly. The capital is growing and new Metro lines are being constructed every year.

11. Find out all mistakes and write down the right variant.

1. priperation _____
2. enjiners _____
3. canstryction _____
4. konditionz _____
5. dable _____
6. opereition _____

7. incrised _____
8. popjulation _____
9. wentilated _____
10. avtometic _____

12. Transcribe the following words.

building	
architect	
thousands	
region	
encounter	
fascist	
considerably	
aqueducts	
efficient	
surface	
widely	
interval	
experimental	
precisely	
required	

13. Match the columns.

1	drawn up	a	шахтеры
2	mine workers	b	промышленные предприятия
3	go overland	c	вагоны метро
4	industrial enterprises	d	разработанный
5	well lit	e	проходить над поверхностью земли
6	metro coaches	f	мрамор
7	marble	g	хорошо освещенный
1 ___, 2 ___, 3 ___, 4 ___, 5 ___, 6 ___, 7 ___.			

14. Write out all phrases with Passive Voice and transform them into Active Voice.

1. _____
2. _____
3. _____
4. _____
5. _____

15. Unscramble the words.

1. jtprcoe _____

2. netnul _____
3. ilne _____
4. tionsta _____
5. actkr _____
6. psgensare _____
7. ouisapcs _____
8. zborne _____
9. atrnsi _____
10. otsf _____

16. Fill in the table.

Infinitive	***Past Indefinite***	***Participle II***	***Participle I***
	decided		
to build			
		drawn	
to be			
			doing
	saw		
to open			
		begun	
to grow			
	wanted		
to lit			
			stopping

17. Answer the questions.

1. Who was endorsed for building the Moscow Metro?
2. How much time did it take to construct the first line?
3. What was the difference between the construction of the European and the Soviet metro?
4. Did the Moscow Metro stop during the time when the fascists were near Moscow?
5. What was the reason for the capital to have efficient and convenient means for accommodating passenger traffic?
6. What building materials are used for decorating the Metro nowadays?
7. What does “clever’ machine mean?
8. Do you think that the future is for the underground constructions? Why?

18. Translate into English.

1. Мы хотели, чтобы вы показали нам московское метро.
2. Они знают, что вы хороший строитель.
3. Пассажиры видели, как поезд подошел к платформе.
4. Известно, что залы Московского метро хорошо освещены и имеют хорошую вентиляцию.

5. Ожидают, что строительство этого тоннеля будет закончено в срок.

19. Match beginnings and endings of sentences.

1	In June 1931 it was decided	a	.... connected the Sokolniki district with the Gorky Park district.
2	More than 11 km of track	b	..... completed and it connected all the radial routes.
3	On May 15, 1935	c	.... trains according to the time-table and stops precisely as required.
4	The construction of the belt line was	d	..... to start the building of the Metro in Moscow.
5	An experimental automatic driver conducts	e	..... the Metro was opened.
1 ___, 2 ___, 3 ___, 4 ___, 5 ___.			

20. Divide the text into 3 logical parts and define the key idea of each one.

21. Write a short resume of the text.

Grammar

Глагол to be в Simple Active

Present	Past	Future
(I) am (he, she, it) is (we, you, they) are	was (ед. ч.) were (мн. ч.)	shall be (1-е л.) will be

Глагол to have в Simple Active

Present	Past	Future
have (got) has (got)	had	shall have will have

Оборот there + to be в Simple Active

Present	Past	Future
there is (ед.ч.) there are (мн.ч.)	there was (ед.ч.) there were (мн.ч.)	there will be

Степени сравнения прилагательных

	Положительная	Сравнительная	Превосходная
I	long easy	longer easier	(the) longest (the) easiest
п	interesting	more interesting	(the) most interesting
ш	good bad much, many little	better worse more less	(the) best (the) worst (the) most (the) least

Времена группы Simple Passive

to be + Participle П	
Infinitive	to be written, to be translated
Present Past Future	The letter is written/translated. The letter was written/translated. The letter will be written/translated.

Сводная таблица модальных глаголов и их эквивалентов

	Present	Past	Future
Долженствование	I must meet him. I have to meet him. I am to meet him. I **should** meet him.	I **had** to meet him. I **was** to meet him	I **shall have to** meet him. I'll be to meet him.
Способность или возможность совершения действия	He **can** help you. He is able to help you.	He **could** help you. He was able to help you.	He **will be able to** help you.
Разрешение или возможность (вероятность)	I may use this device. I am allowed to use the device.	I might use this device I was allowed to use the device.	I **shall be allowed to** use the device.

Таблица времен группы Simple Active

Форма	Present Simple	Past Simple	Future Simple
Утвердительная	My friends study French. He speak**s** English.	My friends studi**ed** French at school. He **spoke** English at the conference.	My friends **will study** French at the Institute. The teacher **will speak** about our English exam.
Вопроситель ная	**Do** your friends study French? **Does** he speak English?	**Did** your friends study French at school? **Did** he speak English at the conference?	**Will** your friends study French at the Institute? **Will** the teacher speak about our English exam?
Отрицательн ая	My friends **don't** study French. He **doesn't** speak English.	My friends **did not** study French. He **didn't** speak English at the	My friends **won't study** French at the Institute. The teacher **won't speak** about our English exam.

Структура специальных вопросов

Вопроси-тельные слова	Вспомогате льный глагол	Подлежащее и определение к нему	Смысловой глагол в форме инфинитива	Другие члены предложения
What Where When	do did will	you he your sister	do go return	in the evening? yesterday? home?

Таблица времен группы Progressive Active

Форма	Present Progressive	Past Progressive	Future Progressive
Утвердительная	The **are having** an English class. He **is** still **writing** an exercise.	They **were having** an English class when I came to see them. He **was writing** an exercise from 6 till 8 o'clock.	They **will be having** an English class tomorrow at 9 o'clock. He **will be writing** an exercise from 6 till 8 o'clock tomorrow.
Вопросительная	**Are** they **having** an English class? **Is** he still **writing** an exercise?	**Were** they **having** an English class when I came to see them? **Was he writing** an exercise from 6 till 8 o'clock.	**Will** they **be having** an English class tomorrow at 9 o'clock? **Will he be writing** an exercise from 6 till 8 o'clock tomorrow?
Отрицательная	They **aren't having** an English class, they are having a Russian class. He **isn't writing** an exercise, he is reading a book.	They **weren't having** an English class when 1 came to see them, they were having a Russian **class.** **He wasn't writing** an exercise from 6 till 8 o'clock, he was reading a book.	They **will not be having** an English class tomorrow at 9 o'clock, they will be having a Russian class. He **won't be writing** an exercise from 6 till 8 o'clock tomorrow, he'll be reading a book.

Таблица времен группы Perfect Active

Форма	Present Perfect	Past Perfect	Future Perfect
Утвердительная	I **have sent** the letter.	I **had** already **sent** the letter by 6 o'clock yesterday.	I **shall have sent** the letter by tomorrow evening.
Вопросительная	**Have** you **sent** the letter?	**Had** you **sent** the letter by 6 o'clock yesterday?	**Will** you **have sent** the letter by tomorrow evening?
Отрицательная	I **have not sent** the letter yet.	I **had not sent** the letter by 6 o'clock yesterday.	I **shall not have sent** the letter by tomorrow evening.

Таблица времен Simple, Progressive, Perfect in Passive Voice

	Simple to be + Participle II	Progressive to be + being + Participle II	Perfect to have + been + Participle II
Present	The letter is translated Is the letter translated? The letter isn't translated	The letter is being translated Is the letter being translated? The letter isn't being translated	The letter has been translated Has the letter been translated? The letter hasn't been translated.
Past	The letter was translated Was the letter translated? The letter wasn't translated.	The letter was being translated Was the letter being translated? The letter wasn't being translated	The letter had been translated Had the letter been translated? The letter hadn't been translated?
Future	The letter will be translated Will the letter be translated? The letter won't be translated	Не употребляются.	The letter will have been Will the letter have been translated? The letter won't have been translated.

Таблица производных слов от some, any, no, every

Местоимения	+ thing	+body, one	+where	Употребляютс
some *некоторый* *какой-то* *какой-нибудь* *несколько*	something *что-то, что-нибудь*	somebody someone *кто-то* *кто-нибудь*	somewhere *где-то, куда-то, где-нибудь, куда-нибудь*	в утверд. предл.
any *1)всякий любой* *2)какой-нибудь*	anything *1)всё* *2)что-то 3)что-нибудь*	anybody anyone *1)всякий,* *2)кто-то, кто-нибудь*	anywhere *1)везде*, *2)где-нибудь, куда-нидудь*	1)в утверд. 2)в вопросит, предл.
no, not any *никакой + не*	nothing (not anything) *ничто + не ничего*	nobody (not anybody), no one *никто + не*	nowhere not anywhere *нигде, никуда + не*	в отрицат. предп.
every *всякий, каждый*	everything *всё*	everbody everyone *все*	everywhere *везде, повсюду*	в утверд., вопросит, и отрицат. предл.

Словообразовательные аффиксы

Существительные	
- ion / - sion /-tion	- discussion, transmission,
- er / -or	combination
-ing	- writer, inspector
-ment	- opening
-ty / -ity	- development
-ance / -ence	- activity
-ness	- importance, difference
-ure / -ture	- darkness
	- mixture
Прилагательные	
-ic	- democratic
-ive	- progressive
-able / -ible	- valuable, accessible
-ant / -ent	-resistant, different
-ous	- dangerous
-al	- central
-ful	- hopeful
-less	- hopeless
-un / -in / -ir / -il / -im	- uncomfortable, indirect, irregular, illogical, impossible
Глагол	
-ize	- to characterize
re-	- to rewrite