МИНИСТЕРСТВО ОБРАЗОВАНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ

Белорусский национальный технический университет

Кафедра английского языка №2

Электронный учебно-методический

комплекс по учебной дисциплине

«ИНОСТРАННЫЙ ЯЗЫК (АНГЛИЙСКИЙ)»

для специальности I ступени

получения высшего образования

1-70 04 03 «Водоснабжение, водоотведение и охрана водных ресурсов»

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Диск содержит данные об учебно-методическом комплексе по дисциплине «Иностранный язык (английский)», который предназначен для студентов очной формы получения высшего образования, а также преподавателей БНТУ кафедры английского языка №2. Может использоваться как для проведения аудиторных практических занятий, так и для самостоятельной работы студентов

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СОДЕРЖАНИЕ

ПОЯСНИТЕЛЬНАЯ ЗАПИСКА

Данный электронный учебно-методического комплекс (ЭУМК) предназначен для реализации образовательной программы по учебной дисциплине «Иностранный язык (английский)» для специальности 1-70 04 03 «Водоснабжение, водоотведение и охрана водных ресурсов» на I ступени обучения.

Целью ЭУМК является формирование иноязычной коммуникативной компетенции будущего специалиста, позволяющей использовать иностранный язык как средство профессионального и межличностного общения в области информационных технологий. В процессе достижения главной цели решаются следующие задачи:

познавательные (знакомство с основными аспектами технической специальности посредством иностранного языка);

развивающие (совершенствование коммуникативных умений, формирование потребности к самостоятельной познавательной деятельности, систематизация знаний и умений);

практические (овладение иноязычным общением в единстве всех его компетенций, функций и форм, что осуществляется посредством взаимосвязанного обучения всем видам речевой деятельности в рамках определенного программой предметно-тематического содержания, а также овладения технологиями языкового самообразования).

Оформление и использование ЭУМК по учебной дисциплине осуществляется в соответствии с требованиями СТП СМК БНТУ 6.3–02–2014.

Особенностью структурирования и подачи учебного материала является сама структура комплекса, которая позволяет эффективно реализовывать процесс обучения при проведении практических занятий, а также ориентирует обучающегося на использование иностранного языка в качестве инструмента профессиональной деятельности: для перевода и реферирования профессионально-ориентированных и научных текстов, выступления с публичной речью, составления деловой документации.

Рекомендации по организации работы с ЭУМК. Данный электронно-методический комплекс предназначен как для аудиторных занятий, так и для самостоятельной работы студентов, обучающихся по специальности 1-70 04 03 «Водоснабжение, водоотведение и охрана водных ресурсов».

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ПЕРЕЧЕНЬ МАТЕРИАЛОВ

Структура ЭУМК включает следующие разделы: теоретический, практический, контроля знаний и вспомогательный.

Теоретический раздел ЭУМК включает в себя учебно-методическое пособие «Практическая грамматика английского языка» Колосовой Т.В., Крюковой Л.А., которое позволяет студентам технического вуза повторить грамматические явления языка и рассмотреть их на примерах из технической литературы, что повышает мотивацию изучения иностранного языка для специальных целей. Чёткая структура предлагаемого пособия помогает студентам систематизировать знания и, в случае необходимости, воспользоваться им на разных этапах обучения при самостоятельной работе.

Практический раздел ЭУМК включает в себя дидактический материал, представляющий собой разработки с дополнительными заданиями как для работы на практических занятиях при непосредственном контроле преподавателя, так и для самостоятельной работы студентов. Разнообразный характер упражнений позволяет варьировать лексическую и грамматическую наполняемость занятия в соответствии с практическими задачами, а также дает возможность выбора для соответствия определенному уровню владения иностранным языком. Кроме того, дополнительно используются такие учебники и учебные пособия, как:, «Английский язык для инженеров» (под общ. ред. Т.Ю. Поляковой), «Engineering Activities and the Environment» (Е.Е. Глуховская, Т.В Колосова, «English Grammar in Use» (R. Murphy), «Technology 2» (E.H. Glendinning, A. Pohl); Jackson A. «Complete plumbing and central heating», «Key words in Science and Technology» (B. Mascull); энциклопедии: «The World Book Encyclopedia», «McGraw-Hill Encyclopedia of Science and Technology», а также словари: Англо-русский терминологический словарь-справочник (Парменова Л.А., Муха О.Ю.); электронные словари ColorDict, Merriam-Webster Dictionary, Oxford Dictionary of English и онлайн-словарь-справочник academic.ru.

В **разделе контроля знаний** ЭУМК представлены образцы лексико-грамматических тестов тематического и итогового контроля, а также предметно-тематическое содержание зачёта и экзамена.

Во **вспомогательный раздел** включены учебная программа БНТУ по дисциплине «Иностранный язык (английский)», включающая учебно-методическую карту дисциплины, и список рекомендуемой литературы.

ТЕОРЕТИЧЕСКИЙ РАЗДЕЛ

Теоретический раздел включает необходимый для изучения грамматический материал, который представлен в учебно-методическом пособии:

Колосова, Т. В. Практическая грамматика английского языка: учебно-методическое пособие для строительных специальностей БНТУ / Т.В. Колосова, Л.А. Крюкова. – Минск: БНТУ, 2005. – 107 с. http://rep.bntu.by/handle/data/30611.

ПРАКТИЧЕСКИЙ РАЗДЕЛ

Практический раздел включает методические разработки и упражнения по разделам грамматики, практики устной и письменной речи и технического перевода.

РАБОЧИЕ МАТЕРИАЛЫ

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UNIT I. Water on the Earth

Warming-up

1. Read interesting facts about water, matching questions with the answers.

1) How much water is on the earth?
2) How much of the earth's water is fresh?

The largest single use of water is by industry. It takes about 300 liters of water to make the paper for one Sunday newspaper, and about 20 gallons of water per pound (170 liters per kilogram) of steel

On the average, each person in the United States uses more than 380 liters of water a day in the home.

3) How much water do living things contain?
4) How much water does a person take in over a lifetime?

All living things consist mostly of water. For example, the body of a human being is about 65 % water. An elephant is about 70 % water. A potato is about 80 %.

There are about 1.4 billion cubic kilometers of water.

5) What are the different forms of water?
6) How much water does a person use every day?

On the average, a person takes in about 60,600 litres of water during his or her life.

Only about 3 % of the earth's water. About three-fourths of the earth's fresh water is frozen in icecaps and other glaciers.

7) What is the largest single use of water?

Water is used and reused over and over again—it is never used up. Every glass of water you drink contains molecules of water that have been used countless times before.

Water is the only substance on earth that is naturally present in three different forms—as a liquid, a solid (ice), and a gas (water vapour).

8) Can water ever be used up?

Reading Task: A

2. Find the translation of the following terms and memorize their meaning.

substance	to consist of	wet
soil	to absorb	dry
glacier	to release	available
water supplies	to overflow	plenty of
destruction	to irrigate	challenge
farm lands	to reuse	storage tanks
waterfalls	to produce	fresh and salt water
demand	to evaporate	to dump
drop	to manufacture	sources of water
water shortage	to pollute	treatment plants
distribution pipes	to carry away	wastes

3. Read the text carefully paying attention to the terms in italics. Answer the following question.

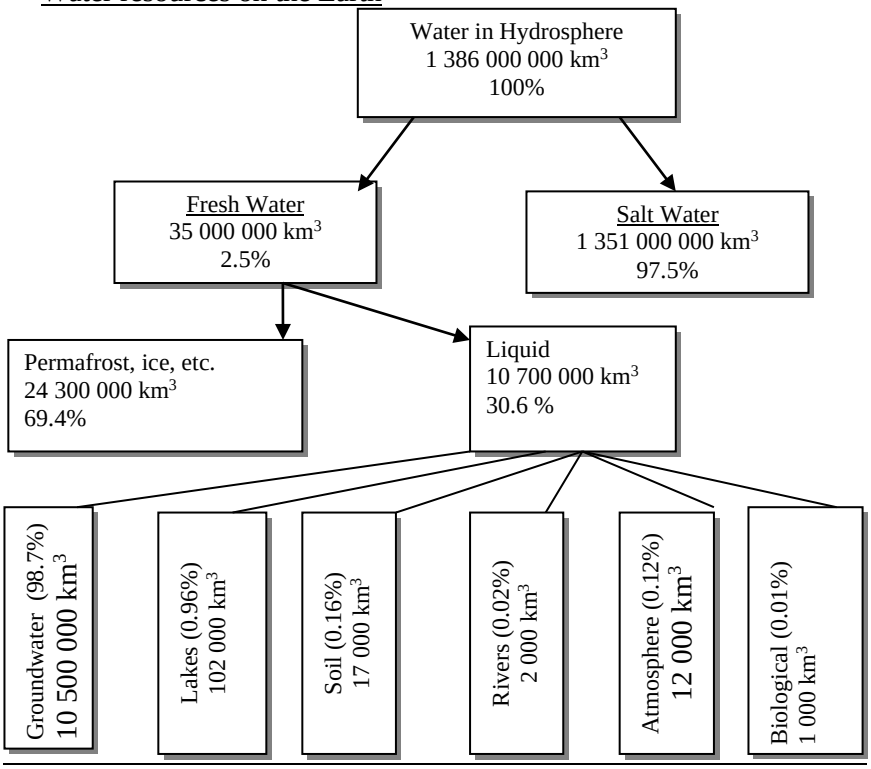
Why is water never used up?

Text A Water

Water is the most common *substance* on earth. It covers more than 70 per cent of the earth's surface. It fills the oceans, rivers, and lakes, and is in the ground and in the air we breathe. Water is everywhere.

Without water, there can be no life. In fact, every living thing *consists* mostly of water. Your body is about two-thirds water. A chicken is about three-fourths water, and a pineapple is about four-fifths water. Most scientists believe that life itself began in water—in the salty water of the sea.

Water resources on the Earth



Ever since the world began, water has been shaping the earth. Rain hammers at the land and washes *soil* into rivers. The oceans pound against the shores, chiselling cliffs and carrying away land. Rivers knife through rock, carve canyons, and build up land where they empty into the sea. *Glaciers* plough valleys and cut down mountains.

Water helps keep the earth's climate from getting too hot or too cold. Land *absorbs* and *releases* heat from the sun quickly. But the oceans absorb and release the sun's heat slowly. So breezes from the oceans bring warmth to the land in winter and coolness in summer.

Throughout history, water has been people's slave— and their master. Great civilizations have risen where *water supplies* were plentiful. They have fallen when these supplies failed. People have killed one another for a muddy water hole. They have worshiped rain gods and prayed for rain. Often, when rains have failed to come, crops have withered and starvation has spread across a land. Sometimes the rains have fallen too heavily and too

suddenly. Then rivers have *overflowed* their banks, drowning large numbers of people and causing enormous *destruction* of property.

Today, more than ever, water is both slave and master to people. We use water in our homes for cleaning, cooking, bathing, and carrying away *wastes*. We use water *to irrigate* dry *farm lands* so we can grow more food. Our factories use more water than any other material. We use the water in rushing rivers and thundering *waterfalls to produce* electricity.

Our *demand* for water is constantly increasing. Every year, there are more people in the world. Factories turn out more and more products, and need more and more water. We live in a world of water. But almost all of it—about 97.5 per cent—is in the oceans. This water is too salty to be used for drinking, farming, and *manufacturing*. Only about 2.5 per cent of the world's water is fresh (unsalty). Most of this water is not easily *available* to people because it is locked in icecaps and other glaciers.

There is as much water on earth today as there ever was—or ever will be. Almost every *drop* of water we use finds its way to the oceans. There, it is *evaporated* by the sun. It then falls back to the earth as rain. Water is used and *reused* over and over again. It is never used up.

Although the world as a whole has *plenty of fresh water*, some regions have a *water shortage*. Rain does not fall evenly over the earth. Some regions are always too *dry*, and others too *wet*.

Some regions have a water shortage because the people have managed their supply poorly. People settle where water is plentiful—near lakes and rivers. Cities grow, and factories spring up. The cities and factories *dump* their wastes into the lakes and rivers, *polluting* them. Then the people look for new *sources of water*. Shortages also occur because some cities do not make full use of their supply. They have plenty of water but not enough *storage tanks*, *treatment plants*, and *distribution pipes* to meet the people's needs.

As our demand for water grows and grows, we will have to make better and better use of our supply. The more we learn about water, the better we will be able to meet this *challenge*.

Comprehension Check

4. Decide whether the following statements are true or false according to the text.

1) Water covers more than 70 % of the earth's surface.
2) Water is in the air we breathe.
3) We can’t exist without water.
4) Most scientists don’t believe that life itself began in the salty water of the sea.
5) Water influences the earth's climate.
6) Land absorbs and releases heat from the sun slowly.
7) People irrigate dry farm lands to grow more food.
8) 2.5% of the water supply on Earth is saltwater and 97.5% of it is fresh water.
9) Most of fresh water is easily available to people.
10) Rains fall evenly over the earth.
11) The cities and factories pollute water.

5. Answer the following questions.

1) Why is water the most common substance on earth?
2) Does every living thing consist mostly of water?
3) Why do breezes from the oceans bring warmth to the land in winter?
4) Where have great civilizations risen?
5) What do we use water in our homes for?
6) Is water used up?
7) Have any regions a water shortage?
8) Why do some regions have a water shortage?
9) Should we learn more about water? Why?

6. Read the text again and make the plan of it.

7. Choose the best abstract for the text.

1) This article tells us broadly about water. It discusses water's importance to civilization and to life itself. It describes the nature of water.
2) This article comments broadly about water problems. It discusses how we use and abuse our water supply.
3) This article deals with water supply on the Earth. It discusses the problems of water pollution and water usage. It also describes the properties of water.

Language Focus

8. Match the words with their synonyms.

1) substance	6) destruction	*a) fresh*	*f) contaminate*
2) shape	7) constantly	*b) stock*	*g) abundant*
3) supply	8) unsalty	*c) shore*	*h) material*
4) plentiful	9) shortage	*d) deficit*	*i) always*
5) bank	10) pollute	*e) form*	*j) devastation*

9. Match the words with their opposites.

1) salty	6) dry	*a) wet*	*f) fresh*
2) hot	7) slave	*b) cold*	*g) master*
3) absorb	8) pollute	*c) clean*	*h) dissipate*
4) quickly	9) increase	*d) slowly*	*i) decrease*
5) warm	10) demand	*e) supply*	*j) cool*

10. Fill in the correct prepositions then choose any five items and make sentences.

1) to consist … sth.; 2) to wash soil … rivers; 3) to pound … the shores; 4) to carry … wastes; 5) to build … sth.; 6) to release heat … the sun; 7) to bring warmth … the land; 8) to spread … a land; 9) to use water … our homes … cleaning; 10) demand … sth.; 11) to be locked … icecaps; 12) to find way … the oceans; 13) to fall back … the earth … rain; 14) to dump wastes … the lakes and rivers; 15) to look … new sources of water.

11. Translate the following words into English using the vocabulary of the text.

Самое распространенное вещество; поверхность земли; состоять из воды; поглощать солнечное тепло; многочисленные запасы воды; вызывать разрушения; использовать воду для питья; орошать сельскохозяйственные угодья; производить электричество; слишком соленая вода; доступный для людей; капля воды; использоваться повторно; никогда не израсходоваться; располагаться равномерно; дефицит воды; сбрасывать отходы в реку; удовлетворять требованиям людей; распределительный трубопровод; водоочистная станция; источники воды.

12. Make sure you know the nouns formed from the following verbs.

to believe→…;	to destruct→…;
to begin →…;	to produce→…;
to shape→…;	to irrigate→…;
to fail→…;	to evapourate→…;
to dump →…;	to pollute→…;
to distribute→…;	to manufacture→…;
to demand →…;	to use →…;
to increase→…;	to treat→…;
to store→…;	to release→…

13. Write down all adverbs from the text (not less than 8) then choose any four items and make your own sentences.

Quickly, …, …

Reading Task: B

14. Find the translation of the following terms and memorize their meaning.

to get rid of	a waterfall	to pipe
to stay alive	luxury	vapour
to raise crops	to haul up	fuel
to light homes	a well	a root
to run factories	a raw material	coal
a sewer pipe	to air-condition	nutrients
a recreation area	to consume	to dissolve
hydroelectric power stations		

15. Read the first paragraph of Text B and answer the question.

Why do we need water?

16. The rest of the text about "Water in our daily life" is in the jumbled order. Look at the plan of the text, read the paragraphs and number them in the correct order according to the plan.

Plan:
1. Water usage.
2. Water in living things.
3. Water in our homes.
4. Water for irrigation.
5. Water for industry.
6. Water for power.
7. Water for transportation and recreation.

Text B Water in our daily life

1) Every plant, animal, and human being needs water to stay alive. This is because all the life processes—from taking in food to getting rid of wastes—require water. But people depend on water for more than just to stay alive. We also need it for our way of life. We need water in our homes—to brush our teeth, cook food, and wash dishes. We need water in our factories—to manufacture almost everything from automobiles to zippers. We need water for irrigation—to raise crops in regions that do not get enough rain.

☐ People also use water to produce electric power to light homes and to run factories. Electric power stations burn coal or other fuel to turn water into steam. The steam supplies the energy to run machines that produce electricity. Hydroelectric power stations use the energy of falling water from waterfalls and dams to produce electricity.

☐ In our homes, we use far more water than the amount we need simply to stay alive. We require water for cleaning, cooking, bathing, and carrying away wastes. For many people, such water is a luxury. Millions of homes in Asia, Africa, and South America have no running water. The people must haul water up by hand from the village well, or carry it in jars from pools and rivers far from their homes.

☐ Industry uses water in many ways. It uses water for cleaning fruits and vegetables before canning and freezing them. It uses water as a raw material in soft drinks, canned foods, and many other products. It uses water to air-condition and clean factories. But most of the water used by industry is for cooling. For example, water cools the steam used in producing electric power from fuel. It cools the hot gases produced in refining oil, and the hot steel made by steel mills. Although industry uses a lot of water, only 6 per cent of it is consumed. Most of the water used for cooling is piped back to the rivers or lakes from which it is taken. The water consumed by industry is the water added to soft drinks and other products, and the small amount of water that turns to vapour in the cooling processes.

☐ After people learned to build crude small boats, they began using rivers and lakes to carry themselves and their goods. Later, they built larger boats and sailed the ocean in search of new lands and new trade routes. Today, people still depend on water transportation to carry such heavy and bulky products as machinery, coal, grain, and oil. People build most of their recreation areas along lakes, rivers, and seas. They enjoy water sports, such as swimming, fishing, and sailing. Many people also enjoy the beauty of a quiet lake, a thundering waterfall, or a roaring surf.

☐ Most of the plants that people raise need great quantities of water. For example, it takes 115 gallons (435 liters) of water to grow enough wheat to bake a loaf of bread. People raise most of their crops in areas that have plenty of rain. But to raise enough food for their needs, people must also irrigate dry areas. The rainfall that crops use to grow is not considered a water use, because the water does not come from a country's supply. Irrigation, on the other hand, is a water use because the water is drawn from a nation's rivers, lakes, or wells. The water a nation uses for irrigation is important to its water supply because none of the water remains for reuse. Plants take in water through their roots. They then pass it out through their leaves into the air as a gas called water vapour. Winds carry away the vapour, and the liquid water is gone. On the other hand, nearly all the water used in our homes is returned to the water supply. The water is carried by sewer pipes to treatment plants, which return the water to rivers so it can be used again.

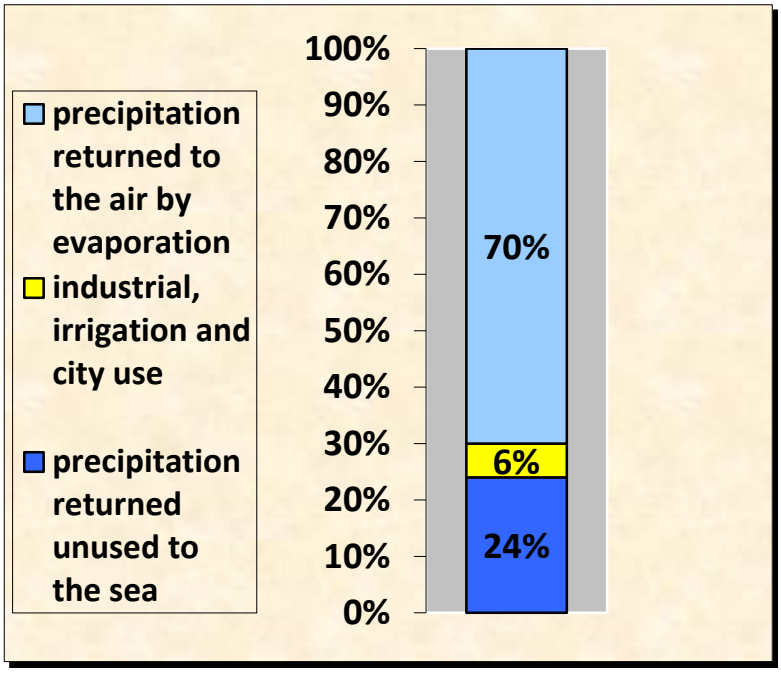
☐ Every organism needs a lot of water to carry out its life processes. Plants, animals, and human beings must take in nutrients (food substances). Watery solutions help dissolve nutrients and carry them to all parts of an organism. Through chemical reactions, the organism turns nutrients into energy, or into materials it needs to grow or to repair itself. These chemical reactions can take place only in a watery solution. Finally, the organism needs water to carry away waste products. Every living thing must keep its water supply near normal, or it will die. Human beings can live without food for more than two months, but they can live without water for only about a week. If the body loses more than 20 per cent of its normal water content, a person will die painfully. Human beings must take in about 2.4 liters of water a day. This intake can be in the form of beverages we drink, or water in food.

17. Study the diagram below and fulfill the following tasks using the information of Text B.

a) Fill in the correct numbers in the following text from the list below.

On the average, … gallons (… liters) of precipitation fall on the United States every day. About … per cent of this moisture returns directly to the air by evaporation, or is used by plants where it falls. People use about … per cent of the precipitation.

a *- 6;* ***b*** *- 15,900,000,000,000;*
c *- 70;* ***d*** *- 4,200,000,000,000*



b) Answer the following questions:

1. How much precipitation is returned unused to the sea?
2. How much precipitation do people use?
3. What is 6% of precipitation used for?
4. What is city use of water if industrial use is 3.12 per cent and irrigation use is 2.46 per cent?

c) Give the examples of …

- industrial use of water
- irrigation use
- city use

Reading Task: C

18. Find the translation of the following terms and memorize their meaning.

to affect	to utilize	improvement
shortage	utilization	to increase
available	reclamation system	to involve
supply *(v)*	irrigation system	natural resource
supply *(n)*	to require	destruction
sewerage	to prevent	application
exploitation	to expand	land drainage
existence	to neglect	impurity
culvert	to ensure	facilities
to construct	to subdivide	branch
construction	to relate to	urban
facilities	to deal with	liquid
management	to exploit	development
water at rest and in motion		

19. Skim the text. Answer the following question.

What is water-resources engineering?

Text C Water-Resources Engineering

Man has affected his environment ever since he introduced agriculture and started to exploit natural resources. And the very existence of humans, animals, and plants has always depended on the availability of water. Without it, there would be no life on the earth.

But the supply of water available for our use is limited by nature. Although there is plenty of water on the earth, it is not always in the right place and at the right time. Moreover, chemical wastes discarded yesterday are showing up in our water supplies today.

So the development of water resources is known to require the planning, design, construction and operation of facilities to control and utilize water. It is basically a function of civil engineers, but the help of such specialists as geologists, chemists, biologists, economists is also required. In other words *water-resources engineering* is a science of designing, construction and utilizing hydraulic structures (such as dams and hydropower stations), and structures related to the river and sea transport, reclamation and irrigation systems.

Thus, hydraulic engineering may be subdivided into four main branches:

1. Water projects;
2. Hydropower stations;
3. River and sea transport;
4. Reclamation and irrigation systems.

Water-resources engineering involves *the application of engineering principles* and *methods for control,*

conservation and utilization of water.

Flood control, land drainage, sewerage and highway culvert design are fields where water-resources engineering is used for the control of water in natural processes and in human society.

Water supply, irrigation, hydroelectric power development and navigation improvement are examples of the utilization of water.

Conservation is planned management of a natural resource or of a particular ecosystem to prevent exploitation, pollution, destruction, or neglect and to ensure the future usability of the resource.

Modern civilization is far more dependent on water than the civilizations of the past. The increasing population requires expanded areas for agriculture, much of which must come through land drainage and irrigation. Increasing urban population requires more attention to water supply and sewerage. Industrial progress also requires much water. Thus, all factors point to unprecedented development of water-resources engineering in the future.

Do you know that the term "hydraulics" is derived from a Greek word meaning water and is fundamentally the science dealing with water at rest and in motion?

Comprehension Check

20. Decide whether the following statements are true or false according to the text.

1) The very existence of humans, animals, and plants has not depended on the availability of water.
2) There would be no life on earth without water.
3) Chemical wastes discarded yesterday are showing up in our water supplies today.
4) The development of water resources requires the planning, design, construction and operation of facilities to control and utilize water.
5) Hydraulic engineering may be subdivided into four main branches.
6) Water-resources engineering involves only methods for control, conservation and utilization of water.
7) Flood control, land drainage, sewerage and highway culvert design are fields where water-resources engineering is used for the conservation of water in natural processes and in human society.
8) Water supply, irrigation, hydroelectric power development and navigation improvement are examples of the utilization of water.
9) Control is planned management of a natural resource or of a particular ecosystem to prevent exploitation, pollution, destruction, or neglect and to ensure the future usability of the resource.
10) Increasing population and industrial progress require less water than the civilization of the past.

21. Answer the following questions.

1) What has humans, animals and plants always depended on?
2) Is the supply of water unlimited by nature?
3) Does the development of water resources require the planning, design, construction and operation of facilities to control and utilize water?
4) How many branches may hydraulic engineering be subdivided into? What are they?
5) What does water-resources engineering involve?
6) What are the examples of the water control?
7) What are the examples of the water utilization?
8) What are the examples of the water conservation?
9) What points to the development of water-resources engineering in future?
10) What does the word "hydraulics" mean?
11) Why is water-resources engineering developing?

22. Make the plan of the text "Water-resources engineering" and write a short summary of the text.

Language Focus

23. Match the meanings of the terms with their definitions.

a) to pollute *c) irrigation* *e) water*
b) waste *d) resource* *f) reclamation*

1) Inorganic compound composed of hydrogen and oxygen, existing in liquid, gas (steam, water vapour), and solid (ice) states.
2) To make (air, water, earth, etc.) dirty or harmful to people, animals, plants, esp. by adding harmful chemicals.
3) A useful or valuable possession or quality of a country, organization or person.
4) Unwanted matter or material of any type, often that which is left after useful substances or parts have been removed.
5) Artificial supply of water to land, to maintain or increase yields of food crops, a critical element of modern agriculture.
6) It is the attempt to make land suitable for building and farming and it is also the treatment of waste materials to obtain useful materials from them.

24. Fill in the correct preposition, then choose any five items and make sentences.

1) to depend … sth.; 2) to show … in our supplies; 3) to be subdivided … sth.; 4) to be used … the control of water; 5) to require attention … sth.; 6) to point … sth.; 7) to deal … sth.; 8) water … rest and … motion.

25. Fill in the tables.

verb	*noun*
to control	a control
	utilization
to require	
	protection
to navigate	
	supply
to construct	

verb	*noun*
to improve	
	conservation
to manage	
	dependence
to destruct	
	design
	development

26. Translate the following words into English using the vocabulary of the text.

Использовать природные ресурсы; развитие водных ресурсов; проявляться в запасах воды; использование гидравлического сооружения; осушительные и оросительные системы; применение инженерных правил; инженерия по использованию водных ресурсов; паводковый контроль; дренаж и канализационные системы; улучшение навигации; управление экосистемой; предотвращать разрушение; указывать на развитие науки в будущем.

Language Development

27. Read the following text and fill in the missed words.

a) quantity *g) needed* *l) economic*
b) accurately *h) power* *m) tests*
c) demands *i) create* *n) chemical*
d) provide *j) water-supply* *o) methods*
e) quality *k) acceptable* *p) determine*
f) water-resources engineer

The job of 1)_____ may be limited by a number of basic questions associated basically with the 2) _____ and quality of water. The first question is: "How mush water is 3)_____?" This is probably the most difficult of all design problems to answer 4)_____, because it involves social, 5)_____ and engineering aspects. Basically the answer depends on future 6)_____ for irrigating crops, domestic water and hydroelectric 7)_____.

Being adequate in quantity, water must often withstand certain 8)_____ of quality. Thus the second question is: "What is the 9)_____ of water?" Problems of water quality are encountered in planning 10)_____ and irrigation projects. Polluted streams 11)_____ many problems. Therefore in order to 12)_____ the amount and character of impurities in water it is necessary to employ 13)_____ and

bacteriological tests. The effect of these impurities on water quality - must be evaluated and set standards of 14)_____ quality. The engineer must then 15)_____ the necessary facilities for removing impurities from the water by mechanical, chemical or bacteriological 16)_____.

28. Translate the following extracts into English using the vocabulary of the texts.

1) Без воды нет жизни на земле, вода есть в каждом живом существе. Без пищи можно прожить гораздо дольше, чем без воды. Человек и многие животные почти на 2/3 состоят из воды. А некоторые растения состоят из воды примерно на 4/5.

2) Вода занимает 2/3 поверхности земного шара, и лишь 1/3 приходится на сушу. Вода – в океанах и морях, реках и озерах, под землей и в почве. Ледники и айсберги тоже вода, только замерзшая. Много воды в атмосфере: это облака, туман, пар, дождь, снег.

3) Чистой воды становится на Земле все меньше. Люди все больше пользуются водой для нужд промышленности, загрязняют воду отходами производства. Инженеры уже придумали разные способы очистки воды от примесей. Запрещается спускать в водоемы промышленные отходы и сточные воды.

4) Особое внимание уделяется проектированию, строительству и работе различных гидротехнических сооружений, а также оросительных и осушительных систем.

5) Работа инженера-гидротехника требует не только знаний по применению инженерных правил и способов контроля, хранения и использования воды, но и их применение на практике.

Follow Up

29. Read the texts again and make notes under the following headings. Then use your notes to talk about water and water-resources engineering.

1) Water resources on the Earth.
2) Water in our daily life.
3) Water-resources engineering as a science.
4) Future of water-resources engineering.

UNIT II. Water Demands. Sources to Meet Water Demands

"When the well is dry, we know the worth of water." Benjamin Franklin, (1706–1790), Poor Richard's Almanac, 1746

WARMING-UP

1. Fill in the omitted words and word combinations.

drinking water, resource, water quality, safe, to maintain, inexhaustible, community, consumer, delivered

It is apparent that our supply of water is not ___ and our freshwater supplies are indeed a precious ___. It is now clear that the ___ also has an important role to play in the management of our ___. Every ___ should be encouraged to become more active in this process.

It is important to highlight the many steps that water must go through before it is ___ safely to your tap, and the things that we can all do to ensure that we continue to receive the highest quality ___.

___ water is essential to sustain life — we all have a responsibility to make every effort to ensure the quality of our drinking water. Water is important; let's work together ___ this precious resource.

VOCABULARY WORK

2. Read the following international words and guess their mean-ing. Mind the stressed syllables. Prove that these words are interna-tional ones.

Model: commercial ə ə **коммерческий**, торговый; про-мышленный; технический; рентабельный, прибыльный

3. Translate the following words and phrases and memorize them.

Nouns and noun phrases	
advantage	municipal water consumption
bathing	pattern
commercial (water) demand	public (water) demand
commercial (water) use	public (water) use
community	purpose
construction material	raw material
domestic (water) demand	street cleaning
domestic (water) use	urban water use
drinking [potable] water	volume
fire fighting	wastes
fire protection	water consumption
hydropower	[dmand/requirement/usage/
impurity	use]
industrial (water) demand	watering
industrial (water) use	waterwheel
mineral ore	withdrawal
Verbs and verbal phrases	
to average	to meet (a requirement/
to capture	a need /a demand)
to carry away	to monitor
to consume	to satisfy (a requirement /
to estimate	a need /a demand)
to fall	to serve
to locate	to take into account
Adjectives	
average	paramount
efficient	potable
extravagant	residential
fit (for)	scarce
municipal	wasteful
Adverbs	
approximately	per day
nevertheless	per person
numerically	relatively
per capita	though
Conjunctions	
both … and …	in order to
Prepositions	
despite	throughout
through	without

4. Match the English and Russian equivalents.

(1)

1. civil and environmental engineers 2. drinking [potable] water 3. electric power generation 4. municipal water consumption / urban water use 5. potential water consumers [users] 6. power engineering 7. public building 8. pumping system 9. residential area 10. water consumption [demand/requirement/usage/use] 11. water supplied [delivered] 12. water withdrawal	a. водопотребление; водопользование; водопотребность, потребность в воде; расход воды b. возможные потребители воды [водопотребители] c. выработка электроэнергии d. городское водопотребление e. жилой район f. инженеры-строители и специалисты в области охраны окружающей среды g. общественное здание h. отбор воды из природного источника i. питьевая [годная для питья] вода j. подаваемая вода k. система накачки [накачивания] l. энергетика

(2)

1. as indicated by the fact that … 2. chemical or heat treatment 3. cooling fluid 4. despite recent advances 5. finished products 6. fossil and nuclear fuels	a. более низкий порог качества b. быть в недостаточном количестве c. быть основой для выживания d. готовая продукция e. иметь относительно низкую стоимость на единицу веса или объема

7. lower quality threshold 8. navigable waterway 9. steel and pulp mills 10. the conversion of raw materials into finished product 11. to be essential for survival 12. to be scarce 13. to have a relatively low value per unit of weight or volume 14. with the latter consuming far greater volumes	f. ископаемое и ядерное топливо g. на что указывает тот факт, что … h. несмотря на недавние достиже-ния [прогресс] i. охлаждающая жидкость j. превращение сырья в готовую продукцию k. причем последнее потребляет гораздо большие объемы l. сталелитейные и целлюлозные заводы m. судоходный водный путь; судоходная река n. химическая или термическая обработка

(3)

1. commercial (water) demand 2. domestic (water) demand 3. industrial (water) demand 4. public (water) demand	a. потребность в воде для коммунально-бытовых нужд b. потребность в воде для коммунальных нужд c. потребность промышленности в воде; потребность промышленных предприятий в воде d. потребность торговли в воде; потребность торговых предприятий в воде

(4)

1. commercial (water) use 2. domestic (water) use 3. industrial (water) use 4. public (water) use	a. водоснабжение на коммерческой основе b. коммунально-бытовое водопотребление, водопотребление коммунально-бытового водоснабжения c. муниципальное водопотребление, водопотребление для общегородских нужд d. промышленное водопотребление

5. Match the terms and their definitions.

bacterium, chlorine**,** consumption, impurity, per capita, potable, residential, wasteful, waterwheel

a. a constituent that impairs the purity of something
b. a large wheel driven by flowing water, used to work machinery or to raise water to a higher level
c. a microscopic unicellular living organism found almost every-where that causes decay and human diseases; most are harmless
d. designed for people to live in *e.* for each person
f. safe to drink; drinkable
g. the chemical element of atomic number 17, a toxic, irritant, pale green gas
h. the using up of a resource
i. using something of value carelessly, extravagantly, or to no purpose

6. Translate the following phrases and sentences into Russian paying attention to the underlined words that can be verbs, nouns or adjectives without changing their form and adding suffixes.

1. metallic minerals; nonmetallic minerals; mineral water; mineral spring
2. we all need several glasses of fluid a day; a cleaning fluid; a cool-ing fluid; a fluid medium
3. to put much / little value upon *smth*.; a total value of $500; the equipment was valued at $5,000
4. magnetic force; centrifugal force; force of gravity; to exert force; to force out; to force particle settling
5. the human body; a human being; the survival of the human race; water for human consumption; human water consumption requirements; the human; to be harmful for humans
6. a total cost of $4,000; total sum; sum total; to add up / calculate a total; the sum was totalled
7. water demand varies on a seasonal, daily and hourly basis; to change daily; to vary hourly
8. an average person; average daily consumption; above the average; below the average; on average; the world average; daily water consump-tion averages 20 gallons per capita per day
9. atomic / nuclear power; solar power; electric power; power indus-try; to power devices
10. to fulfill / perform a function; to function properly / improperly

Now fill in the table with Russian equivalents to the words from the sentences above.

daily, fluid, force, function, hourly, human, mineral, power, total, value

	NOUN	VERB	ADJECTIVE	ADVERB
average	среднее число; средняя величина; среднее	выводить среднее число; в среднем равняться, составлять	обычный, средний	---

READING PRACTICE

7. Answer the following questions and read the text carefully to check your answers.

What purposes do water consumers use water for?

What quantity of water does a person use every day and for what pur-poses?
Does water consumption vary in different countries?

Text A Water Consumption and Its Types

Part 1.

In designing any water supply system specialists determine the re-quired quantity and quality of water supplied. For solving this problem it is necessary to take into account all the potential water consumers and find out their requirements for the quantity and quality of the water delivered.

Water is used by various consumers and is required for a wide variety of purposes.

Water consumption (also called "***water requirement/water demand / water use***") is the use of water delivered to satisfy particular needs of a community. Water consumption is characterized by several ***types (cate-gories) of demands***, including domestic, public, commercial, and indus-trial uses.

Domestic demand includes water for drinking, cooking, washing up dishes, cleaning, laundering (washing), bathing, car washing, yard and garden watering, carrying away wastes, and other household functions.

Public demand includes water for fire protection, street cleaning, and use in schools, hospitals and other public buildings.

Commercial and ***industrial demands*** include water for shops, ware-houses, offices, hotels, laundries, restaurants, and most manufacturing plants, for various technological purposes in industry, power engineer-ing, transport, etc.

There is usually a wide variation in total water demand among different communities. This variation depends on population, geographic location, climate, the extent of local commercial and industrial activity, and the cost of water.

Water use or demand is expressed numerically by average daily consumption per capita (per person). In the United States the average demand is approximately 100 gallons (380 litres) per capi-ta per day for domestic and public needs. Overall, the average total demand is about 180 gallons per capita per day, when commercial and industrial water uses are included. (These figures do not include withdrawals from freshwater sources for such purposes as crop irrigation or cooling operations at electric power generation facilities.) Water consumption in some developing countries may aver-age as little as 4 gallons per capita per day; the world average is estimated to be approximately 16 gallons per person per day.

In any community, water demand varies on a seasonal, daily, and hour-ly basis. On a hot summer day, for example, it is not unusual for total water consumption to be as much as 200 percent of the average demand. Water consumption also varies hourly throughout the day. The peak demands in residential areas usually occur in the morning as well as early evening hours (just before and after the normal workday). Water demands in com-mercial and industrial districts, though, are usually uniform during the working day. Minimum water demands typically occur in the very early morning and predawn hours when very few people use water.

Civil and environmental engineers must carefully study each community's water use patterns in order to design efficient pumping and distribution systems.

Part 2.

Let's consider some of **the main types of water use**.

1. Water for drinking and other municipal (urban) uses

Water for drinking is still paramount, and such water must be rela-tively pure. Water for urban use other than drinking serves a multitude of purposes, such as fire fighting, street cleaning, sanitation, and sewage disposal.

Water fit for human consumption is called ***drinking,*** or ***potable wa-ter***. Water that is not potable can be made potable by distillation (heating it until it becomes water vapour, and then capturing the vapour without any of the impurities it leaves behind), or by other methods (chemical or heat treatment that kills bacteria). Sometimes the term "safe water" is applied to potable water of a lower quality threshold. Water that is not fit for drinking but is not harmful for humans when used for swimming or bathing is called by various names other than potable or drinking water, and is sometimes called "safe water", or "safe for bathing". Chlorine is a substance used to make water safe for bathing or drinking. Its use is highly technical and is usually monitored by various regulations.

2. Water for industrial use

Steel mills, pulp mills, chemical factories, and most other industrial processes that involve the conversion

of raw materials into finished products require water. Next to agriculture, one of the most extravagant uses of water is as a cooling fluid in the generation of power from fossil and nuclear fuels, with the latter consuming far greater volumes. Water has been used directly as a source of power since the time of the first boat and the first waterwheel. A small but important part of the world's electrical supply now is generated by hydropower, in which the force of falling water is used to turn turbines that produce electricity.

3. Water for transportation

Water for transportation has always been important, as indicated by the fact that most major cities are located on the shores of oceans and other large bodies of water or along rivers and other types of navigable waterways. Despite recent advances in ground and air transportation, water transportation has an economic advantage for the movement of goods that have a relatively low value per unit of weight or volume, such as raw mineral ores, fuels, and various types of construction materials.

4. Water for irrigation

Irrigation is one of the most wasteful uses of water in areas in which it is scarce, because great quantities are lost through evaporation in both storage areas and transport. In many regions irrigation is, nevertheless, essential for human survival.

COMPREHENSION CHECK

8. Decide whether the following statements are true (T) or false (F) according to the text. Correct the false statements.

1. In designing a water supply system it is necessary to find out the water consumers' requirements for the quantity and quality of water de-livered.
2. There are several types of water demands, including domestic, public and industrial uses.
3. Domestic demand includes water for drinking, laundering, bathing, carrying away wastes, garden watering, street cleaning, etc.
4. Industrial demand includes water for various technological purposes in industry and power engineering.
5. Water demand is expressed numerically by average hourly consumption per capita.
6. Water consumption in the USA is approximately 100 gallons per capita per day, whereas water use in some developing countries may average 4 gallons per person per day.
7. Water demand varies on a seasonal, daily and hourly basis.
8. On a hot summer day it is quite usual for total water consumption to be as much as 200% of the average demand.
9. In residential areas minimum water demands usually occur in the morning and early evening hours, whereas the peak water demands typically occur in early morning and predawn hours.
10. Water for urban use serves a multitude of purposes, such as drinking, fire fighting, street cleaning, sanitation, and sewage disposal.
11. Water can be made potable by various methods, including distillation or chemical or heat treatment that kills bacteria.
12. The term "safe water" is sometimes applied to water fit not only for drinking, but also for bathing or swimming.
13. The most extravagant and wasteful uses of water are for industrial and agricultural purposes.
14. The force of falling water to produce electricity has been used since the time of the first waterwheel.
15. Water transportation has a certain economic advantage over ground and air transportation.

9. Answer the following questions.

1. What factors must be taken into account for solving the problem of designing any water supply system?
2. What is water consumption?
3. What are the synonyms of "water consumption"?
4. What types (categories) of demands is water consumption characterized by?
5. What do domestic, public, commercial and industrial demands include?
6. What does the variation in total water demand among different countries depend on?
7. How is water use expressed?
8. Does water consumption in the developed countries differ from the one in developing countries, as a rule?
9. On what basis does water demand vary in any country?
10. For what purpose must engineers study carefully each communi-ty's water use patterns?

11. What purposes does water for urban use serve? 12. What is drinking (potable) water?
13. By what methods can water be made potable? 14. What are the most extravagant uses of water? 15. How is water used in industry?
16. Why has water for transportation always been important?
17. What is an economic advantage of water transportation over ground and air transportation?
18. In many regions irrigation is essential for human survival, isn't it?

10. What parts of the text can you define in Part 1? Do they cor-respond to the paragraph? Entitle each part.

1. _____
2. _____
3. _____
4. **_____**

11. Find key words and phrases which best express the general meaning of each paragraph in Part 2.

12. Write a summary of the text.

LANGUAGE FOCUS

13. Match the synonyms.

1. approximately	a. amount
2. carefully	b. energy
3. delivered	c. household
4. despite	d. in spite of
5. domestic	e. municipal
6. drinking	f. overall
7. extravagant	g. per person
8. laundering	h. potable

9. manufacturing	i. power industry
10. per capita	j. production
11. power	k. roughly
12. power engineering	l. supplied
13. quantity	m. thoroughly
14. to find out	n. to discover
15. to include	o. to generate
16. to produce	p. to involve
17. to require	q. to need/to demand
18. total	r. washing
19. urban	s. wasteful
20. water consumption	t. water use

14. Match the antonyms.

1. approximately	a. cooling
2. demand	b. developed country
3. developing country	c. exactly
4. efficient	d. inefficient
5. evening hours	e. land reclamation
6. fresh water	f. low
7. heating	g. maximum
8. highly	h. morning hours
9. impurity	i. purity
10. land irrigation	j. rural
11. minimum	k. salt water
12. scarce	l. sufficient
13. to include	m. supply
14. unusual	n. to exclude
15. urban	o. usual

15. Fill in the table with the derivatives.

Noun	Verb	Adjective /Participle
		average
	to bathe	
	to consume	
		developing/ developed

Noun	Verb	Adjective /Participle
	to drink	
electricity		
		industrial
		powerful
		productive
	to purify	
requirement		
transportation		
usage		
		wasteful

16. Translate the following text into English using the active vo-cabulary.

Основные категории водопотребления

Вода расходуется различными потребителями на самые разнооб-разные нужды. Однако подавляющее большинство этих расходов может быть сведено к трем основным категориям.

1. Расход воды на хозяйственно-питьевые (бытовые) нужды населения. Сюда входят все расходы воды, связанные с бытом лю-дей: питье, приготовление пищи, умывание, стирка, поддержание чистоты жилищ и т. п. К этой же категории могут быть отнесены все расходы воды, необходимые для обеспечения благоустройства города или поселка: поливка улиц, зеленых насаждений и т. п.

2. Расход воды для производственных (технических) целей на предприятиях промышленности, транспорта, энергетики, сельского хозяйства и т.п. Примерами использования воды для производ-ственных (технических) целей служат парообразование, охлажде-ние, конденсация пара, изготовление различных фабрикатов, про-мывка продукции и пр.

3. Расход воды для пожаротушения. Кроме того, вода расходу-ется на собственные нужды водопровода (промывка фильтров, во-доприемных устройств, сети и др.).

Требования, предъявляемые к качеству воды, различны в зави-симости от характера ее использования.

Так, к воде, идущей на **удовлетворение питьевых нужд насе-ления**, в первую очередь предъявляют требования санитарно-гигиенического порядка. Вода должна быть прозрачной и безвред-ной для здоровья. Она не должна содержать болезнетворных бактерий и иметь запаха и дурных привкусов.

SPEAKING PRACTICE

17. Get ready to speak about types of water consumption.

VOCABULARY WORK

18. Read the following international words and guess their meaning. Mind the stressed syllables. Prove that these words are international ones.

Model: natural естественный, природный; настоящий, **натуральный**; обычный, нормальный

19. Translate the following words and phrases and memorize them.

Nouns and noun phrases	
artesian [confined] water	subsurface source
bore	surface source
intake	tank
maintenance	underground source
pond	water transmission
reservoir	water-bearing stratum (*pl*. strata)
spring	well
stream	
Verbs and verbal phrases	
to access	to find
to come from	to guarantee
to distribute	to obtain
to enable	to take place
to experience	to treat
to face *smth*	to withdraw
Adjectives / Participles	
deep	pathogenic
dissolved	shallow
harmful	suitable
organic	suspended

20. Match the English and Russian equivalents.

1. continuity of water supply	a. бесперебойность снабжения водой
2. deep water	b. взвешенное вещество (взвесь) и растворенные минералы и газы
3. impounding reservoir	c. владелец *или* сотрудник системы коммунальнго водоснабжения
4. in designing a water supply system	d. водохранилище
5. natural water sources	e. глубинная вода; донная вода; глубоководный участок (*водоема*)
6. porous or fractured rock	
7. reasonably priced	
8. shallow and deep wells	
9. suspended matter and dis-	

solved minerals and gases 10. through a bore 11. through intakes 12. to determine to a considerable degree 13. to experience water shortage [scarcity, deficit] 14. to pose a threat 15. to satisfy requirements 16. water supplier 17. with a glance of an increase 18. without ecological disturbance	f. испытывать недостаток [дефицит, нехватку] воды g. не нарушая экологического баланса h. неглубокие и глубокие скважины i. недорогой j. обуславливать в значительной степени k. пористая или раздробленная порода l. представлять угрозу (ставить под угрозу, являться угрозой, угрожать) m. при проектировании системы водоснабжения n. природные источники воды o. с помощью водозаборных сооружений [водозаборов] p. с учетом роста q. отвечать требованиям r. через скважину

21. Match the terms and their definitions.

aquifer, drinking water supplier, inorganic, organic, pathogen, reservoir, spring, well, withdraw

a. a body of permeable rock that can contain or transmit groundwater *b.* a disease-causing organism (*e.g.* bacteria, viruses and protozoa)

c. a place where water or oil wells up from an underground source, or the basin or flow formed in such a way

d. a shaft sunk into the ground to obtain water, oil, or gas

e. an organization, agency or company that has responsibility and authority for treating and/or supplying drinking water

f. any natural or artificial holding area used to store, regulate or control water

g. of, relating to, or denoting compounds that are not organic (broadly, compounds not containing carbon)

h. of, relating to, or denoting compounds containing carbon (other than simple binary compounds and salts) and chiefly or ultimately of biological origin

i. remove or take away *smth* from a particular place or position

22. Translate the following phrases and sentences into Russian paying attention to the underlined words that can be verbs, nouns or adjectives without changing their form and adding suffixes.

1. to have access to smth.; access for repair; easy / free access; access to water; unlimited access; this article can be accessed via the Internet
2. practical experience; to acquire / get experience from smth.; to experience water shortage; the company is experiencing difficulties
3. to get face to face with a problem; to face the challenge; the building faces eastwards; the external basement walls were faced with granite slabs
4. we offer a 10-year guarantee against rusting; to give / offer a firm guarantee of quality; valid guarantee; to guarantee fully
5. high / low price; a wide selection of tools varying in price; the equipment is priced at $20,000
6. firm / hard / solid ground; soft ground; to lie on the ground; ground water; shore dumping can pollute fishing grounds and beaches; the conclusions must be grounded on facts
7. working / operating / maintenance costs; to cover the cost of smth.; at all costs; to cost much / little
8. hot / thermal spring; mineral spring; subterranean spring; spring water; the water springs out of the ground
9. subsurface water; subsurface irrigation; subsurface is the stratum or strata below the earth's surface
10. water tank; fresh water tank; auxiliary / service tank; to tank water

Now fill in the table with Russian equivalents to the words from the sentences above.

cost, experience, face, ground, guarantee, price, spring, subsurface, tank

	NOUN	VERB	ADJECTIVE
access	доступ	иметь доступ, получить доступ	---

READING PRACTICE

23. Answer the following questions and read the text carefully to check your answers.

Where does our drinking water come from?
Why is there a limited supply of fresh water on the Earth?

Text B Natural Water Sources and Their Use for water Supply Purposes

The choice of a water source is one of the most responsible tasks in de-signing a water supply system. The source determines to a considerable degree the type of the water supply system itself, the necessity of certain facilities and, therefore, the cost of its construction and maintenance.

A water supply source should satisfy the following requirements:

a. it should provide the acquisition of adequate quantities of water with a glance of a prospective increase in water consumption;

b. it should provide continuity of water supply;

c. it should provide the water of such quality that meets the demands of water consumers by means of reasonably priced treatment;

d. it should enable water transmission at the lowest cost;

e. it should guarantee water acquisition without ecological disturbance. **Natural sources of water** include:

- ***surface sources*** (oceans, seas, lakes, reservoirs, rivers, streams, tanks and ponds);
- ***underground sources*** (ground water, artesian [confined] water, shallow wells, deep wells, springs).

Natural sources, such as rivers and lakes, and impounding reservoirs are ***sources of surface water***. So, surface water can come from oceans and seas, lakes and reservoirs, rivers and streams, tanks and ponds. Water is withdrawn from rivers, lakes, and reservoirs through ***intakes***. The simplest intakes are pipes extending from the shore into deep water.

Water obtained from subsurface sources, such as sands and gravels and porous or fractured rocks, is called ***ground water***. The flow of ground water takes place in river valleys and, in some areas, along the seacoast in water-bearing strata known as ***aquifers***. Groundwater is accessed through a bore.

For the community's needs groundwater is more suitable. However, for the supply of water to large inhabited localities groundwater sources are often insufficient, and acquisition of a considerable quantity of water from them is unprofitable.

For the supplying of big cities and industrial enterprises with water, therefore, surface sources of fresh water are mainly used.

Sources of Drinking Water

Drinking water is water intended primarily for human consumption, either directly, as supplied from the tap, or indirectly, in beverages or foods prepared with water. It should contain no harmful concentrations of chemicals or pathogenic microorganisms, and ideally it should be aesthetically pleasing in regard to appearance, taste and odour.

Drinking water comes from ***both surface and groundwater sources***. Surface water (rainfall and its runoff into streams and rivers) normally contains suspended matter, pathogenic organisms, and organic substances. Groundwater (water that has collected in aquifers) normally contains dissolved minerals and gases. Both require treatment. Water suppliers access this water, treat it and distribute it to consumers.

A Limited Supply of Fresh Water on the Earth

The amount of water on our planet that is suitable and available for drinking is very small. Only 2.5% of the total water on earth is fresh wa-ter. Most of this is not available for drinking, because it is frozen in glaciers or the polar icecaps, or is unavailable in the soil. Accessible fresh water is found in the atmosphere, lakes, rivers, streams, wetlands and under the surface in aquifers (groundwater).

Across the globe, population growth, urban development and environmental degradation pose an ever-increasing threat to freshwater sup-plies. Today, 4 out of every 10 people live in areas that are experiencing water scarcity, and nearly 50% of the world's population is likely to face severe water shortages by 2025.

COMPREHENSION CHECK

24. Decide whether the following statements are true (T) or false (F) according to the text. Correct the false statements.

1. The choice of a water source is one of the most responsible tasks in water supply system design.
2. A water supply source should satisfy a number of requirements.
3. Natural sources of water include surface, subsurface, underground and groundwater sources.
4. An aquifer is a water-bearing stratum.
5. For the supplying of big cities groundwater sources are sufficient. 6. Drinking water should not contain any harmful concentrations of chemicals or pathogenic microorganisms.
7. Drinking water comes from both surface and underground sources.
8. Surface water usually contains dissolved minerals, pathogenic organisms, and organic substances.
9. Groundwater normally contains suspended matter and gases.
10. Most of fresh water on the Earth is not available for drinking.
11. Population growth, urban development and environmental degradation threaten freshwater supplies across the globe.

25. Answer the following questions.

1. Why is the choice of a water source considered one of the most responsible tasks in designing a water supply system?
2. What requirements should a water supply source satisfy? 3. What do natural sources of water include?
4. What is ground water?
5. An aquifer is a water-bearing stratum, isn't it?
6. Are surface or underground sources of water used for the community's needs?
7. Does drinking water come only from groundwater sources? 8. Why do both surface and ground water require treatment?
9. There is a large amount of water on the Earth that suitable and available for drinking, isn't there?
10. Why is most of the Earth's fresh water not available for drinking? 11. Is fresh water found not only on and under the Earth's surface, but also in the atmosphere?
12. What factors pose an ever-increasing threat to freshwater supplies? 13. Nearly half of the world's population will probably face severe water shortages soon.

26. Find key words and phrases which best express the general meaning of each paragraph.

27. What parts of the text can you define? Do they correspond to the paragraph? Entitle each part.

1. _____
2. _____
3. _____
… _____

28. Write a summary of the text.

LANGUAGE FOCUS

29. Find the words in the text that mean …

1. existing in nature; not made or caused by humankind; not artificial
2. a structure through which water is taken in from a river into a channel or pipe
3. a distinctive smell, esp. an unpleasant one

4. a layer or a series of layers of rock in the ground
5. land consisting of marshes or swamps
6. disease-producing, disease-causing
7. subterranean, subsurface

30. Use the words and word combinations from the box to change the underlined words.

regions, amount, designs, desalination, besides, sea water, increasing, densely, contaminated, predictable, recycling, nevertheless, to satisfy, demands, solar energy, shortage, use

"New" Sources of Water

Lack of water of proper quality and quantity has been a major factor affecting urban and industrial growth. To overcome this problem, ***water has been transported great distances*** (e.g., the channeling of Rocky Mountain water from the Colorado River to Tucson, Ariz.) During the 1970s and 1980s the Soviet Union proposed several projects to reverse or divert the waters of northward-flowing rivers of Siberia and the Russian S.F.S.R. to meet the demands of the more heavily populated and water-short regions of the Volga Basin, Central Asia, and Kazakstan. The predicted environmental and climatic consequences of such undertakings, however, combined with their engineering logistics, prevented the practical application of most of these plans.

The use of the oceans as sources of fresh water is being developed in many areas. Kuwait, a desert nation in Arabia, now receives much of its water supply through the desalinization of seawater, as do a number of small communities and several large urban centres elsewhere in the world. Seawater may be used as a source of fresh water on a more wide-spread basis if an additional power source (*e.g.*, solar power) can be de-veloped for the desalinization process. Moreover, the materials re-claimed from seawater could, if power is available for their separation and concentration, help in meeting many of the world's mineral needs. It seems unlikely, however, at least with foreseeable sources of power, that desalinized ocean water will be extensively pumped to inland regions. Meeting the growing needs of such areas will require the purification of waters polluted by urban or industrial use or of waters that have become salinized through their use in irrigation. The reuse of such waters could go far toward reducing the need for new water by inland communities.

33. Translate the following texts into English using the active vocabulary.

1. Выбор источника является одной из наиболее ответственных задач при проектировании системы водоснабжения, так как он определяет в значительной степени характер самой системы, нали-чие в ее составе тех или иных сооружений, а следовательно, стоимость и строительства, и эксплуатации.

2. Практически все используемые для целей водоснабжения природные источники воды могут быть отнесены к двум основным группам:

а) **поверхностные источники** — реки (в естественном состоянии или зарегулированные) и озера;

б) **подземные источники** — грунтовые и артезианские воды и родники.

3. **Поверхностные источники** характеризуются значительными колебаниями качества воды и количества загрязнений в отдельные периоды года. Качество воды рек и озер в большой степени зависит от интенсивности выпадения атмосферных осадков, таяния снегов, а также от загрязнения ее поверхностными стоками и сточными водами городов и промышленных предприятий.

Характерными качествами **речной воды** являются относительно большая мутность (особенно в период паводков), высокое содержание органических веществ, бактерий, цветность. Наряду с этим речная вода характеризуется обычно относительно малым содержанием минеральных солей и относительно небольшой жесткостью (особенно в период паводков).

Вода озер обычно отличается малым содержанием взвешенных веществ (т. е. малой мутностью или, иначе, большой прозрачностью), кроме прибрежной зоны, где мутность воды увеличивается в результате волнения. Степень минерализации озерной воды различна.

4. **Подземные воды**, как правило, не содержат взвешенных веществ (т. е. весьма прозрачны) и обычно бесцветны.

Артезианские воды, перекрытые сверху водонепроницаемыми породами, защищены от поступления проникающих с поверхности земли загрязненных стоков и потому обладают высокими санитарными качествами. Такими же качествами часто обладают и **родниковые воды**.

Наряду с этими положительными качествами подземные воды часто сильно минерализованы. В зависимости от характера растворенных в них солей они могут обладать теми или иными отрицательными свойствами (повышенная жесткость, наличие неприятного привкуса, содержание веществ, вредно влияющих на организм человека).

5. Окончательный выбор источника водоснабжения для данного объекта производится в зависимости не только от качества воды в нем, но также от его мощности, удаленности от объекта, стоимости подачи и очистки воды.

6. Для водоснабжения населенных мест наиболее подходящим источником являются подземные (особенно артезианские и родниковые) воды, если они не сильно минерализованы.

7. Для крупных населенных мест подземных источников часто оказывается недостаточно. В этих случаях, несмотря на отрицательные качества поверхностных вод, приходится использовать их, производя соответствующую очистку.

8. Водоснабжение большинства малых и средних населенных мест основано на использовании подземных источников. Для водоснабжения большинства крупных городов приходится полностью или в значительной степени пользоваться поверхностными водами (с соответствующей их очисткой).

SPEAKING PRACTICE

34. Get ready to speak about natural sources of water and their use for water supply purposes.

VOCABULARY WORK

35. Read the following international words and guess their mean-ing. Mind the stressed syllables. Prove that these words are interna-tional ones.

Model: utilization : ə использование, пользование, употребление; **утилизация**

36. Translate the following words and phrases and memorize them.

Nouns and noun phrases	
(non-)renewable resource	pesticide
algal bloom	recharge
availability	release
depth	river flow
desalinization	salinity
deterioration	seepage
disease	snowfield
drinking water supply	water distribution
estuary	water resources
fertilizer	water reuse
herbicide	water table
overfertilization	water utilization
overuse	
Verbs and verbal phrases	
to be filled with	to recover
to disappear	to remain
to disrupt	to replace
to fill with	to store
to give rise to	to trickle down
to increase	
Adjectives	

dry	nonpolluting
freshwater	uneven
glacial	unfit (for)
improper	untreated
inaccessible	
Adverbs	
continually	primarily
currently	roughly
evenly	steadily
permanently	
Prepositions	
due to	regardless of
Conjunctions	
although while	while

37. Match the English and Russian equivalents.

1. bottom water	a. атомная электростанция, АЭС
2. evenly distributed	b. влажность грунта, почвенная влага
3. ever-widening	c. воды, залегающие в верхних слоях почвы
4. flood prevention	d. гидроэлектростанция, ГЭС
5. ground water recharge	e. донная [глубинная] вода
6. groundwater plane	f. ледниковый щит
7. hydropower plant	g. максимальная мощность [производительность]
8. ice sheet	h. маловероятно, что …
9. it is unlikely that …	i. покрывающая порода
10. maximum capacity	j. пополнение запасов подземных вод
11. nuclear power plant	k. поровое пространство *(в почве)*; объём пор
12. overlying rock	l. постоянно расширяющийся
13. pore space	m. противопаводочные мероприятия
14. shallow groundwater	n. равномерно распределённый
15. soil moisture	o. сделать *что-л.* непригодным для
16. thermoelectric power	p. термоэлектродвижущая сила, термоэдс
17. to render *smth*. unfit for	q. уровень подземных вод

38. Match the terms and their definitions.

ecosystem, lake, lead, ocean, recharge, reservoir, river, snowfield, water table

a. a biological community of interacting organisms and their physical environment

b. a heavy, bluish-gray, soft, ductile metal, the chemical element of atomic number 82 (Symbol: Pb). It has been used in roofing, plumbing, ammunition, etc.

c. a large body of water surrounded by land

d. a large natural or artificial lake used as a source of water supply

e. a large natural stream of water flowing in a channel to the sea, a lake, or another such stream

f. a permanent layer of ice covering an extensive tract of land, esp. a polar region

g. a very large expanse of sea, in particular, each of the main areas into which the sea is divided geographically

h. the level below which the ground is saturated with water

i. the replenishment of an aquifer by the absorption of water

Now fill in the table with Russian equivalents to the words from the sentences above.

concern, drain, flow, overuse, recharge, release, result, reuse, rise, store

	NOUN	VERB	ADJECTIVE
maximum	максимум; максимальное значение; высшая степень	---	максимальный, наибольший, предельный

READING PRACTICE

40. Read the text using a dictionary.

Text C Natural Water Resources and Their Use for Water Supply Purposes

Part 1. The Earth's Water Supply and Its Natural Distribution

A water resource is any natural waters that occur on the Earth, regardless of their state (*i.e.*, vapour, liquid, or solid) and that are of potential use to humans. Of these, the resources most available for use are the waters of the oceans, rivers, and lakes; other available water resources include groundwater and deep subsurface waters and glaciers and permanent snowfields.

Water is stored on the Earth's surface in a number of places called ***reservoirs***.

Oceans. By far the largest reservoir is the ocean, which contains 96% of the Earth's water and occupies more than two-thirds of the Earth's surface. Ocean water, [1]being saline, is not generally available for human consumption, although it can be used for some purposes, mainly thermo-electric power.

Glaciers. Fresh water makes up only about 4% of the Earth's water. The largest freshwater reservoir is glacial ice, at 3%. Most of this ice (about 85%) occurs as continental glaciers in Antarctica and less than 10% in the Greenland ice sheet. Alpine or mountain glaciers which occur in mountain valleys on the continents contain a small part of the total ice. ***Ground water***. The largest reservoir of available fresh water is groundwater (1.05% of total water) which is stored in the pores and spaces in rocks, sand, gravel, and soil under the Earth's surface. The top plane of the ground water is referred to as the water table, below which all the spaces are filled with water. About half of the ground water occurs quite near the Earth's surface and this is an important source of water for human consumption. Although shallow ground water is continual-ly being refilled by precipitation [2]trickling down to the water table, the rate of recharge is very slow and often takes hundreds or thousands of years. This makes many ground-water aquifers a nonrenewable re-source. The rest of the ground water, while at greater depths, does not occur much deeper than a few kilometers, where the pressure of the [3]overlying rock becomes so great that pore space disappears. Deep groundwater is harder to recover and is more likely to be saline. A smaller amount of water occurs in the soil above the water table, where both air and water fill the pore spaces; this water is referred to as soil moisture and is tightly held in the pores.

Lakes, rivers, and other reservoirs. Fresh-water lakes and rivers on the Earth's surface contain only 0.01% of the Earth's water. This water is generally available for human consumption. There is also an even smaller reservoir of water in the atmosphere (0.001%), where the water occurs as water vapour gas. The smallest reservoir of water occurs in the biosphere, within plants and animals (0.0006%). To summarize, the main fresh-water resources available for humans on the Earth's surface are ground water and lake and river water, which together only constitute about 1.1% of the Earth's total water.

Hydrologic cycle. Water does not permanently remain in any one reservoir on the Earth but is continually in motion through the hydrologic, or water cycle.

The total amount of water on the Earth's surface in the various reservoirs remains roughly constant over time. The general belief is that the amount of water on or near the Earth's surface has not changed greatly since 3.8 billion years ago.

Part 2. Worldwide Water Use and Water Usage Problems

Although water is a renewable resource which is continually being replaced by precipitation it is not evenly distributed and is scarce in many areas. The distribution of both surface and ground water resources is uneven on the Earth. Groundwater is of special importance for [4]drinking water supply throughout the

world, every region having differ-ent groundwater resources.

Human use of natural waters, particularly of freshwater resources, has increased steadily over the centuries. It is unlikely that this trend will change given the continued growth of population and the [5]ever-widening utilization of water for agricultural, industrial, and recreational purposes.

This situation has given rise to [6]growing concern over the availability of adequate water supplies to accommodate the future needs of society. Surface water resources are already being used to their maximum capacity in various regions of the world.

Quantity of water is not the only concern. Overuse has resulted in the progressive deterioration of **water quality**. Seepage of mineral fertilizers (phosphates and nitrates), pesticides, and herbicides into surface and subsurface waters has not only rendered them unfit for human consumption but also disrupted aquatic ecosystems. Lakes and rivers also have been contaminated by the improper disposal of sewage, the discharge of untreated industrial wastes, and the release of heated wastewater from nuclear power plants and other industrial facilities, which results in thermal pollution and its attendant problems.

The result of the uneven distribution of precipitation and world's rivers is that many areas do not have adequate water resources. In total, about 20% of world river flow (the remote northern rivers of North America and Eurasia, as well as large parts of the flow of the Amazon and Congo rivers) is geographically inaccessible to populated areas and thus not available for human use. Rivers in other dry parts of the world, such as the Nile in Egypt, have had their flow greatly reduced due to dams and irrigation. At times, the Nile is reduced to zero flow. Freshwa-ter lakes only make up 0.009% of the world's water by volume, but they are important water resources. There are several very large saline lakes. In fact, the world's largest lake, the Caspian Sea at the border between Asia and Europe, is saline. It was named a "sea" because of its salinity. The Aral Sea is another large saline lake, although it has been shrunk extensively by the use of its water for irrigation.

The uses of water worldwide are 70% for agriculture, 10% for domestic purposes such as drinking water, and 20% for industry (more than half of which is used for hydropower). Countries that have scarce water include a number in the belt of low precipitation such as the northern tier of Africa (Mauritania, Algeria, Morocco, Libya, Niger, and Egypt) and the Middle East (Saudi Arabia, Palestine, Syria, and Jordan). Worldwide there are 500 million people in countries with scarce water.

Water for human consumption is unsafe in many places, particularly in the [7]developing countries. It is estimated that as much as 80% of diseases in developing countries are water-related, and 1.7 million people, often children, die from these diseases mainly in Africa and south-east
Asia. Typical diseases are diarrhea, cholera, typhoid, and malaria. The main problem is that unsafe disposal of human and animal waste contaminates water for domestic use and irrigation.

More than 50% of the water used by industry (20% of the total) is used for hydropower plants. These plants provide one-fifth of the world's electricity. Hydropower is relatively clean and [8]nonpolluting and is renewable. Dams used for hydropower generation also store water resources for agricultural irrigation, flood prevention, and domestic use. Industrial uses of water can lead to pollution of rivers and aquifers by heavy metals (such as mercury and lead) and persistent organic pollutants.

Agriculture uses 70% of water worldwide, primarily for irrigation. About 65% of irrigation water is "consumed" in distribution and application and by crops and not available for reuse. Irrigation can be wasteful of water and can lead to salt buildup in soils if the soil is poorly drained. Agricultural and lawn runoff often cause over-fertilization of water from nitrate and phosphate, causing algal blooms and loss of oxygen in bottom water of rivers, lakes, and estuaries. There have also been problems with agricultural pesticides [9]polluting ground and surface water.

Desalinization of saltwater currently supplies only about 0.1% of fresh water. It is expensive since it requires a lot of energy. Thus, it is used primarily for drinking water in water-poor areas.

COMPREHENSION CHECK

41. Decide whether the following statements are true (T) or false (F) according to the text. Correct the false statements.

1. A water resource is any natural waters that occur on the Earth in liquid state and that are of potential use to humans.
2. The resources most available for use are groundwater and deep subsurface waters and glaciers and permanent snowfields.
3. Reservoirs are places where water is stored on or under the Earth's surface.

4. The largest saline water reservoir is the ocean.
5. Freshwater reservoirs include glaciers, rivers, lakes, and ground-water.
6. Deep groundwater is more likely to be saline.
7. The largest reservoir of water occurs in the biosphere, within plants and animals.
8. The total amount of water on the Earth's surface in the various reservoirs remains approximately constant over time.
9. Although water is a renewable resource which is continually being replaced by precipitation it is distributed unevenly and is scarce in many areas.
10. It is likely that human use of natural waters, particularly of fresh-water resources, will decrease steadily.
11. Surface water resources are being used to their minimum capacity in most regions of the world.
12. Both quality and quantity of water are of concern.
13. About 20% of world river flow is not available for human use.
14. The world's largest lake, the Caspian Sea, is named a "sea" be-cause of its salinity.
15. The worldwide water uses are 70% for agriculture, 10% for domestic purposes such as drinking water, and 20% for industry.
16. It is estimated that as much as 80% of diseases in developed countries are water-related.
17. Though desalinization of saltwater is expensive since it requires a lot of energy, it is used primarily for drinking water in water-poor areas.

42. Answer the following questions to Part 1 of the text.

1. What is a water resource? 2. What is a reservoir?
3. How much Earth's water does the ocean contain?
4. Is ocean water generally available for human consumption?
5. Fresh water makes up about 96% of the Earth's water, doesn't it? 6. Where does glacial ice occur?
7. What is groundwater? 8. What is the water table?
9. What is the difference between shallow and deep groundwater? 10. What is soil moisture?
11. Is the water of lakes, rivers and other fresh-water reservoirs avail-able for human consumption?
12. Are there reservoirs of freshwater water in the atmosphere and the biosphere?
13. Through what process doesn't water on the Earth remain permanently in any one reservoir?

43. Find key words and phrases which best express the general meaning of each paragraph.

44. What parts of the text can you define? Do they correspond to the paragraph? Entitle each part.

1. _____
2. _____
3. _____
… _____

45. Write a summary of the text.

LANGUAGE FOCUS

46. Choose the correct word.

Water: a Renewable or Nonrenewable Resource?

Water may be considered an inexhaustible resource because the total supply of water in the biosphere is not **affected/effected** by human activi-ties. Water is not destroyed by human uses, **although/despite** it may be held for a time in combination with other chemicals. To be **useless/useful**, however, water must be in a particular place and of a certain quality, and so it must be regarded as a renewable, and often scarce, resource, with wa-ter recycling times that **dependent/depend** on its location and use.

Water that falls from the **atmosphere/biosphere** as various types of precipitation and **than/then** runs off the land surface to form streams and rivers that eventually reach the ocean generally operates on a one-year-renewable cycle known as the **hydrologic/hydraulic** cycle. From the ocean the water is evaporated by solar energy and returned to the atmos-phere, from which it again falls **as/like** rain or some other form of pre-cipitation. In certain locations, however, water has a much **long-er/longest** cycling time; after entering the ground from rainfall, it may percolate slowly **through/though** underground **channels/canals** until it reaches underground reservoirs. In certain arid regions the total water supply may be underground water

that accumulated during past ages, when the climate of the region was **less/more** humid. **Since/science** that time there may have been little or no addition to this supply because of the **existing/exciting** climatic conditions. Because its cycling time may be extremely long and dependent **upon/from** the frequency with which wet and dry climates alternate in a particular region, such a water re-source **can/should** be virtually nonrenewable.

47. Read the text and answer the following questions in written form.

Water Resources in Europe

The mountainous and upland areas of Europe collect great quantities of surface water which supply the rivers and lakes. In the Mediterranean lands, surface water is minimal in summer, with the exception of Alpine rivers, lakes, and springs, and the Apennine zone of Italy. In the east, surface water is relatively abundant in Belarus and central and northern Russia, but it decreases to the south; dams on the Volga and Dnieper (Dnepr), however, have created enormous reservoirs. There are large artesian and ground water basins in Belarus and the Baltic countries.

The increasing water requirements of thermal power stations, industry and domestic needs make the little-populated and little-industrialized European highlands, which offer surplus water, vital to the lowlands. The pollution of water by effluents from urban areas, oil refineries and chemical and metallurgical plants presents serious problems in, for ex-ample, the Rhine and the Ruhr regions, and Lakes Geneva. In reaction to water shortages, for example, in the Thames, water is recycled many times, a practice that improves river water quality.

Europe is relatively well supplied with water, for the water table is normally not far below the surface in the lowlands, and wells and springs are widely available there; groundwater supplies that are held particular-ly in porous rocks are sporadically utilized through the process of pump-ing. A growing trend is to artificially integrate surface and underground water; nearly half of Sweden's urban water requirements are thus sup-plied. High capital costs, rather than an actual lack of water, leave some areas of the continent (in particular, southwestern Russia near the Caspi-an Sea and parts of interior Spain and Turkey) in an arid state.

The needs of the major European cities and of the industrial regions involve continuing efforts to collect enough water by impounding sur-face water, by pumping groundwater, and by encouraging the economy, reuse, and reclamation of water.

1. Where are the areas of abundance and shortage of water in Europe? 2. What are some of the water-related problems in Europe?
3. What natural sources of water are mainly used in Europe?
4. How is the problem of collecting enough water solved in Europe-an countries?

48. Translate the following sentences into English using the vo-cabulary of the text.

1. Водные ресурсы – это пригодные для использования в хозяй-стве воды рек, озер, каналов, водохранилищ, морей и океанов, под-земные воды, почвенная влага, вода (льды) ледников и снежного покрова.
2. Ледники (глетчеры) – это движущиеся естественные скопле-ния льда атмосферного происхождения на земной поверхности; ко-торые образуются в тех районах, где твердых атмосферных осадков отлагается больше, чем испаряется.
3. Грунтовые воды – это подземные воды первого от поверхно-сти Земли постоянного водоносного горизонта, которые образуются главным образом за счёт инфильтрации (просачивания) атмосфер-ных осадков и вод рек, озёр, водохранилищ, оросительных каналов. Местами запасы грунтовых вод пополняются восходящими водами более глубоких горизонтов (например, водами артезианских бас-сейнов).
4. Грунтовые воды благодаря относительно лёгкой доступности имеют большое значение для национальной экономики как источ-ники водоснабжения промышленных предприятий, городов, посёл-ков, населенных пунктов в сельской местности и т. д.
5. Круговорот воды на Земле (влагооборот) - непрерывное пере-мещение воды на Земле (в её атмосфере, гидросфере и земной ко-ре), состоящий из испарения, переноса водяного пара в атмосфере, конденсации пара, выпадения осадков и стока.. Различают малый круговорот: море (океан) → атмосфера → море (океан) и большой круговорот: океан → атмосфера → суша → океан.

SPEAKING PRACTICE

49. Get ready to speak about natural water resources and their use for water supply purposes.

VOCABULARY WORK

50. Read the following international words and guess their mean-ing. Mind the stressed syllables. Prove that these words are interna-tional ones.

Model: crisis (*pl.* **crises** :) **кризис**; критическая ситуация; критический момент, решительный момент, перелом

51. Translate the following words and phrases and memorize them.

Nouns and noun phrases	
benefit	jeopardy
diamond	practice
environmentalist	threat
flush	water shortage
Verbs and verbal phrases	
to cost	to pour
to lack	to save
to look for	to threaten
to matter	
Adjectives / Participles	
conscious (of)	shared
sensible	
Adverbs	
approximately	immediately
considerably	moreover
economically	rapidly
fiercely	undoubtedly
however	unfortunately
Prepositions	
according to	like

52. Match the English and Russian equivalents.

1. energy conservation 2. no longer 3. oil crisis 4. to put in jeopardy 5. water conservation 6. World Health Organization (WHO)	a. Всемирная организация здравоохранения, ВОЗ *(специализированное учреждение ООН, ставящее целью достижение всеми народами более высокого уровня здоровья; создано в 1948 г.)* b. нефтяной кризис c. сохранение воды; накопление воды; охрана водных ресурсов d. сохранение энергии; рациональное использование энергии; экономия энергии e. ставить под угрозу, подвергать опасности f. уже не, больше не

53. Match the terms and their definitions.

consensus, crisis, economically, jeopardy, lack, save, sensible, shortage

a. a state or situation in which something needed cannot be obtained in sufficient amounts
b. a time of intense difficulty, trouble, or danger
c. an agency of the United Nations, established in 1948 to promote health and control communicable diseases
d. be without or deficient in
e. chosen in accordance with wisdom or prudence; likely to be of benefit
f. danger of loss, harm, or failure *g.* general agreement
h. in a way that involves careful use of money or resources *i.* keep safe or rescue (*smb. or smth.*) from harm or danger

54. Make sure you know the words and word combinations from the box and insert them into the sentences.

providing, urban, dense, maintaining, sanitation, groundwater, quality

Where the Water Goes

What exactly constitutes a water crisis varies greatly, according to type of environment: rural or _____ community, developing or indus-trial nation.

In rural areas, the conflict is one of agricultural overuse, _____ con-tamination, and, in some parts of the world, lack of infrastructure and _____ .

In urban areas, the crisis is primarily one of insufficient water to sup-port the _____ population.

In developing nations, the primary concern is simply _____ water to people, while water quality may take a backseat.

In industrial nations, where the infrastructure for providing drinking water to the majority of the population is already in place, the concern turns to _____ the level of service and the _____ of the water supply.

READING PRACTICE

55. Read the text using a dictionary.

Text D The Threat of a Worldwide Water Shortage

"High quality water is more than the dream of the conservationists, more than a political slogan; high quality water, in the right quantity at the right place at the right time, is essential to health, recreation, and economic growth." EDMUND S. MUSKIE, U.S. Senator, speech, 1 March 1966

"Water, which is essential for life, costs nothing. *On the other hand*, diamonds, which are essential for nothing, cost a lot." *Unfortunately*, the world has changed considerably since an eighteenth century economist made this remark. What was true over two hundred years ago is certainly no longer true now. In a number of countries people pay as much for water in their homes as they do for electricity.

What is still true, *however*, is the re-mark made by Benjamin Franklin at the same time as the previous observation was made. "When the well's dry, we know the worth of water," he observed. Like health, we ignore water when we have it — unless there are floods, of course. Once there is a threat to our water supply, however, water can quickly become the only thing that matters. We know only too well that, without water, there can be no life.

The situation is now becoming so bad that environmentalists feel it may be necessary to shock the world into saving water in a similar way to the shock caused by the oil crisis in the 1970s. At that time, the oil crisis became such a serious threat to the lives of everyone in the developed countries that it made people conscious of the importance of saving oil and provided powerful encouragement for governments to look for other forms of energy. The result *undoubtedly* was of major benefit to energy conservation.

There is now no longer an unlimited supply of fresh water. If all the earth's water could be poured into a gallon jug, the fresh water which would be available for everyone would amount to slightly more than one tablespoon — less than half of one per cent of the total water in the jug. About 97 percent of the planet's water is seawater. Another 2 percent is locked in icecaps and glaciers. There are also reserves of fresh water un-der

the earth's surface but these are too deep for us to use economically. Unfortunately, competition is growing fiercely for what little water is available. It may be a matter of time before that competition becomes a conflict. *To make matters worse*, the world's population is increasing so rapidly that it is expected to grow in thirty years to approximately 8,000 million — an increase of 60%.

Moreover, in many developed countries throughout the world, flush lavatories and washing machines mean the average person now uses 300 liters of water a day compared with 50 at the beginning of the century.

At the other extreme, ac-cording to the World Health Organization, one quarter of the world's present population still lacks safe drinking water and proper sanitation. Most live in the southern hemisphere, where supplies of fresh water are put in jeopardy through dirty industrial practices, poor irrigation and erosion It is estimated that diarrhea caused by polluted water will kill 15 out of every 1,000 children born in developing countries before they reach the age of five. Cases of cholera have risen to levels unheard of in the past. Contamination is responsible for 80 percent of diseases and 33 percent of deaths in these countries.

The social stability of the world is no longer threatened by global wars, the Cold War, etc. However, the supply of water could soon be-come the chief threat to such stability. There is already evidence of this happening, especially in Africa. Recently the Egyptian government threatened to destroy any dams built on the Nile if they considered the dams would affect their supply of fresh water. What is required *immediately* is an awareness of the true value of water and the formation of sensible water conservation strategies. It is also of vital importance to have a consensus on how best to use shared water resources for the benefit of all the countries in the world as well as an examination of the best methods of the distribution of the world's water.

COMPREHENSION CHECK

56. Complete the sentences according to the text.

1. Water, which is essential for life, … . On the other hand, diamonds, which are essential for nothing, … .
2. In a number of countries people pay as much for water in their homes … .
3. When the well's dry, we know … .
4. Once there is a threat to our water supply, however, … . 5. Without water, there can be … .
6. There is now no longer an unlimited supply of … .
7. About 97 percent of the planet's water is … . Another 2 percent is locked in … .
8. To make matters worse, the world's population is increasing so rapidly that … .
9. Moreover, in many developed countries throughout the world, flush lavatories and washing machines mean … .
10. At the other extreme, one quarter of the world's present population still lacks … .
11. Most live in the southern hemisphere, where … . 12. The supply of water could soon become … .
13. What is required immediately is … .
14. It is also of vital importance to have a consensus on … .

57. Write a summary of the text.

LANGUAGE FOCUS

58. Match 1-10 to a-j to form complete sentences.

1. We only appreciate the importance of water...	a ... for what little water is available.
2. The water crisis is now so bad ...	b ... while another 2 percent is ice.
3. The amount of fresh water available for everyone now ...	c ... the social stability of the world will be threatened.
4. About 97 percent is sea water...	d ... that the world must be shocked into taking action.
5. The fresh water below the surface of the earth ...	e ... is responsible for large numbers of deaths and illnesses.
6. The water shortage is made more serious ...	f ... how to use and distribute the world's water.
7. Polluted water in developing countries ...	g ... when we do not have any.
8. There will soon be keen competition ...	h ... is too deep to obtain at a reasonable cost.
9. Countries must reach an agreement on ...	i ... because the world's population is increasing at a rapid rate.
10. If there is no such an agreement...	j ... is less than one percent of the total water in the world.

59. Choose the right variant. Comment on your choice.

Water is essential for life. However, **(like/as/such as)** the air we breathe, water is something that we often take for granted. It is **(easy/ uneasy/easily)** to take something for granted when it is always there. In places rich with clean water resources, **(these/there/their)** are watered lawns, clean cars and long showers. Comprehending the global need for water **(are/is/it is)** difficult when wells are abundant and public waterworks are aptly funded – the tap turns and the water comes out. It is un-imaginable to even think of walking great distances **(everyday/every day/per day)** to throw a bucket into a swamp and call what comes out drinking water.

The need is so vast that **(some/any/no)** single solution will work in every case; therefore, there is room for various creative solutions. The need **(of/to/for)** clean water will continue to grow **(as/however/but)** the global population increases. In the developing world, wells are **(enough/ too/such)** expensive for impoverished villages to afford **(because of/ because/due to)** they require skilled workers and specialized heavy equipment. To top it all off, subterranean water **(is not/are not/is no)** always available, and surface water is generally not safe to **(drink/ drinking/drank)**. **(Another/ Other/Others)** innovations are necessary, and tremendous steps are being taken to bring water to **(this/that/these)** communities.

60. Insert the appropriate word.

lack, protect, flush, misused, management, worse, increase, stress, purposes, droughts, precious, ecosystems

1. The world is currently in a water crisis. A _____ of water to meet daily needs is a reality today for one in three people around the world.
2. Globally, the problem is getting _____ as cities and populations grow, and the needs for water _____ in agriculture, industry and house-holds.
3. Water is an essential resource for life and good health. The WHO urges everyone to be part of efforts to conserve and _____ this re-source.
4. Water conservation is the protection, development, and efficient _____ of water resources for beneficial _____.
5. Regions throughout the world are experiencing water shortages, due to both _____ and overuse of water.
6. According to the Washington Post in 2005, "Just one _____ of a toilet in the West uses more water than most Africans have to perform an entire day's washing, cleaning, cooking and drinking."
7. There is no resource more _____ than water. There is also no re-source that is _____, abused, misallocated, and misunderstood the way water is.
8. Safe drinking water, healthy and intact natural _____, and a stable food supply are a few of the things

at risk as our water supply is put under greater and greater _____.

✓ 443 million school days are lost each year due to water-related ill-nesses that keep children out of school and compromise their ability to learn when they do attend.

✓ When you flush the toilet, you are using the same water amount that one person in a developing country uses all day to wash, clean, cook and drink.

✓ 40 billion hours are lost annually to hauling water, a chore primar-ily undertaken by women and girls, in sub-Saharan Africa.

✓ In many areas of sub-Saharan Africa women and girls often walk an average of five miles to the nearest water source every day. If a wom-an only had to carry water for one hour a day, she could earn an addi-tional US $100 a year.

✓ The weight of the water container that women in Asia and Africa carry on their heads is equivalent to the baggage weight allowed by air-lines (20 kg/44 lbs).

✓ It takes 630 gallons of water to produce one hamburger and 2,900 gallons of water go into producing a single pair of blue jeans!

LANGUAGE DEVELOPMENT

61. The following prefixes are concerned with water and with earth. Read and translate them.

aqu- (water): aqueduct, aqualung, aquamarine, aquaplane, aquarium, aquatic
hydr- (water): hydrant, hydraulic, hydroelectric, hydrofoil, hydroplane **mar**- (sea): marina, marine, mariner, maritime, submarine
geo- (earth): geocentric, geography, geology, geometry, geophysics **terr**- (earth): terra firma, terra incognita, terrace, terrain, terrestrial,
territorial, territory

62. Using a dictionary to help you, complete each blank in the fol-lowing sentences with the most appropriate word from the list above.

1. A long bridge carrying a road or railway is called a viaduct. A long bridge carrying water is called an _____.
2. Swimming, skin-diving, sailing and water skiing are all _____ sports.
3. Electricity produced by the force of water is called _____ power.
4. _____ brakes work by using compressed fluid to supply the braking force.
5. The _____ is very mountainous, making it difficult to build roads.
6. Countries which had powerful navies were often referred to as great _____ powers.
7. _____ refers to the study of the movements of parts of the Earth. 8. A fire _____ is a water pipe in the street from which water

may be taken for public use in times of emergencies — for example, for fighting fires or for distributing water during severe water shortages.

63. Using the information from Exercise 61, choose the best ending for the following sentences.

1. An aquamarine jewel is … . A. reddish-brown
B. light yellow C. dark purple D. bluish-green
2. A hydrofoil can travel at high speed … . A. through the air
B. over the water
C. by both land and sea D. on land
3. A marina is … .
A. a tank for keeping fresh fish
B. an aircraft with two sets of wings C. an area of mountainous country D. a harbor for pleasure boats

4. Extra-terrestrial beings are creatures who … . A. come from the sea
B. live on other planets C. take the form of ghosts D. lead very lonely lives

5. "Terra firma" is a Latin phrase used to refer to … . A. water as contrasted with land and air
B. fresh air as compared with polluted air C. dry land as contrasted with air and water D. fresh water as compared with sea water **6. Geocentric refers to regarding … .**
A. the Earth as the central point for measurements, etc. B. the sun as the center of the solar system
C. the sea as forming the largest and most important part of the Earth D. the atmosphere as the most important of all subjects for study

64. The following idioms all contain the word "water."

in deep water	in serious trouble, in difficulties
to hold water	to seem true or reasonable
to keep one's head above water	to stay out of difficulties, keep out of debt
(like) water off a duck's back	to have no effect on someone (used about criticism, advice, warnings, etc.)
to pour cold water on	to try to prevent or discourage by criticizing and pointing out problems, etc.
water under the bridge	past events which cannot be changed or influenced in any way

65. Complete each blank in the following sentences with the most appropriate idiom from the list above. Make sure that you use the correct form of the verb in the idiom.

1. Mrs. Ford was very enthusiastic about her plans to open a dress shop until you began to … it. Now she thinks that there will be too many problems.
2. The lecturer warned Vincent that he would fail if he continued to miss lectures, but I'm afraid his warning was … . The trouble with Vin-cent is that he will never listen to advice.
3. Be careful! You'll get … if you borrow money from people like that. You'll have to pay a huge amount of interest and they'll keep on threatening you if you don't repay the loan at the time you've promised.
4. "How's your new business?" "I'm managing quite well. At least. I'm … ."
5. "I wish I'd learned Japanese at school. I wish I hadn't taken my uncle's advice."
"Stop thinking about the past and start to live in the present. That's all … . Have you ever thought of taking private lessons in Japanese or even of learning another language?"
6. What Mr. Jones has just said doesn't seem to … . I can't see any-thing unfair or deliberately misleading about it.

SPEAKING PRACTICE

66. Find additional information on the problem of water short-age. Make a presentation.

67. Get ready to speak about the threat of a worldwide water shortage.

FOLLOW-UP ACTIVITIES

68. Read the texts of UNIT 2 again and make notes under the following headings. Then use your notes to talk about *Types of Water Demands* and *The Threat of a Worldwide Water Shortage*.

1. Water consumption and its types. 2. The main types of water use.
3. Natural water sources and their use for water supply purposes. 4. Natural water resources and their use

for water supply purposes. 5. The threat of a worldwide water shortage.

Text 1. CATEGORIES OF WATER USE

The use of water can be classified into four categories: (1) domestic use, (2) agricultural use, (3) in-stream use, and (4) industrial use.

Domestic Use of Water

Many rural residents still obtain safe water from untreated private wells, but urban residents are usually supplied with water from complex and costly water purification facilities. Extending and merging of urban communities have created problems in the development, transportation, and maintenance of quality water applies. A relatively small amount of freshwater—roughly 8 percent of the global total—is withdrawn for domestic and municipal requirements. Domestic activities in highly devel-oped nations require a great deal of water. This domestic use includes drinking, air conditioning, bathing, washing clothes, washing dishes, flushing toilets, watering lawns and gardens. On average, each person in a North American home uses 300-400 liters of water each day. Most of this domestic water is used as a solvent to carry away wastes, with only a small amount used for drinking. Yet all water that enters the house has been purified and treated to make it safe for consumption. Until recently, the cost of water in almost every community has been so low that there was very little incentive to conserve, but increasing purification costs have raised the price of domestic water and it is becoming evident that increased costs do tend to reduce use. Natural processes cannot cope with the highly concentrated wastes typical of a large urban area. The unsightly and smelly results present a potential health problem for the municipality. Cities and towns must provide for both the domestic water supplies and the treatment of the wastewater following its use, and both processes are expensive and require trained personnel.

The major problem associated with domestic use of water is maintain-ing an adequate, suitable supply for growing metropolitan areas. Demand for water in urban areas sometimes exceeds the immediate supply.

During the summer, water demand is high, and precipitation is often low. More domestic water is wasted than consumed. This loss, nearly 20 percent of the water withdrawn from public supplies (mainly through leaking water pipes and water mains), is amazingly large. Another major cause of water loss has been that of public attitudes. As long as water is considered a limitless, inexpensive resource, there will be little effort to conserve. As the cost of water rises and attitudes toward water change, so will usage and efforts to conserve.

Agricultural Use of Water

The major consumptive use of water in most parts of the world is for agricultural purposes and principally for irrigation.

In the 1980s, for example, irrigation accounted for nearly 80 percent of all the water consumed in North America. The amount of water used for irrigation and livestock continues to increase throughout the world. Future agricultural demand for water will depend on the cost of water for irrigation; the demand for agricultural products, food, and fiber; govern-mental policies; and the development of new technology.

In some areas, irrigation is a problem because there is not a supply of water nearby. This is particularly true in the western United States, where about 14 million hectares of land are irrigated. In some places, water must be piped hundreds of kilometers for irrigation.

Because most of the world's consumptive use of water results from irrigation, it is becoming increasingly important to modify irrigation practices to less water. Water loss from irrigation may be reduced in many ways. Increasing cost of water will stimulate conservation of water by farmers just as it does the owners. Another method is to reduce amount of water-demanding crops grown in dry areas, or change from high water-demanding to lower water-demand crops. Planting wheat or soybeans instead of potatoes or sugar beets reduces amount of water required. Switching trickle irrigation also reduces water consumption. With trickle irrigation, a series of pipes are placed on the ground with openings strategically placed so that when water flows through the pipe, it delivers a particular quantity of water to the individual plants. This method delivers the water directly to the roots of the plants, rather than flooding entire fields. Although used extensively in greenhouses, trickle irrigation is generally too costly for large agricultural operations. Methods that do not use as much water as flooding irrigation and that are not as expensive in terms of labor and equipment as the trick method include furrow irrigation, corrugation irrigation, overhead irrigation, and subirrigation. Each of these methods has its drawbacks and advantages as well, conditions under which it works well.

Irrigation requires a great deal of energy. Estimates indicate that 40 per cent of the energy devoted to agriculture in Nebraska is used for irrigation. Increasing energy costs may force some farmers to reduce or discontinue irrigation. In addition, much of western Nebraska relies on groundwater for irrigation, and the

water table is dropping rapidly. If a water shortage develops land values will decline. Land use and water use are interrelated and cannot be viewed independently.

In-Stream Use of Water

When the flow of water in streams is interrupted or altered, the value of the stream is changed. Major in-stream uses of water are for hydroelectric power, recreation, and navigation. Electricity from hydroelectric power plants is an important energy resource. Presently, hydroelectric power plants produce about 13 percent of the total electricity generated in the United States. Hydroelectric power plants do not consume water and do not add waste products to it. However, the dams needed for hydroelectric power plants have definite disadvantages, including the high cost of construction and the resultant destruction of the natural habitat in streams and surrounding lands. While dams reduce the amount of flooding, they do not eliminate it. In fact, the building of a dam often encourages people to develop the flood-plain. As a result, when flooding occurs, the potential loss of property and lives is greater.

The sudden discharge from a dam of the impounded water also can seriously alter the downstream environment. If the discharge is from the top of the reservoir, the stream temperature rapidly increases. Discharging the colder water at the bottom of the reservoir causes a sudden decrease in the stream's water temperature. Either of these changes is harmful to aquatic life in the stream.

The impoundment of water also reduces the natural scouring action of a flowing stream. If water is allowed to flow freely, the silt accumulated in the river is carried downstream during times of high water. This maintains the river channel and carries nutrient materials to the river's mouth. But if a dam is constructed, the silt deposits behind the dam, eventually filling the reservoir with silt.

In addition, impounded water has a greater surface area, which increases the amount of evaporation. In areas where water is scarce, the amount of water lost through such evaporation can be serious. This is particularly evident in hot climates. Furthermore, flow is often intermittent below the dam, which alters the water's oxygen content and interrupts fish migration. The populations of algae and other small organisms are also altered. Therefore, dam construction requires careful prior planning.

Water tends to be a focal point for recreational activities. Sailing, waterskiing, swimming, fishing, and camping all require water of reasonably good quality. Water is used for recreation in its natural setting and often is not physically affected. Even so, it is necessary to plan for recreational use, because overuse or inconsiderate use can degrade water quality. For example, waves generated by powerboats can accelerate shoreline erosion and cause siltation.

Dam construction creates new recreational opportunities because reservoirs provide new sites for boating, camping, and related recreation. However, this is at the expense of a previously free-flowing river. Some recreational opportunities, such as river fishing, have been lost.

Most major rivers are used for navigation. North America currently has more than 40,000 kilometers of commercially navigable waterways. Waterways used for navigation must have sufficient water to ensure passage of transport vessels.

Canals, locks, and dams are employed to guarantee this. Often, dredging is necessary to maintain the proper channel depth. Dredging can re-suspend in the water contaminated sediments that had previously been covered over. In addition, the flow within the hydrologic system is changed, which, in turn, affects the water's value for other uses.

Most large urban areas rely on water to transport needed resources. During recent years, the inland waterway system has carried about 10 percent of the goods, such as grain, coal, ore, and oil. In North America expenditures for the improvement of the inland waterway system have totaled billions of dollars.

In the past, almost any navigation project was quickly approved and funded, regardless of the impact on other uses. Today, however, such decisions are not made until the impacts on various other uses are carefully analyzed.

Industrial Use of Water

Water for industrial use accounts for more than half of total water withdrawals. 90 percent of the water used by industry is for cooling. Most industrial processes involve heat exchanges. Water is a very effective liquid for carrying heat away from these processes. For example,
electric power generating plants use water to cool steam so that it changes back into water. If the water heated in an industrial process is dumped directly into a watercourse, it significantly changes the stream's water temperature. This affects the aquatic ecosystem by increasing the metabolism of the organisms and reducing the water's ability to hold dissolved oxygen.

Industry also uses water to dissipate and transport waste materials. In fact, many streams are now overused for this purpose, especially water-courses in urban centers. The use of watercourses for waste dispersal degrades the quality of the water and may reduce its usefulness for other purposes. This is especially true if the industrial wastes are toxic.

During the past thirty years, many nations have passed laws that severely restrict industrial discharges of

wastes into watercourses. In the United States, the federal role in maintaining water quality began in 1948 with the passage of the Federal Water Pollution Control Act. This act provided federal funds and technical assistance to strengthen local, state, and interstate water-quality programs. Through amendments to the act in 1956, 1965, 1972, and 1987, the federal role in water-pollution control was increased to include establishing water-quality standards, financing area-wide waste-treatment management plans, and establishing the framework for a national program of water-quality regulation.

Text 2. SOLVING PROBLEMS

There are no easy solutions to the world's water crises, but there are some promising technologies. ***Desalination***, in particular, has been identified as a promising technology for creating new sources of potable water.

"Desalination is an area of major interest in Southern California coastal areas, which are currently very Colorado River water dependent", Deister said. "The technology has become so much more affordable that it's a viable solution for coastal areas that need a new source of water."

Five large municipal water agencies, all based in California, have joined together to form the United States Desalination Coalition. Its goal is to ask congress to approve legislation aimed at providing financial incentives and grants for the development of desalination treatment facilities.

Desalination is also gaining traction in Florida, where North America's largest seawater desalination plant is under construction for Tampa Bay Water. The Brazos River Authority in Waco, Texas, also expects to begin work on a seawater desalination facility soon.

Aquifer storage and recovery offers another alternative for drought-plagued communities. The method uses aquifer formations to collect water when it is plentiful and to store it in an environmentally friendly way. It doesn't create a new supply of water, but rather stores available water efficiently. The Metropolitan Water District of Southern California has undertaken some major projects in this arena. (The Metropolitan Water District program was the subject of an article, "Putting water Back," in the February 2003 issue.)

Water recycling and reuse are perhaps the cornerstone techniques for helping to drought-proof communities, according to Deister. "Recycling provides a safe and reliable source of water, and a good way to keep wastewater from entering the environment," she said.

Deister's own El Dorado Irrigation District, which lies midway between Sacramento and South Lake Tahoe, currently uses recycled wastewater to irrigate golf courses and public grass plots. The district also recently received approval to use the water in residential gardens.

While recycled wastewater in the United States is carefully treated and used only for non-consumable and non-hygiene-related purposes, this isn't always the case in developing countries. According to Turral in Sri Lanka, many cities of Asia and Africa are reusing wastewater for irrigation, but they're not necessarily treating it. This exposes irrigation workers and even consumers to parasites, as well as to organic, chemical, and heavy metal contaminants. According to the World water Report.

A better alternative in agricultural developing countries is ***improved irrigation technology*** to use less water. Remote sensing, sprinkler irrigation, hydrodynamic gates on irrigation canals, and micro-irrigation kits for small farms could all go a long way to improve the efficiency of irrigation, Turral said. Automatic controls for canal gates are already in place in Morocco, Iran, Iraq, and Pakistan. But there is still potential for improvement.

Averting a water crisis is a massive undertaking that will require ***a combination of conservation, new technology, and cooperation*** among competing interests. Contaminated water will have to be cleaned up, while further pollution is reduced. And, new sources of water will need to be found if the constantly growing demand for suitable water for drinking, farming, and industry is to be met.

Text 3. WATER(LESS) WORLD: H_2O USE AROUND THE WORLD

Approximately 71 percent of the Earth's surface is covered with water. Yet, by all accounts, the world is on the verge of a water crisis. What exactly that water crisis entails, or when it will hit, depends on what part of the world you're looking at. In drought-plagued regions, such as Zimbabwe, Mauritania, and the western United States, the water crisis has already begun.

"At this point in time, the water crisis isn't global, but there are pockets of crisis," said Hugh Turral, a theme leader and principal researcher for the International Water Management Institute in Colombo, Sri-Lanka. "Right now, in most parts of the world, the crisis is one of governance.

Long-term, there will be problems with scarcity around the world.

In its first World Water Development Report, Water for People, Water for Life, the United Nations

concurred, stating: "Attitude and behavior problems lie at the heart of the crisis. Inertia at leadership level and a world population not fully aware of the scald of the problem means we fail to take the needed timely corrective actions." The World Water Development Report was produced by the World Water Assessment Programme, whose secretariat is hosted by UNESCO.

"Of all the social and natural crises we humans face, the water crisis is the one that lies at the heart of our survival and that of our planet Earth," said UNESCO's director-general, Koichiro Matsuura, in a prepared statement. "No region will be spared from the impact of this crisis, which touches every facet of life, from the health of children to the ability of nations to secure food for their citizens."

Though water is indeed a renewable resource, to a certain extent it is also a finite one. Only 2.53 percent of the Earth's water is fresh, and some two-thirds of that is locked up in glaciers and permanent snow cover. Regionally, the distribution of that water is far from equitable. Asia is particularly hard hit, with just 36 percent of the world's water resources supporting 60 percent of the world's population, according to the UN's World Water Report. Africa, though it has just 11 percent of the world's available fresh water, has a better balance since it has 13 percent of the world's population.

Freshwater resources are reduced by pollution. The UN report estimates that some 2 million tons of waste per day are disposed of within waters. This waste includes industrial trash and chemicals, human waste, and agricultural runoff, such as fertilizers, pesticides, and pesticide residue.

The World Water Report estimates that global wastewater production is roughly 1,500 cubic kilometers per year. Assuming that I liter of wastewater pollutes about 8 liters of freshwater, the present burden of water pollution may be as high as 12,000 km^3. The UNO estimates that 50 percent of the population of developing countries depends on polluted water sources.

Factoring in the availability of fresh water, current rates of pollution, and the potential for climate change — including a trend toward more frequent extreme weather conditions, such as floods and droughts — the World Water Report predicts that by the middle of this century, at worst, 7 billion people in 60 countries will be short of water; at best, 2 billion people in 48 countries will suffer shortages.

While water shortages are not widespread at the present time, a large percentage of the world's population lacks access to safe drinking water. Currently, 1.1 billion people lack access to an "improved" water supply (defined as water that has been at least marginally treated to remove chemical or biological contaminants). Some 2.4 billion people lack access to adequate sanitation.

UNIT III. Water Supply Systems

"If there is magic on this planet, it is contained in water." Loran Eisely, The Immense Journey, 1957

WARMING-UP

1. Study the following table paying attention to the meanings of the term "water supply". Use the tips below. Make up sentences of your own using the term "water supply" in its various meanings.

In the English language, ***"water supply"*** is a broad term which may have the following definitions:

WATER SUPPLY

1. water storage or sufficiency [availability] of water for a community or region; the water available for a community

2. the supply [delivery] of treated and purified water for a community

3. the delivery system of such water (a complex of reservoirs, purifica-tion plants, distribution pipes, etc., for providing water to a community)

4. water resources (water of rivers, lakes, reservoirs, seas and oceans, as well as groundwater, soil moisture, water (ice) of glaciers, icecap and snow cover which is suitable for use in economy)

The proper Russian equivalents for the term ***"water supply"*** are: ► водообеспеченность
► запас воды
► водоснабжение, снабжение водой ► водоподача, подача воды
► водопровод
► водные ресурсы

VOCABULARY WORK

2. Read the following international words and guess their meaning. Mind the stressed syllables. Prove that these words are international ones.

Model: sedimentation ə **седиментация**, образование осадка, выпадение осадка, оседание; отстаивание; осаждение, осаждение отстаиванием

3. Translate the following words and phrases and memorize them.

Nouns and noun phrases	
abundance	heating
apparatus	layout
appurtenance	mismatch
arrangement	undertaking
elimination	water source
fittings	water supply
fixture	
Verbs and verbal phrases	
to be aimed at	to obtain

to be designed for	to pump
to be situated	to represent
to carry out	to serve
Adjectives and Participles	
available	sufficient
elevated	treated
palatable	undesirable
pure	wholesome

4. Study your topical vocabulary and memorize the new terms.

- **availability [sufficiency] of water** водообеспеченность
- **collecting system** канализационная система
- **drainage system** канализационная сеть; система сбора сточных вод; дренажная система [сеть]
- **drainage** дренаж; дренажная система; дренирование, осушение; слив, сток; канализация
- **main line** главный [магистральный] трубопровод
- **pipeline** трубопровод
- **piping** трубопровод; система труб; система [сеть] трубопроводов; прокладка трубопровода; подача по трубопроводу; *pl*. трубы
- **plumbing fixture** водопроводная арматура; санитарно-техническое оборудование
- **plumbing system** внутридомовая система водоснабжения, газоснабжения и канализации; водопроводно-канализационная сеть здания; инженерное оборудование зданий, сантехника
- **plumbing** водопровод, водопроводная система; водопроводно-канализационная сеть *(здания)*; сантехническое оборудование
- **sanitary piping** канализация
- **sanitation** канализация; ассенизация; санитария; улучшение санитарных условий
- **secondary main** трубопровод второго подъема
- **service main** служебный трубопровод
- **service reservoir** буферное наливное водохранилище
- **sewage system** система канализации, канализационная система
- **sewage treatment plant** завод [установка] по переработке сточных вод, станция аэрации
- **sewage treatment works** сооружения по очистке сточных вод
- **sewer system** канализационная система
- **sewer(age) network** канализационная сеть
- **sewerage system** система канализации, канализационная система; система трубопроводов и туннелей для сбора и транс-портировки сточных вод до станций аэрации
- **sewerage** канализация, канализационная система; наруж-ная канализационная система; система сбора, обработки и сброса сточных вод
- **storage tank** бак-хранилище, резервуар-хранилище
- **sufficiency of water** водообеспеченность
- **trunk main** главная, основная магистраль
- **wastewater treatment plant** водоочистная станция, станция водоочистки
- **wastewater treatment works** станция очистки сточных вод, водоочистная станция, станция водоочистки
- **water accumulation** накопление воды
- **water acquisition [collection]** сбор [добывание, получе-ние] воды, водосбор
- **water conservation** сохранение воды; накопление воды; охрана водных ресурсов
- **water distribution system** система водораспределения [распределения воды]; система водоснабжения
- **water distribution** распределение воды
- **water main** водопроводная магистраль; магистральный водопровод
- **water purification [treatment]** обработка воды, очистка воды
- **water storage** хранение воды; запас воды, аккумулирова-ние воды; водные запасы; водные ресурсы
- **water storage facility** водохранилище
- **water supply network [system]** система водоснабжения; водопровод

- **water tower** водонапорная башня
- **water transmission [transportation]** подача воды, водоподача; транспортирование воды

5. Match the English and Russian equivalents.

1. complex of activities 2. complex of engineering structures 3. adequate quantity 4. adequate supply 5. firefighting equipment 6. industrial enterprise 7. inland lakes or rivers 8. maintenance 9. populated locality 10. rural area 11. sewage disposal 12. specific conditions 13. to flow by gravity	a. внутренние озера или реки b. воспользоваться *чем-л.*, использовать в своих интересах, с выгодой для себя c. достаточное количество d. достаточный запас e. компания водоснабжения, водопроводная компания f. комплекс инженерных сооружений g. конкретные условия h. населенный пункт i. поддержание; сохранение; содержание и техническое обслуживание, уход; содержание в исправности; текущий ремонт; эксплуатация
14. to take advantage of 15. water company	j. промышленное предприятие k. противопожарное вооружение l. сельская местность, сельский район m. совокупность мероприятий n. течь самотеком o. удаление [сброс] сточных вод

6. Match the terms and their definitions.

accomplish, elaborate, engineered, fittings, fixture, main, sewerage, supply, water purification

a. a piece of equipment that is fixed in position in a building
b. a principal pipe carrying water or gas to buildings, or taking sew-age from them
c. a stock of a resource from which a person or place can be provided with the necessary quantity of that resource
d. achieve or complete successfully
e. any of several processes in which undesirable impurities in water are removed or neutralized
f. designed, developed, constructed
g. involving many carefully arranged parts or details; detailed and complicated in design and planning
h. small parts attached to a piece of equipment *i.* the provision of drainage by sewers

7. Make sure you know the words and word combinations from the box and insert them into the sentences.

contamination, treatment, demand, supply of water, water sources, sewage disposal systems, methods, disastrous

The importance of a sufficient _____ for domestic and industrial purpose has long been a deciding factor in the location of cities. Early people realized this need and took advantage of natural _____ by establishing their settlements in close proximity to them.

As man`s communities grew on population, the _____ for water in-creased and the need for protection of the source of water increased and the need for protection of the source of water supply against the possibility of _____ became evident. Progress and civilization have called for elaborate and various systems and _____ of water treatment.

Today water may be taken from any sources of water for human consumption after it has undergone a preliminary _____ to assure its purity.

Man uses water for domestic and sanitary purposes and returns it to the source through _____ . Industry likewise replaces water diverted to its use. Hence the cycle is completed but it is of prime importance that the

supply be protected against pollution, for if it fouls no one can predict how _____ may be the results.

8. Translate the following sentences into Russian paying attention to the underlined words that can be verbs, nouns or adjectives with-out changing their form and adding suffixes.

1. underground pipe; drain pipe; water pipe; these pipes contain ei-ther hot water or steam; town water is piped into the more modern build-ings; water from the lakes is piped to several towns
2. underground channels; underground sources; underground pipe; underground pipeline; miners work underground
3. to consist of several components; component part 4. individual buildings; private individual
5. trunk main; secondary main; sewer main; water main; main water (водопроводная вода); a water main is a main line in a water supply system
6. to establish / set a standard; high standard; standard size 7. early people; early in the morning
8. usual term of transportation; the term "water supply"; such a sys-tem of pipes and fittings is termed *plumbing*
9. to service the whole area; to service the equipment; have this equip-ment serviced regularly; to offer / give / provide service; a service main
10. the occurrence of leaks and breaks; to check the pipes for leaks; a water leak; to leak like a sieve; water leaked into the basement; water was leaking from the pipe; a leaking gutter; the machine has broken
11. sewer system; sewer main (канализация); trunk sewer (маги-стральный канализационный коллектор); sanitary sewer (санитарный коллектор); to sewer a building

Now fill in the table with Russian equivalents to the words from the sentences above.

component, early, individual, leak, main, pipe, service, sewer, stand-ard, term, underground

	NOUN	VERB	ADJECTIVE	ADVERB
break	разрушение; поломка	ломать(ся), разбивать(ся)	---	---

READING PRACTICE

9. Answer the following questions and read the text carefully to check your answers.

What is the difference between water supply and a water supply system? What does water supply include?

Text A Water Supply Systems

"Children of a culture born in a water-rich environment, we have never really learned how important water is to us. We understand it, but we do not respect it."
William Ashworth, Nor Any Drop to Drink, 1982

An adequate supply of pure, wholesome and palatable water is essential to the maintenance of high standards of health and life and to provide the convenience modern society demands. So, the importance of a sufficient supply of water for domestic and industrial purposes has long been a deciding factor in the location of settlements, towns and cities. Even early people realized this need and took advantage of natural water sources.

In some regions water is available in unlimited quantities and converting it to use is not a difficult problem. This is especially true of populated localities which are situated on large inland lakes or rivers. However, there are towns and cities whose geographical location requires elaborate ***systems of water supply***, and providing a satisfactory supply of water in these inhabited localities becomes a serious engineering task.

Water supply is a complex of activities intended for the provision of various consumers (community, industrial enterprises, transport) with water. The term may also refer to the supply of water provided in this way.

A ***water supply system,*** or ***water supply network,*** is a complex of engineering structures or a system of engineered hydrologic and hydraulic components which are aimed at providing water supply for various water uses. These structures carry out the supply of water including *acquisition* of water from a variety of natural

water sources, its *treatment*, *transmission*, *storage*, and *distribution* to the consumers. A water supply system is arrangements for transporting water from areas of abundance to an area of shortage.

1. Water acquisition is collection of water from a variety of natural water sources (both surface and underground ones).

2. Water treatment is purification of water to make it suitable for human consumption or for any other purpose. It is any of several processes (or their combination) in which undesirable impurities or pollutants are removed or neutralized. Water treatment is accomplished at various water treatment facilities. Conventional water treatment processes include coagulation and flocculation, sedimentation and flotation, filtration, disinfection, as well as some additional treatment methods (softening, aeration, carbon adsorption, distillation, deferrization, desalination, fluoridation, reverse osmosis).

3. Water transmission is transportation of water over long distances, especially in those areas where there is a significant mismatch between water supply and water demand.

4. Water storage is conservation of water in a variety of water storage facilities for future use.

5. A water distribution system is an elaborate network of pumps, pipelines, storage tanks, and other appurtenances. It must deliver adequate quantities of water at pressures sufficient for operating plumbing fixtures and firefighting equipment, yet it must not deliver water at such high pressures as to increase the occurrence of leaks and pipeline breaks.

In general, ***water supply*** can be represented as the following ***scheme***:

water acquisition [collection] ➔ water storage ➔ water treatment [purification] ➔ water distribution ➔ water consumption ➔ wastewater [sewage] dis-posal

Pict. 7. The General Scheme of Water Supply

Water supply systems get water from a variety of sources. ***Water sources*** include:

1. underground sources (groundwater from aquifers, artesian water); ***2. surface water*** (water from rivers, lakes, reservoirs, as well as seas through desalination);

3. water accumulation and conservation.

The water is then, in most cases, purified, disinfected through chlorination and sometimes fluoridated. Treated water then either flows by gravity or is pumped to reservoirs which can be elevated (*e.g.* water towers) or can be on the ground.

Having been treated, water is to be distributed to all the water consumers served by the area water undertaking. Methods of ***water distribution*** vary. For towns and cities, water companies treat water collected from wells, lakes, rivers, and ponds and distribute it to individual buildings. In rural areas water is commonly obtained directly from wells.

The construction and maintenance of a ***water distribution system*** for a large city is a complex operation since there must be at least one water main in each street. A ***water main*** is a main line in a water supply system.

The layout of water mains is greatly dependent on local conditions and topography.

Water mains can be divided into three classes:

1. a trunk main is the main supply line between the treatment plant and service reservoirs or water towers.

2. a secondary main is a supply line distributing water from the ser-vice reservoirs to the street service mains. In some cases they provide supplies to large industrial consumers.

3. service mains are the pipes along each street to which individual consumers are connected.

Once water is used, wastewater is typically discharged into ***sewerage*** and treated in a ***wastewater treatment plant*** (also called a ***sewage treat-ment works***) before being discharged into a river, lake or the sea or re-used for landscaping, irrigation or industrial use.

Sewerage (also called a ***sewerage system,*** a ***sewage system,*** a ***sewer system,*** a ***collecting system, drainage, sanitary piping)*** is intended for the provision of drainage (sewage disposal) by sewers.

A ***sewerage network*** (also called ***a sewer network*** or ***a drainage sys-tem***) is a part of the sewerage system; it is a complex of underground pipes (pipelines) and sewers for the collection and disposal of sewage from populated localities and industrial enterprises to the sewage treat-ment works.

Plumbing [a plumbing system] is installed in a building and designed for the supply of water and the elimination of wastes. It is the system of pipes, tanks, fittings, and other apparatuses required for the water supply, heating and sanitation in a building.

The general scheme of water supply may vary depending on specific conditions.

COMPREHENSION CHECK

10. Decide whether the following statements are true (T) or false (F) according to the text. Correct the false statements.

1. The English term “water supply” has several meanings.
2. The presence of water supply systems has long been a deciding factor in the location of settlements, towns and cities.
3. Providing some regions where water is available in unlimited quantities with a satisfactory supply of water becomes a serious engi-neering task.
4. Every town and city in the world needs elaborate water supply systems.
5. Water supply is a complex of engineering structures intended for the provision of various consumers with water.
6. A water supply system is a complex of activities aimed at the pro-vision of water to various consumers and for various water uses.
7. Water supply is the same as a water supply system.
8. The terms “a water supply system” and “a water supply network” are synonymous.
9. Water supply systems carry out the supply of water including ac-quisition of water from a variety of natural water sources, its treatment, transmission, storage, and distribution to the consumers.
10. Water acquisition is storage of water in a variety of natural water sources.
11. Natural water sources include both underground and surface ones. 12. The aim of water treatment is to make water suitable for human consumption or for any other purpose.
13. Water purification is accomplished at various sewage treatment facilities.
14. Water treatment is necessarily a combination of several processes in which undesirable impurities or pollutants are removed or neutralized.
15. A significant mismatch between water supply and water demand in an area requires transportation of water over long distances.
16. Water distribution systems must deliver adequate quantities of water at pressures sufficient for operating plumbing fixtures.
17. Water for any use is filtered, aerated, purified, disinfected with chlorine, ozone or ultraviolet, and fluoridated.
18. There are various methods of water distribution.
19. Water companies always treat water collected from natural water sources and distribute it to water users both in urban and rural areas.
20. There must be at least one water main in each city.
21. The layout of water mains depends on local conditions and topography.
22. Water mains can be divided into three classes: trunk mains, secondary mains and service mains.
23. Treated water is usually discharged into a sewerage system. 24. Sewage is treated in a sewage treatment plant.
25. Treated water is used for landscaping or irrigation. 26. A sewerage system is a part of the sewerage network.
27. Plumbing is a complex of underground pipes (pipelines) and sewers for the collection and disposal of sewage from populated localities and industrial enterprises to the sewage treatment works.
28. The general scheme of water supply does not depend on specific conditions.

11. Choose the right variant according to the text.

1. An adequate supply of pure, wholesome and palatable water … a. is especially true of towns situated on large inland lakes or rivers. b. is essential for the maintenance of high standards of health.
c. may be taken from any source of water.
d. should be protected from contamination by filtration. **2. There are cities whose geographical location …**
a. makes water pass through an elaborate cycle of treatment. b. requires elaborate systems of water supply.
c. makes the problem of water supply very difficult. d. calls for modern systems of water treatment.
3. The geographic location of some towns and cities requires … . a. the removal of undesirable

impurities at various water treatment facilities

b. the application of additional water treatment methods c. elaborate water supply systems

d. transporting water from areas of shortage to an area of abundance

4. Even early people took advantage of natural water sources by … a. building water power stations on them.

b. establishing their settlements near them.

c. providing sufficient water supply for their needs. d. using water without much preliminary treatment. **5. A water supply system is a complex of … .**

a. engineers

b. engineering structures

c. hydrology and hydraulics d. water purification plants

6. Too high pressures in a water distribution system increase the occurrence of … .

a. undesirable impurities and pollutants

b. coagulation, sedimentation, filtration and disinfection

c. a significant mismatch between water supply and water demand d. leaks and pipeline breaks

12. Match 1-13 to a-m to form complete sentences.

1. Water supply … 2. A water supply system, or water supply network, … 3. Water acquisition … 4. Water treatment … 5. Conventional water treatment processes … 6. Water transmission … 7. Water storage … 8. A water distribution system … 9. Water sources … 10. A water main … 11. A trunk main … 12. A secondary main … 13. Service mains …	a. … are the pipes along each street to which individual consumers are connected. b. … include coagulation and flocculation, sedimentation and flotation, filtration, disinfection, as well as some additional treatment methods. c. … include underground and surface sources, as well as water accumulation and conservation. d. … is a complex of activities intended for the provision of various consumers with water. e. … is a complex of engineering structures aimed at providing water supply for various water uses. f. … is a main line in a water supply system. g. … is a supply line distributing water from the service reservoirs to the street service mains. h. … is an elaborate network of pumps, pipelines, storage tanks, and other appurtenances aimed at delivering adequate quantities of water. i. … is collection of water from a variety of natural water sources. j. … is conservation of water in a variety of water storage facilities for future use. k. … is purification of water to make it suitable for human consumption or for any other purpose. l. … is the main supply line between the treatment plant and service reservoirs or water towers. m. … is transportation of water over long distances.

13. Find key words and phrases which best express the general meaning of each paragraph.

14. What parts of the text can you define? Do they correspond to the paragraph? Entitle each part.

1. _____
2. _____
3. _____
… _____

15. Write a summary of the text.

LANGUAGE FOCUS

16. Match the synonyms.

1. carry out	a. aggregate
2. combination	b. appurtenance/apparatus
3. commonly	c. back
4. complex	d. comfort

5. convenience
6. conventional
7. elevated
8. equipment
9. fixture
10. fluoridation
11. install
12. layout
13. location
14. main
15. pipeline
16. reverse
17. undertaking
18. wholesome

e. enterprise
f. facilities
g. fluorination
h. fulfill
i. generally/usually
j. healthsome
k. mixture
l. mount
m. overground
n. piping
o. placement
p. principal
q. scheme/plan
r. traditional

17. Match the antonyms.

1. abundance
2. connect
3. conventional
4. divide
5. early
6. healthy
7. high
8. including
9. limited
10. populated
11. salinization
12. satisfactory
13. softening
14. underground
15. untreated

a. desalination
b. detrimental
c. excluding
d. hardening
e. late
f. low
g. overground
h. separate
i. shortage
j. treated
k. unconventional
l. unite
m. unlimited
n. unpopulated
o. unsatisfactor

18. Fill in the table with the derivatives.

Noun	Verb	Adjective	Adverb
…	…	…	…

Distribution, storage, mismatch, complex, advantage, locality, vari-ous, location, undesirable, conventional, fixture, variety, elaborate, equipment, structure, desalination, company, maintenance, sufficient, arrangement, abundance, shortage, purify, disinfect, chlorinate, fluori-date, pump, individual, component, main, dependent, typically, appa-ratus, sewerage, sewage, sanitary, disposal, discharge, high, even, under-ground, neutralize, accomplish, distil, vary, especially.

19. Form the nouns from the following verbs.

to accomplish
➔ to accumulate
➔ to acquire
➔ to arrange
➔ to break ➔
to collect
➔ to connect
➔ to conserve
➔ to deliver
➔ to demand
➔ to discharge
➔ to dispose
➔

to distribute
➔ to eliminate
➔ to fit ➔
to install
➔ to intend
➔ to leak
➔ to locate
➔
to maintain
➔ to neutralize
➔ to plumb
➔ to provide
➔ to pump ➔

to purify
➔ to remove
➔ to service
➔ to settle
➔ to situate
➔ to store
➔ to supply
➔ to transmit
➔ to transport
➔ to treat ➔
to vary ➔
to undertake ➔

20. Read the following text and determine which of the under-lined word-combinations are "stone wall" constructions.

Britain's Water Supply

Britain's water supplies are obtained partly from surface sources such as mountain lakes, streams impounded in upland gathering grounds and river intakes, and partly from underground sources by means of wells, adits and boreholes.

Such is the present demand for water in Britain that the reuse of water is being constantly extended. Two-thirds of London's water comes out of the River Thames for purification. At this point the river has already been through the sewage system of several Thames valley towns. York, for example, drinks water out of the River Ouse, after its tributaries have drained a number of the county's towns. Nottingham takes water from the Derwent. Rivers provide most of Britain's water supply, and in in-land communities they rake back most of the waste from human bodies, households and factories.

Modern methods of water purification and the capacity of rivers for self-purification make possible water reuse, and where water is in short supply, second-hand water is regularly drunk and so far without ill effect.

21. Translate the following text into English using the vocabulary of the text.

1. **Водоснабжение** – совокупность мероприятий по обеспечению водой различных потребителей – населения, промышленных предприятий, транспорта и др.

2. Комплекс инженерных сооружений и устройств, осуществляющих водоснабжение (т. е. получение воды из природных источников, ее очистку, транспортирование и подачу потребителям), называется **системой водоснабжения**, или **водопроводом**.

3. **Система водоснабжения** представляет собой комплекс сооружений для обеспечения определенной группы потребителей водой в требуемых количествах и требуемого качества. Кроме того, система водоснабжения должна обладать определенной степенью надежности, т. е. обеспечивать снабжение потребителей водой без недопустимого снижения установленных показателей своей работы в отношении количества или качества подаваемой воды.

4. В зависимости от назначения обслуживаемых объектов современные водопроводы подразделяются на **коммунальные** и **производственные** (промышленные или сельскохозяйственные).

5. Наиболее крупные **потребители воды** — предприятия металлургической, химической, нефтеперерабатывающей промышленности, а также ТЭС.

SPEAKING PRACTICE

22. Develop the following statement in 3-4 sentences.

However, there are inhabited localities where water supply becomes a serious engineering task.

23. Disprove the following statement in 3-4 sentences.

Water is available in unlimited quantities in all parts of the world.

24. Get ready to speak about water supply and water supply systems.

VOCABULARY WORK

25. Read the following international words and guess their mean-ing. Mind the stressed syllables. Prove that these words are interna-tional ones.

Model: infrastructure ə ə **инфраструктура** (промышленная, городская); сети обслуживания населения; инженерные коммуникации

26. Translate the following words and phrases and memorize them.

Nouns and noun phrases	
accessory	infrastructure
cistern	ion exchange
component	preservation
facility	water pressure
fire hydrant	watershed
Verbs and verbal phrases	
to add	to interfere with
to aerate	to maintain
to consist of	to prevent
to convey	to reach
to disinfect	to reserve
to draw *smth*. from	to soften
to filter	to vary
to integrate	
Prepositions	
depending on	in addition to

27. Study your topical vocabulary and memorize the new terms.

- **(water-)pumping station** насосная станция; насосная установка; водокачка
- **accumulator tank** сборный резервуар
- **aqueduct** акведук; водопровод; мост-водовод; водопроводящее сооружение; магистральный водо-провод
- **collecting [collection] tank** сборный резервуар
- **conduit** труба, трубопровод; акведук; водовод; канал
- **distribution piping** сеть распределительных трубопроводов; система распределительных трубопроводов
- **distribution reservoir** буферное водохранилище; распре-делительный бассейн
- **main** главный канал; трубопровод; водопроводная магистраль; магистральный водопровод; *pl*. водопроводная сеть; система трубопроводов; линии энерго-, тепло-, газо- и водоснабжения; коммуникации
- **main pipeline** магистральный трубопровод ▪ **pipe network** водопровод
- **pipeline tank** сборный резервуар
- **pressure vessel** сосуд под давлением; резервуар под давлением
- **pumping plant** насосная установка; насосная станция ▪ **storage facility** водохранилище
- **underground pipeline** подземный трубопровод; заглубленный трубопровод
- **water (supply) facilities** водохозяйственные сооружения; система водоснабжения
- **water conduit** водопровод

- **water intake** водозаборное сооружение, водозабор; водоприёмник
- **water main** водопроводная сеть
- **water tank** ёмкость для воды; цистерна для воды; водяной бак
- **waterworks** водопроводная станция; водопроводное сооружение; водохозяйственная система; водонапорная станция

28. Match the English and Russian equivalents.

1. capital equipment 2. dissolved gas 3. previously listed 4. residential apartment buildings and private houses 5. tooth decay 6. ultraviolet light 7. usage point 8. water pressurizing components	a. вышеперечисленный b. жилые здания [многоквартирные дома] и одноквартирные дома c. капитальное [основное] оборудование *(оборудование, приобретенное организацией для использования в своей хозяйственной деятельности в течение длительного периода)* d. компоненты, служащие для поддержания давления воды e. место использования f. разрушение зубов g. растворенный газ h. ультрафиолетовое излучение, УФ-излучение

29. Match the terms and their definitions.

(1)

aerate, aqueduct, component, infrastructure, ion, ozone, pipeline, pump, raw

a. (of a material or substance) in its natural state; not yet processed or purified

b. a colorless unstable toxic gas with a pungent odor and powerful oxidizing properties, formed from oxygen by electrical discharges or ultraviolet light. It differs from normal oxygen (O_2) in having three atoms in its molecule (O_3)

c. a long pipe, typically underground, for conveying oil, gas, *etc*., over long distances

d. a mechanical device using suction or pressure to raise or move liquids, compress gases, or force air into inflatable objects such as tyres

e. a part or element of a larger whole

f. an artificial channel for conveying water, typically in the form of a bridge supported by tall columns across a valley

g. an isolated electron or positron or an atom or molecule which by loss or gain of one or more electrons has acquired a net electric charge (результирующий электрический заряд)

h. introduce air into (a material)

i. the basic physical and organizational structures and facilities (*e.g.*, buildings, roads, and power supplies) needed for the operation of a society or enterprise

(2)

aquifer, lake, ocean, pool/pond, reservoir, river, sea, spring, stream, well

a. a body of permeable rock that can contain or transmit groundwater *b.* a large body of water surrounded by land

c. a large natural or artificial lake used as a source of water supply

d. a large natural stream of water flowing in a channel to the sea, a lake, or another such stream

e. a place where water or oil wells up from an underground source, or the basin or flow formed in such a way

f. a shaft sunk into the ground to obtain water, oil, or gas *g.* a small area of still water, typically one formed naturally *h.* a small, narrow river

i. a very large expanse of sea, in particular, each of the main areas into which the sea is divided geographically

j. the expanse of salt water that covers most of the earth's surface and surrounds its landmasses

30. Make sure you know the words and word combinations from the box and insert them into the sentences.

conduit, distribution system, reservoir, treatment plant, well

A water-supply system consists essentially of the following elements: ▪ a source of supply which may be a lake, stream, spring, or _____;

- a _____ for storing water for use during periods when demand is greater than the daily flow of water;
- conveying the water from the source of supply to the community is accomplished by means of a pipe line or a _____;
- removing impurities from the water to make it suitable for use re-quires a _____;
- a _____ of pipes is used for delivering the water throughout the various streets of the community.

31. Translate the following sentences into Russian paying atten-tion to the underlined words that can be verbs, nouns or adjectives without changing their form and adding suffixes.

1. water tank; tank capacity; to tank a liquid
2. capital equipment; to invest capital; world capitals
3. main pipeline; underground pipeline; to pipeline water
4. a complete water supply system; complete period of time; to com-plete work
5. to reserve extra water; limited reserve; Australia has major coal, gas, and uranium reserves
6. to filter water; to pass through a filter; the solids were filtered out and only the liquid passed into the container
7. ion exchange; the exchange of ions; in exchange for *smth*; to ex-change opinions
8. tooth decay; the odour of decaying vegetation

Now fill in the table with Russian equivalents to the words from the sentences above.

capital, complete, decay, exchange, filter, pipeline, reserve

	NOUN	**VERB**	**ADJECTIVE**
tank	бак, резервуар, цистерна	наливать в бак; хранить в баке	---

READING PRACTICE

32. Read the text carefully.

Text B The Main Components and Facilities of a Water Supply System

A water supply system typically consists of the following ***compo-nents***:

1. a watershed or ***geographic area that collects water***;

2. a source of supply, or ***a reservoir of raw (untreated) water*** (above or below ground) where the water accumulates (*e.g.* a lake, river, stream, spring, well, groundwater from an underground aquifer);

3. a reservoir for storing the water for use during periods when de-mand is greater than the daily consumption of water;

4. an underground pipeline or ***a ground-level conduit (an aqueduct)*** for conveying the water from the source

of supply to the community;

5. water treatment facilities (also called “water treatment plants [sta-tions/ works]” or “water purification plants [stations / works]”) and

6. wastewater treatment facilities (also called “wastewater treat-ment plants [stations / works]”, “sewage treatment plants [stations / works]”) for removing impurities from the untreated water to make it suitable for various uses;

7. a pipe network (a distribution system of pipes, usually under-ground) for delivering the treated water to the consumers (which may be residential apartment buildings and private houses, industrial and commercial establishments, educational and medical institutions) and other usage points (such as fire hydrants);

8. water storage facilities (reservoirs, water tanks, or water towers for larger water systems; cisterns or pressure vessels for smaller water systems). Tall buildings may also need to store water locally in pressure vessels in order for the water to reach the upper floors.

Some systems are simpler and consist only of a source of supply, a main pipeline, and a small number of distribution piping; others are more complicated and include, in addition to elements previously listed, distribution reservoirs, additional water pressurizing components (pumping plants / stations), and other accessories.

All these water supply system components are integrated into ***water infrastructure*** - the stock of basic water facilities and capital equipment needed for the functioning of a country or area.

For the purposes of acquisition of water from a variety of natural wa-ter sources, its treatment, transmission, storage, and distribution to the consumers a number of ***water supply facilities*** are utilized:

- ***water intake structures [facilities];***
- ***water-pumping facilities [stations / plants]*** supplying water to the point of its treatment;
- ***water treatment facilities [structures/stations/plants/works]***, also called ***water purification facilities [structures/stations/plants/works]***;
- ***collection [collecting / accumulator/pipeline] tanks*** for purified water;
- ***water-pumping facilities [stations / plants]*** supplying the purified water to towns, cities or industrial enterprises;
- ***water conduits, aqueducts***, and ***water mains [water-supply net-works]*** serving for water delivery to the consumers;
- ***plumbing [plumbing systems]*** installed in a building and designed for the supply of water and the elimination of wastes.

A complete water supply system is known as a ***waterworks***. Some-times this term is specifically applied to pumping stations, treatment sta-tions, or storage facilities. Storage facilities are provided to reserve extra water for use when demand is high and, when necessary, to help main-tain water pressure. Treatment stations are places in which water may be filtered to remove suspended impurities, aerated to remove dissolved gases, or disinfected with chlorine, ozone, ultraviolet light, or some other agent that kills harmful bacteria and microorganisms. Sometimes hard water is softened through ion exchange by which dissolved calcium and magnesium salts are replaced by sodium salts which do not interfere with soap. Salts of iodine and fluorine which are considered helpful in pre-venting goiter and tooth decay are sometimes added to water in which they are lacking.

Not all water supply systems are used to deliver drinking water. Sys-tems used for purposes such as industry, irrigation and fire fighting oper-ate in much the same way as systems for drinking water, but the water need not meet such high standards of purity. In most municipal systems hydrants are connected to the drinking water system except during peri-ods of extreme water shortage. Because many cities draw water from the same water body into which they discharge sewage, proper sewage treatment has become increasingly essential to the preservation of sup-plies of useful water.

COMPREHENSION CHECK

33. Decide whether the following statements are true (T) or false (F) according to the text. Correct the false statements.

1. A watershed, a source of water supply, a reservoir for storing the water, a pipeline or an aqueduct, water or wastewater treatment facilities, a distribution pipe system, as well as water storage facilities are the main components of a water supply system.
2. Simpler water supply systems consist of a source of supply, a main pipeline, as well as additional water pressurizing components (pumping stations).
3. All water supply system components are integrated into water infrastructure.

4. Water supply facilities include water intake structures, water-pumping stations, water treatment plants, collection tanks, water conduits, aqueducts, water mains, as well as plumbing.

5. Water-pumping stations can vary according to their purpose.

6. Plumbing is designed for the supply of water and the elimination of wastes in a village, town or city.

7. A waterworks is not only pumping stations, treatment plants, or storage facilities, but also the whole water supply system.

8. Sometimes hard water is softened through ion exchange by which dissolved calcium and magnesium salts replace sodium salts.

9. Salts of iodine and fluorine are considered helpful in water softening. 10.Water supply systems used for purposes such as industry, irrigation and fire fighting operate in much the same way as systems for drinking water.

11.Water for irrigation or fire fighting needn't meet such high standards of purity as drinking water.

12.Cities never draw water from the same water body into which they discharge sewage.

13.Proper sewage treatment has become increasingly essential to the preservation of supplies of useful water because many cities draw water from the same water body into which they discharge sewage.

34. Answer the following questions.

1. What components does a water supply system typically consist of? 2. What is water infrastructure?
3. What purposes are water supply facilities utilized for? 4. What are these water supply facilities?
5. What is a waterworks?
6. What are water treatment stations intended for?
7. Are water supply systems used to deliver only drinking water? 8. Why is proper sewage treatment of vital importance?

35. Choose the right variant according to the text.

1. Sources of water, or reservoirs of raw water are … . ***(several answers possible)***
a. lakes, rivers, streams and springs
b. underground pipelines and ground-level conduits (aqueducts) c. underground aquifers
d. reservoirs, water tanks and water towers
2. Underground pipelines and ground-level conduits (aqueducts) are intended for … .
a. conveying water from the source of supply to water consumers b. removing impurities from untreated water
c. making water suitable for various uses d. storing water for future use
3. Water and wastewater treatment facilities are intended for … . a. water collection
b. water storage c. water delivery
d. impurity removal
4. … are water consumers. ***(several answers possible)*** a. residential apartments and private houses
b. industrial and commercial establishments
c. water purification works and wastewater treatment plants d. educational and medical institutions
5. All water supply system … are integrated into water infra-structure.
a. buildings
b. components

36. Find key words and phrases which best express the general meaning of each paragraph.

37. What parts of the text can you define? Do they correspond to the paragraph? Entitle each part.
1. _____
2. _____
3. _____
… _____

38. Write a summary of the text.

SPEAKING PRACTICE

39. Make a list of the basic water supply system facilities and de-scribe their purpose and functioning in brief.

40. Get ready to speak about the main components and facilities of water supply systems.

VOCABULARY WORK

41. Translate the following words and phrases and memorize them.

Nouns and noun phrases	
aim	emergency
commercial activities	implementation
cooling	industrial activities
dampening	municipal services
dispersal	scouring
drought	steam power
earthquake	waste material
Verbs and verbal phrases	
to be called	to exceed
to be subdivided into	to hire
to degrade	to service
to dig	to supply
to dissipate	
Prepositions	
as opposed to	in exchange for
Conjunctions	
as well as	either … or …

42. Study your topical vocabulary and memorize the new terms.

commercial water supply водоснабжение на коммерческой основе; водоснабжение предприятий торговли

- **domestic water supply** коммунально-бытовое водоснабжение
- **domestic water use** коммунально-бытовое водопо-требление; водопотребление коммунально-бытового водоснабжения
- **industrial water supply** промышленное [производственное] водоснабжение
- **industrial water use** промышленное водопотребление
- **irrigation water supply** водоподача на орошение
- **irrigation water use** водопотребление орошения
- **public water supply** коммунальное водоснабжение

43. Match the English and Russian equivalents.

1. bran muffins 2. industrial water usage [consumption] 3. Jack the Caveman 4. local resident 5. machine-building industry 6. manufactured goods 7. oil-refining and petrochemical industry 8. public-service 9. public-supply water systems 10. self-supplied domestic water withdrawals 11. thermal power station 12. to turn on the tap 13. water supply organization [utility]	a. водохозяйственная организация, предприятие коммунального водоснабжения, компании водоснабжения общего пользования b. коммунальный *(связанный со снабжением населения электричеством, водой, газом и т.п.);* компания общественного обслуживания *(по снабжению газом, электроэнергией, водой)* c. машиностроение d. местный житель e. нефтеперерабатывающая и нефтехимическая промышленность f. оладьи из отрубей g. отбор воды для бытовых нужд из природного источника h. открывать водопроводный кран i. пещерный человек j. промышленное водопотребление k. промышленные товары, товары промышленного производства, фабричные товары l. системы коммунально-бытового водоснабжения m. теплоэлектростанция, ТЭС

44. Match the terms and their definitions.

dissipate, domestic, industrial, machinery, public, public utility, self-, toxic, wastes

a. an organization supplying a community with electricity, gas, water, or sewerage
b. by one's own efforts; by its own action
c. causing or capable of causing death or illness if taken into the body; poisonous
d. disperse or scatter
e. a group of machines arranged to perform a useful function; machines collectively
f. materials that are not wanted; the unusable remains or byproducts of something
g. of or concerning the people as a whole; of or provided by the government rather than an independent, commercial company
h. of or for use in the home rather than in an industrial or office environment
i. of, relating to, or characterized by industry

45. Translate the following sentences into Russian paying attention to the underlined words that can be verbs, nouns or adjectives without changing their form and adding suffixes.

1. chief aim; to achieve / gain one's aim; to aim at
2. flood control; a river is in flood; the dam burst, flooding a small town; the river flooded its banks
3. to produce steam; water steam; steam engine; the equipment was originally powered by steam; the water was steaming
4. waste of time / money / energy; to go to waste; to dump industrial waste into rivers and seas; to recycle household waste; waste water; waste products; waste material; waste paper; we can't afford to waste electricity; to waste time / money / energy

Now fill in the table with Russian equivalents to the words from the sentences above.
aim, flood, steam, waste

	NOUN	VERB	ADJECTIVE	ADVERB

cool	прохлада, свежесть	охла-ждать(ся), остывать	прохладный, свежий	невозму-тимо, спо-койно

READING PRACTICE

46. Read the following text with a dictionary.

Text C Classification of Water Supply Systems

Water supply is available water provided to fulfill a particular need. If the need is domestic, public, commercial, industrial, or agricultural, the water must fulfill both quality and quantity requirements.

Water supply systems are subdivided into several branches according to the purpose of facilities they service:

1. domestic water supply; ***2. public water supply***;

3. industrial and ***commercial water supply***.

Water use in agriculture (for irrigation) is considered separately.

Domestic and Public Water Supply

Of all municipal services, provision of potable water is perhaps the most vital. All people depend on water for satisfying numerous domestic (household) needs indoors and outdoors.

Domestic water use just covers self-supplied domestic water with-drawals by those people and organizations that use their own wells to supply their water, as opposed to public-supplied (public-service) water.

Water generally gets to our homes in one of two ways. Either it is de-livered by a city water supply organization (utility), or people supply their own water, usually from a well. So, water delivered to homes is called "public-supplied/ public-service" and water supplied by people themselves is called "self-supplied".

No doubt, the first public-supply water system was when Jack the Caveman was hired by his neighbours to fetch a bucket of water from the Dinosaur River in exchange for some delicious prehistoric bran muffins. Today organized systems exist all over the world. Their aim is to get wa-ter, clean it and deliver it to local residents.

When the population was a lot more rural, people used to have to dig their own wells and create storage tanks for their water supply. But with the majority of urban population the public-supply water systems do that work for us. All we do is turn on the tap and pay the bills!

During times of droughts, floods, earthquakes, or other emergencies, vigorous efforts must be made to maintain public water supplies.

Industrial Water Supply

Water supply systems must also meet requirements for commercial and industrial activities.

The Industrial Revolution was the rapid development of industry that occurred in Britain in the late 18th and 19th centuries and brought about the introduction of machinery. It was characterized by the use of steam power, the growth of factories, and the mass production of manufactured goods. Water has always played a critical part in implementation of eve-ry industrial process. It is estimated that now about 22% of world-wide water use is industrial. The demand for water is sure to increase in fu-ture. Though water consumption depends on the region, as a whole, in-dustrial water usage is lower than agricultural use.

The most important purposes of industrial water consumption are cooling, scouring, washing, dampening, steam generation, hydraulic transport, etc. The use of water for cooling exceeds all other kinds of water consumption as it is used in such branches of industry as metallur-gy, oil-refining industry, chemical industry, etc. In general, the largest water users are enterprises of metallurgical, chemical, oil-refining, petro-chemical, and machine-building industry, as well as thermal power sta-tions.

Industry also uses water to dissipate and transport waste materials. In fact, many streams are now overused for this purpose, especially water-courses in urban centres. The use of watercourses for waste dispersal degrades the quality of the water and may reduce its usefulness for other purposes. This is especially true if the industrial wastes are toxic.

COMPREHENSION CHECK

47. Complete the following sentences according to the text.

1. Water supply is available water provided to fulfill … .
2. Water supply systems are subdivided into several branches ac-cording to … .
3. Water use in agriculture (for irrigation) … .
4. Of all municipal services, provision of potable water is perhaps … . 5. All people depend on water for satisfying … .
6. Water generally gets to our homes in … .
7. So, water delivered to homes is called … and water supplied by people themselves is called … .
8. … still exist all over the world. 9. All we do is … !
10. During times of droughts, floods, earthquakes, or other emergencies, vigorous efforts … .
11. Water supply systems must also meet requirements … . 12. Water has always played a critical part in … .
13. The demand for water is sure to … .
14. As a whole, industrial water usage is lower than … .
15. The most important purposes of industrial water consumption are … .
16. The use of water for cooling exceeds all other kinds of water consumption as it is used in such branches of industry as … .
17. The largest water users are enterprises of … .
18. Industry also uses water to … .
19. The use of watercourses for waste dispersal … .

48. Answer the following questions.

1. What needs does water fulfill?
2. What branches are water supply systems subdivided into? 3. What is domestic water use?
4. How does water get to our homes?
5. What role has the Industrial Revolution played?
6. Is agricultural water use higher than industrial one?
7. What are the most important purposes of industrial water con-sumption?
8. Why are many streams in urban centres overused nowadays?

49. Find key words and phrases which best express the general meaning of each paragraph.

50. What parts of the text can you define? Do they correspond to the paragraph? Entitle each part.

1. _____
2. _____
3. _____

51. Write a summary of the text.

LANGUAGE FOCUS

60. Match the synonyms

1. branch	a. deteriorate
2. commercial	b. device/engine/mechanism
3. degrade	c. dissipation
4. dispersal	d. divide
5. fulfill	e. engineering industry
6. machine	f. essential
7. machine-building industry	g. field
	h. heat
8. municipal	i. inhabitant
9. power plant	j. intake
10. reduce	k. lower
11. resident	l. perform
12. subdivide	m. poisonous
13. thermal	n. power station
14. toxic	o. public/public-service
15. usefulness	p. suitability/applicability/adequacy
16. vital	q. trading
17. wastes	r. waste products
18. withdrawal	

61. Choose the odd word.

1. to degrade, to make worse, to refine, to become worse, to worsen, to deteriorate, to impair
2. to reduce, to decrease, to diminish, to impair, to disperse, to lower, to lessen, to decline, to fall, to drop
3. to maintain, to increase, to grow, to rise, to raise, to elevate, to heighten, to enhance

62. Choose the synonyms of the underlined words.

1. If the need is domestic, public, commercial, industrial, or agricultural, the water must fulfill both quality and quantity requirements.

a. deliver b. meet
c. carry out d. create

2. Of all municipal services, provision of potable water is perhaps the most vital.

a. palatable b. drinkable c. fresh
d. self-supplied

3. Domestic water use just covers self-supplied domestic water withdrawals by those people and organizations that use their own wells to supply their water, as opposed to public-supplied (public-service) water.

a. by means of b. in order to
c. in addition to d. in contrast with

4. So, water delivered to homes is called "public-supplied" and water supplied by people themselves is called "self-supplied".

a. public water supply b. public-service
c. public water supplies d. self-service

5. The Industrial Revolution was the rapid development of industry that occurred in Britain in the late 18th and 19th centuries.

a. existed
b. situated
c. took place d. took part

6. It was characterized by the use of steam power, the growth of factories, and the mass production of manufactured goods.

a. engineered b. industrial c. household d. finished

7. It is estimated that now about 22% of world-wide water use is industrial.

a. characterized
b. calculated
c. claimed d. required

8. The use of water for cooling exceeds all other kinds of water consumption.

a. surpasses b. decreases c. increases
d. exaggerates

9. In fact, many streams are now overused for this purpose, especially watercourses in urban centres.

a. underused b. reused
c. recycled
d. overexploited

63. Read the following text and complete the table. Translate the fol-lowing text into English using the active vocabulary and the tips below.

Классификация систем водоснабжения

Системы водоснабжения могут классифицироваться по ряду основных признаков.

По назначению различают системы водоснабжения (водопроводы) населенных мест (городов, поселков); системы производственного водоснабжения (производственные водопроводы), которые, в свою очередь, различают по отраслям промышленности (водопроводы тепловых электростанций, водопроводы металлургических заводов и т. д.); системы сельскохозяйственного водоснабжения.

В пределах одного объекта в соответствии с объединением различных функций устраивают водопроводы хозяйственно-питьевые, противопожарные и производственные.

По характеру используемых природных источников различают водопроводы, получающие воду из поверхностных источников (речные, озерные и т.д.); водопроводы, основанные на подземных водах (артезианские, родниковые и т.п.); водопроводы смешанного питания — при использовании источников различных видов.

По способу подачи воды различают водопроводы самотечные (гравитационные); водопроводы с механической подачей воды (с помощью насосов), а также зонные водопроводы, где вода подается в отдельные районы отдельными насосными станциями.

Кроме того, системы производственного водоснабжения можно различать по способу (кратности) использования воды: системы прямоточного водоснабжения (с однократным использованием во-ды); системы оборотного водоснабжения; системы с повторным ис-пользованием воды.

	Принцип классификации	**Типы водопроводов**
Системы водоснабжения (водопроводы)	по назначению	1. … 2. … 3. …
	по характеру используемых природных источников	1. … 2. … 3. …
	по способу подачи воды	1. … 2. … 3. …
	в соответствии с объединением различных функций *(в пределах одного объекта)*	1. … 2. … 3. …
	по способу (кратности) использования воды *(для систем производственного водосна-бжения)*	1. … 2. … 3.

➔ **системы водоснабжения населенных мест** – systems of water supply of inhabited localities

➔ **системы производственного [промышленного] водоснаб-жения** – industrial water supply systems

➔ **системы сельскохозяйственного водоснабжения** – rural wa-ter supply systems

➔ **хозяйственно-питьевые водопроводы** – domestic [household] water supply systems

➔ **противопожарные водопроводы** – fire water supply systems ➔ **производственные водопроводы** – industrial water supply sys-
tems

➔ **водопроводы, получающие воду из поверхностных источ-ников** – water supply systems obtaining water from surface water sources

➔ **водопроводы, основанные на подземных водах** – water sup-ply systems based on groundwater

➔ **водопроводы смешанного питания** – mixed water supply sys-tems

➔ **самотечные [гравитационные] водопроводы** – gravity water supply systems

➔ **водопроводы с механической подачей воды (с помощью насосов)** –supply systems with pump(ed) water feed

➔ **зонные водопроводы** – zonal water supply systems ➔ **системы прямоточного водоснабжения** – once-through water
supply systems

➔ **системы оборотного водоснабжения** – water recycling sys-tems / reverse water supply systems

➔ **системы с повторным использованием воды** – water reuse systems

SPEAKING PRACTICE

64. Find additional information on the water supply of your native city or town. Make a presentation.

65. Get ready to speak about the classification of water supply systems.

VOCABULARY WORK

66. Read the following international words and guess their mean-ing. Mind the stressed syllables. Prove that these words are interna-tional ones.

Model: ancient ə древний; старинный, старый; **антич-ный**

67. Match the English and Russian equivalents.

1. asbestos cement	a. а излишки использовались для …
2. brick-lined walls	b. асбестоцемент
3. cast-iron pipe	c. буферное водохранилище; распределительный бассейн
4. clay pipe	d. быть озабоченным *чем-л.*
5. cut stone	e. водохранилище; бак для воды; водосборный бассейн; резервуар
6. distribution reservoir	f. входить в употребление, начать использоваться
7. ductile iron	g. выдерживать давление
8. lead pipe	h. гравитационная песчаная фильтрация
9. open channel	i. добывать воду, получать воду, качать воду (из)
10. point of use	j. железобетон
11. private household	k. керамическая труба; гончарная (дренажная) труба
12. projects rendered impracticable	l. ковкое (*мягкое*) железо
13. reinforced concrete	m. место использования
14. rough concrete	n. неотделанный бетон, бетон после распалубки
15. slow-sand filtration	o. обмурованные стены
16. storage reservoir	p. открытое русло
17. the excess being used to …	q. планы оказывались неосуществимыми
18. to be concerned with *smth*	r. проводить воду через канал, пускать воду по каналу
19. to channel water	s. свинцовая труба; подводящая труба
20. to come into use	t. тёсаный камень
21. to draw water (from)	u. частное (домо)хозяйство *(семья, которая живет в частном доме)*
22. to withstand pressure	v. чугунная труба

68. Match the terms and their definitions.

advanced, aqueduct, arch, baths, conveyance, fountain, install, neglect, qanat , tunnel

a. (in the Middle East) is a gently sloping underground channel or tunnel constructed to lead water from the interior of a hill to a village below

b. a curved symmetrical structure spanning an opening and typically supporting the weight of a bridge, roof, or wall above it

c. a public establishment offering bathing facilities

d. an artificial channel for conveying water, typically in the form of a bridge supported by tall columns across a valley

e. an artificial underground passage, esp. one built through a hill or under a building, road, or river

f. an ornamental structure in a pool or lake from which one or more jets of water are pumped into the air

g. fail to care for properly

h. far on or ahead in development or progress

i. the action or process of transporting *smth* from one place to another *j.* place or fix (equipment or machinery) in position ready for use

we're planning to install a new shower

READING PRACTICE

69. The following text is in the jumbled order. Look at the plan of the text, read the paragraphs and number them in the correct order according to the plan.

1. Water as an important factor in the development of early civilizations.
2. The emergence and development of advanced water supply systems in ancient times.
3. Highly advanced Roman aqueducts as one of the greatest achievements in the ancient world.
4. The purpose and description of Roman aqueducts.

5. The condition of water supply systems in Europe after the fall of the Roman Empire.
6. Some facts about the development of water supply systems over the past four centuries.

Text D Historical Background: Developments in Water Supply Systems

☐ In the 17th and 18th centuries, distribution systems utilizing cast-iron pipes, aqueducts, and pumps were installed in London and Paris. However, cast-iron pipes with joints capable of withstanding high pressures were not used very much until the early 19th century. The steam engine was first applied to water pumping operations at about that time, making it possible for all but the smallest communities to have drinking water supplied directly to individual homes.

During the 19th century the pollution of most water supplies became so serious that slow-sand filtration was initiated; and by the end of the century the realization that diseases could be transmitted by water led to the use of sterilizing chemicals, usually chlorine compounds.

Asbestos cement, ductile iron, reinforced concrete, and steel came in-to use as materials for water-supply pipelines in the 20th century.

☐ Water is power not only in the hydraulic sense, but in relation to progress and culture; campaigns as well as fortresses have been lost, projects rendered impracticable and communities have flourished or decayed for want of water.

Water was an important factor in the location of the earliest settled communities, and the evolution of public (and later industrial) water supply systems is tied directly to the growth of cities. There is much archaeological evidence to indicate that ancient peoples were concerned with their water supply. In the development of water resources beyond their natural condition in rivers, lakes, and springs, the digging of shallow wells was probably the earliest innovation. Wells were sufficient for small communities, and rivers provided enough water for civilizations along the Tigris and Euphrates, the Nile, and the Indus rivers.

☐ The need to channel water supplies from distant sources was an outcome of the growth of urban communities. Among the most notable of ancient water conveyance systems are the aqueducts built between 312 BC and AD 455 throughout the Roman Empire. Some of these impressive works are still in existence. The writings of Sextus Julius Frontinus (who was appointed superintendent of Roman aqueducts in AD 97) provide information about the design and construction of this system. The outstanding features of the system were 11 major aqueducts totalling 359 miles (578 kilometres) in length – of which 30 miles were supported on stone arches – that delivered some 50,000,000 gallons (189,000,000 litres) of water to the city daily and supplied Rome itself. The great and highly advanced *Roman* waterway system known as the a*queducts* is among the greatest achievements in the ancient world.

☐ During the Middle Ages in Europe there was no no-table progress in the methods or materials used to convey and distribute water. Water supplies were largely neglected, and epidemics caused by water-borne organisms were common.

☐ The Romans constructed numerous aqueducts to bring water from distant sources into their cities and towns, supplying public baths, la-trines, fountains and private households. Extending from a distant spring-fed area, a lake, or a river, a typical Roman aqueduct included a series of underground and aboveground channels. The longest was the Aqua Marcia, built in 144 BC. Its source was about 23 miles (37

kilome-tres) from Rome. The aqueduct itself was 57 miles long, however, be-cause it had to meander along land contours in order to maintain a steady flow of water. For about 50 miles the aqueduct was underground in a covered trench, and only for the last 7 miles was it carried above ground on an arcade. In fact, most of the combined length of the aqueducts sup-plying Rome (about 260 miles) was built as covered trenches or tunnels. When crossing a valley they were supported by arcades comprising one or more levels of massive granite piers and impressive arches.

The aqueducts ended in Rome at distribution reservoirs, from which the water was conveyed to public baths or fountains. The water was distributed from large storage cisterns to public fountains and baths by an elaborate system of lead pipes. A few very wealthy or privileged citizens had water piped directly into their homes, but most of the people carried water in containers from a public fountain. Water was running constant-ly, the excess being used to clean the streets and flush the sewers.

Ancient aqueducts and pipelines were not capable of withstanding much pressure. Channels were constructed of cut stone, brick, rubble, or rough concrete. Pipes were made of drilled stone or of hollowed wooden logs; clay and lead pipes were also used.

☐ But populations grew, the need for water increased, tools were developed, wells had to be dug deeper, and water had to be brought in from more distant sources. These ancient systems included storage reservoirs at water sources, canals and aqueducts for water conveyance to points of use, and water-distribution systems.

Highly advanced systems appeared about 2500 BC and reached their peak in the system supplying ancient Rome. Brick-lined wells were built by city dwellers in the Indus River basin as early as 2500 BC, and wells more than 1,600 feet (almost 500 metres) deep are known to have been used in ancient China. Construction of qanats, slightly sloping tunnels driven into hillside that contain groundwater, probably originated in northwestern Persia (now Armenia) about 700 BC. From the hillsides the water was conveyed by gravity in open channels to nearby towns or cities. The use of qanats became widespread throughout the region, and some are still in existence. Until 1933 the Iranian capital city, Tehran, drew its entire water supply from a system of qanats.

COMPREHENSION CHECK

70. Complete the following sentences according to the text.

1. Ancient peoples … . 2. About 2500 BC … . 3. About 700 BC … .
4. Between 312 BC and AD 455 … . 5. During the Middle Ages … .
6. In the 17th and 18th centuries … . 7. During the 19th century … .
8. In the 20th century … .

71. Find key words and phrases which best express the general meaning of each paragraph.

72. Write a summary of the text.

LANGUAGE FOCUS

73. Match the synonyms.

1. advanced	a. begin
2. ancient	b. carry / transport
3. convey	c. coated
4. impressive	d. cobblestone
5. innovation	e. cutting-edge / up-to-date
6. install	f. even
7. joint	g. grand
8. lined	h. junction
9. meander	i. mount
10. originate	j. novelty
11. rubble	k. old / antique
12. sloping	l. slanting
13. steady	m. wind

74. Match the antonyms.

1. capable	a. aboveground
2. directly	b. close / near
3. distant	c. decay
4. flourish	d. deinstall/uninstall/ dismantle
5. hollow	

6. impracticable	e. incapable
7. install	f. indirectly
8. privileged	g. poor
9. slow-sand filtration	h. practicable
10. steady	i. rapid-sand filtration
11. underground	j. solid
12. wealthy	k. unprivileged
	l. variable/changeable/ inconstant

75. Match the terms (names of materials) and their definitions.

asbestos, cast iron, cement, clay, concrete, granite, iron, reinforced concrete, rock, steel, stone, wood

a. a hard, relatively brittle alloy of iron and carbon that can be readily cast in a mold and contains a higher proportion of carbon than steel (typically 2.0 – 4.3%)

b. a hard, strong, gray or bluish-gray alloy of iron with carbon and usually other elements, used extensively as a structural and fabricating material

c. a heat-resistant fibrous silicate mineral that can be woven into fabrics, and is used in fire-resistant and insulating materials

d. a heavy, rough building material made from a mixture of broken stone or gravel, sand, cement, and water, that can be spread or poured into molds and that forms a stonelike mass on hardening

e. a powdery substance made by calcining lime and clay, mixed with water to form mortar or mixed with sand, gravel, and water to make concrete

f. a stiff, sticky fine-grained earth, typically yellow, red, or bluish-gray in color and often forming an impermeable layer in the soil. It can be molded when wet, and is dried and baked to make bricks, pottery, and ceramics

g. a strong, hard magnetic silvery-gray metal, the chemical element of atomic number 26, much used as a material for construction and manufacturing, esp. in the form of steel (Symbol: Fe)

h. a very hard, granular, crystalline, igneous rock consisting mainly of quartz, mica, and feldspar and often used as a building stone

i. concrete in which wire mesh or steel bars are embedded to in-crease its tensile strength

j. the hard fibrous material that forms the main substance of the trunk or branches of a tree

k. the hard, solid, nonmetallic mineral matter of which rock is made, esp. as a building material

l. the solid mineral material forming part of the surface of the earth and other similar planets, exposed on the surface or underlying the soil or oceans

SPEAKING PRACTICE

77. Find additional information on developments in water supply systems. Make a presentation.

78. Get ready to speak about the history of water supply systems.

FOLLOW-UP ACTIVITIES

79. Read the texts of UNIT 3 again and make notes under the fol-lowing headings. Then use your notes to talk about *Water Supply Systems, The Classification of Water Supply Systems* and *The Main Components and Facilities of a Water Supply System.*

1. Water supply.
2. Water supply systems.
3. Water distribution systems.
4. The main components and facilities of a water supply system. 5. Domestic, public and industrial water supply.
6. Developments in water supply systems. 7. Water supply in Minsk.

Text 1. PLUMBING

Plumbing is a system of pipes and fixtures installed in a building for the distribution and use of potable (drinkable) water and the removal of waterborne wastes. It is usually distinguished from water and sewage systems that serve a group of buildings or a city.

Plumbing is the system of pipes, with their appurtenances and the fixtures and equipment attached to them, which furnish the domestic ser-vices needed for human health and well-being. In its more extensive phases as a pipe craft it includes, besides water piping and drains, various other systems, as piping for gas, air, and other domestic and industrial needs.

Nowadays the term "***plumbing fixture***" embraces not only showers, bathtubs, lavatory basins, and toilets but also such devices as washing machines, garbage-disposal units, hot-water heaters, dishwashers, and drinking fountains.

Materials

The water-carrying pipes and other materials used in a *plumbing sys-tem* must be strong, noncorrosive, and durable enough to equal or exceed the expected life of the building in which they are installed. Toilets and lavatories usually are made of stable porcelain or vitreous china, although they sometimes are made of glazed cast iron, steel, or stainless steel. Ordinary water pipes are usually made of steel, copper, brass, plastic, or other nontoxic materials; and the most common materials for sew-age pipes are cast iron, steel, copper, and asbestos cement.

From the History of Plumbing

One of the problems of every civilization in which the population has been centralized in cities and towns has been the development of adequate plumbing systems.

In certain parts of Europe the complex aqueducts built by the Romans to supply their cities with potable water can still be seen. However, the early systems built for the disposal of human wastes were less elaborate. Human wastes were often transported from the cities in carts or buckets or else discharged into an open, water-filled system of ditches that led from the city to a lake or stream.

Improvement in plumbing systems was very slow. Virtually no progress was made from the time of the Romans until the 19th century. The relatively primitive sanitation facilities were inadequate for the large, crowded population centres during the Industrial Revolution, and out-breaks of typhoid fever and dysentery were often spread by the consumption of water contaminated with human wastes. Eventually these epidemics were curbed by the development of separate, underground water and sewage systems, which eliminated open sewage ditches. In addition, plumbing fixtures were designed to handle potable water and water-borne wastes within buildings.

Evidence of installations designed for the supply of water and the elimination of wastes can be traced back to the earliest settlements of mankind, where materials such as clay, wood, lead and cast iron have been used. It is actually only during the 20th century that plumbing has developed into complex systems with many varieties of pipes and pipe joints. Thus for a very long time the plumber was an artisan in the joining and shaping of lead pipe, and the trade derived its name from the Latin word “plumbum”, “lead”.

Water Distribution Methods

Methods of water distribution vary. For towns and cities, water companies treat water collected from wells, lakes, rivers, and ponds and distribute it to individual buildings. In rural areas water is commonly obtained directly from wells.

In most cities, water is forced through the distribution system by pumps, although, in rare cases, when the source of water is located in mountains or hills above a city, the pressure generated by gravity is sufficient to distribute water throughout the system. In other cases, water is pumped from the collection and purification facilities into elevated storage tanks and then allowed to flow throughout the system by gravity. But in most municipalities water is pumped directly through the system; elevated storage tanks may also be provided to serve as pressure-stabilization devices and as an auxiliary source in the event of pump failure or of a catastrophe, such as fire, that might require more water than the pumps or the water source are able to supply. The pressure developed in the water-supply system and the friction generated by the water moving through the pipes are the two factors that limit both the height to which water can be distributed and the maximum flow rate available at any point in the system.

Modern Plumbing Requirements

In mid 20th century plumbing has become the object of extensive scientific and technical studies in order to make the systems operate properly, and to safeguard human health, “safe” and “sanitary” being the key words. All the installations are governed by the laws, rules, and regulations of building safety engineers and health authorities through sanitary codes, building codes, and plumbing codes. With the development of modern living standards and the increased requirements in industrial work, plumbing is rapidly becoming an involved field which requires a great many new adaptations and special devices.

Water has to be delivered at the desired temperature and in a form that will cause no harm. For the ordinary tub- or bowl-type fixture the flow should enter the vessel at a quiet velocity in a non-splashing stream and in plentiful volume to give the user satisfaction. For flushing-type fixtures the pressure of the water must be efficient to operate the control valve and flush out the bowl and trap. In all cases the installation has to be made in such a manner that reverse flow is impossible. For fixtures with direct connection of the water pipe to any contamination source it becomes necessary to install devices such backflow preventers to ensure the cleanness of the water supply.

Friction loss in the pipes must be carefully measured so that pressure can be provided, either from the street main or auxiliary pumping equipment in the building, sufficient to overcome the friction in the pipes and the additional pressure necessary to lift the water up to the outlet (static head). The water lines are provided with valves for shutoff purposes or for the throttling down of the flow. In each case it is necessary to know the characteristics of the particular water supply in order to select the material which will not be affected through corrosion by the water and in turn cause contamination of the water. For ordinary conditions, a galvanized steel pipe, brass, or copper is used. For such highly purified supplies as demineralized or distilled water, more expensive piping such as a tin or glass pipe may be used.

Pipe Size

The sizing of pipes for the conventional type of building is regulated by plumbing codes. A certain factor, or fixture unit, is assigned to each fixture or drain outlet. The various sizes of drains, risers, and vents are, depending somewhat on the method of installation and the length of pipe, allowed a given number of fixture units. For more involved instal-lations, particularly industrial work where the actual discharges in gallons per minute may be known, the designer of a plumbing system may have to use hydraulic calculations in order to determine the correct size and slope of the drains.

For water piping the sizing is also a problem in hydraulics. There again it has been found practical in the conventional type of building to use fixture units to ascertain the probable maximum flow in gallons per minute. In both drainage and water lines allowance should be made for what is called respectively "base flow" and “constant flow”. These are flows which, as the terms imply, for any period of a few minutes or hours may place a demand on the capacity of the pipe in addition to the fluctuating and momentary demand caused by the individual fixtures.

Equipment

The equipment required in plumbing systems consists of such items as storage tanks which furnish water

from overhead through gravity, or the pressure type which pushes the water up, by having the tank partly filled with compressed air. Both types of tanks have to be supplied by pumps. Pumps are also used for lifting wastes from lower levels into the sewers at a higher level.

Hot water heaters, with or without storage tanks can be heated by steam, any kind of fuel, mostly gas or oil, and electricity. Depending on the type of usage, the heaters may vary from quick recovery, "instantaneous" types to slow recovery tank types. In the heating of water several problems come up. Allowance must be made for possible excess pres-sure due to the expansion of water when heated. Owing to the release of oxygen when water is heated, the corrosion factor is intensified, and minerals are precipitated, causing harm to the tank and coils. Thus there are various combinations of heaters to choose from, all according to the hardness of the water and the maximum temperature to which the water is to be heated.

Text 2. PLUMBING

Domestic water-supply systems for low-rise residential buildings have two sources, either municipal water-distribution systems or, where these are not available, wells that are drilled to underground aquifers which are free of contamination. Water is drawn from the wells with small submersible electric pumps, which are lowered through the well casing to the intake. Underground exterior water-supply pipes are usual-ly cast-iron with threaded connections to contain the pressures applied to the fluid, which is typically sufficient to raise it four stories. Within the building, copper tubing with soldered connections is used for distribution because of its corrosion resistance and ease of fabrication; in some areas plastic pipe is also used. The domestic water supply is divided into cold and hot systems, the cold water being piped directly to the fixtures. The hot-water system first draws the supply through a hot-water heating tank, which raises its temperature to about 60 C (140 F) using electric re-sistance or gas heat. Domestic water heaters that use solar radiation to heat water in coils exposed to the sun on a glass-covered black metal plate (flat-plate solar collectors) are found in areas where there is ample sunshine and relatively high energy costs. The hot water is then distrib-uted from the heater to the fixtures in a recirculating loop pipe system, in which gravity and temperature differentials maintain a constant tempera-ture in period of low demand.

The primary residential use of water is in the bathroom, which typi-cally includes a bathtub of cast iron or pressed steel with a ceramic porcelain coating (although fibre-glass-reinforced resin is also used), a ceramic lavatory, and a ceramic tank-type water closet. The bath and lavatory are supplied with hot and cold water through faucets with lever or screw-type valve controls. The valve of the water closet supply is also lever-operated and relies on the gravity power of the water in the tank for its flushing action. Shower baths are also common, often incorporated into bathtub recesses or in a separate compartment finished with ceramic tile. In some countries a bidet is included.

Other widely used plumbing fixtures include kitchen sinks, usually of cast iron or pressed steel with a ceramic porcelain coating, or of stainless steel; automatic dishwashing machines; and automatic washing machines for laundry. Kitchen sinks can be fitted with garbage disposals, which grind solid waste into a fluid slurry that is flushed out with wastewater.

Where the possibility of back siphonage of wastewater into the water supply exists, a vacuum breaker must be provided at the supply to pre-vent this happening, but most domestic plumbing fixtures are designed to avoid this possibility.

Drainage systems to remove wastewater are made of cast-iron pipe with threaded joints or bell-and-spigot joints sealed with molten lead or with plastic pipe with solvent-welded joints. The waste pipe of every plumbing fixture is provided with a semicircular reverse curve, or trap, which remains constantly filled with water and prevents odours from the drainage system from escaping into occupied spaces. Immediately down-stream from each trap is an opening to a vent pipe system, which lets air into the drainage system and protects the water seals in the traps from removal by siphonage or back pressure. When wastewater leaves the building, it is drained through a backflow-prevention valve and into un-derground ceramic pipes. It then flows by gravity to either a private sew-age treatment plant, such as septic tank and tile field, or to the public sewer system. If the discharge level of the wastewater is below the level of the sewer, a sewage ejector pump is required to raise the wastewater to a higher level, where gravity carries it away.

Text 3. HOUSE PLUMBING

A building's system for waste disposal has two parts: the drainage system and the venting system.

House plumbing consists of three separate pipe systems: • cold water system

• hot water system • drainage system

Plumbing also includes the water heater. ***Cold and Hot Water Systems***

Both cold and hot water systems operate under high pressure. There-fore, the pipes can run up and down without having any adverse effect on their performance. Also, their diameter can be small. The flow of wa-ter is completely controlled by valves.

As soon as the main water line enters the house, it is connected to a meter (municipal water supply only) that registers the amount of water consumed. Next to the meter is a shutoff valve that stops the flow of the water to the entire house in case of emergency. The main water line then splits into two lines: one becomes the cold water line and the other goes to the water heater to be heated and becomes the hot water line. The hot and cold water lines run parallel to each other until they reach the valves of the faucets and the appliances where cold and hot water are mixed during the usage.

Drainage System

A drainage system operates under gravity. Thus the horizontal pipes have to be pitched toward their points of discharge. Also, they have to be wide in diameter. The horizontal drainage pipes are called branches; the vertical pipes are called stacks; the stacks that carry refuse are called soil stacks.

Sewage develops harmful gases. These gases must be vented to the atmosphere by means of the vertical stack vents that penetrate the roof. Sewage gases and insects are prevented from entering into the house by traps located at the discharge of each plumbing fixture.

Above ground drainage pipes may be made of cast iron, copper, or plastic, depending on the local codes. Ail underground drainage pipes are made of cast iron.

Plumbing Installation

Plumbing is installed in two distinct stages: a. rough plumbing

b. finish plumbing (which includes the water heater and plumbing fixture).

Rough plumbing is the installation of all the pipes, fittings, and traps of the plumbing system. It after the wood frame is completed. Most of the rough plumbing is installed inside the walls ceilings. First, the plumber prepares a detailed drawing showing the diameters, lengths, and material of all the pipes and fittings based on the drawings and field measurements. The plumber may require some alteration in the wood framing in order to get the pipes and fittings through. The rough carpen-ter should cooperate fully with the plumber. However, you are expected to compensate the carpenter for any extra work.

It is to be noted that the stack walls in which the pipes and soil stacks are installed must not be of the bearing **type,** meaning that the ceiling joists should not bear on them. They should be wide enough to accommodate the **soil stacks, or else** boxes should be built around the stacks.

Many local codes require that the house trap be installed at a point just before the drainage pipe leaves the house. Its purpose is to prevent the gases and insects of the public sewer from filtering into the house.

Water Heater

Most water heaters consist of a heating furnace and a storage tank. The capacity of the storage tank varies between 40 and 80 gallons. The capacity of the water heater must be stated in the plumbing contract. The source of heat may be gas, oil, or electricity.

Another type of the water heater is the demand type. It has no storage tank. Rather, it consists of a copper coil through which the water to be heated circulates. Upon demand, the water in the coil is heated by either gas or hot water drawn through the boiler. Hot water continues to flow as long as there is demand.

Plumbing Fixtures

Plumbing fixtures are installed in two stages:

1. The bathtubs and showers are installed as soon as wood frame and roofing are completed. They are heavy and should be left for some time to allow their supporting wood frame to settle and shrink before in-stalling the surrounding ceramic tiles. The plumber must cover the fix-ture with glued paper so that they do not get stained, scratched, or cracked.

2. The rest of the fixtures such as the lavatories, toilets, bidets, sinks, faucets, faucet knob, etc., should be installed just before the house is ready to be occupied, to avoid their being damaged during construction.

TAP WATER 1. Read the text.

Tap water (running water)[1] is part of indoor plumbing, which became available in the developed world in the late 19th century and common in the mid-20th century.

The provision of tap water is a massive infrastructure of piping, pumps, and water purification works.

Tap water delivers *public health*[2]*, fire protection, economic development,* and *quality of life*.

The availability of clean tap water brings major ***public health benefits***[3]. Usually, the same administration that provides tap water is also responsible for the removal and treatment before discharge or reclamation of

wastewater[4]. In many areas, chemicals containing fluoride are added to the tap water in an effort to improve public dental health. In some countries, this remains a controversial issue[5] for a portion of the population.

Tap water may contain various types of natural but relatively harm-less contaminants such as scaling[6] agents like calcium carbonate in hard water and metal ions such as magnesium and iron, and odoriferous[7] gas-es such as hydrogen sulfide. Local geological conditions affecting groundwater are determining factors of the presence of these substances in water.

Occasionally, there are health concerns regarding the leakage of dangerous biological or chemical contaminating agents into local water sup-plies when people are advised by public health officials[8] not to drink the water, and stick to bottled water instead.

However, *bottled water* is sometimes not safer than tap water. Some time ago, Environmental Working Group did a study that tested popular brands of bottled water for contamination. They found 38 different harm-ful chemicals, including painkillers, fertilizer and arsenic, in 10 brands of bottled water. Plastic bottles can leach chemicals into your water. Lined[4] aluminum or stainless steel bottles are the safest alternative.

Fire protection. A well-maintained[9] water system is critical in protecting our communities from the ever-present threat of fire. In most communities, water flowing to fire hydrants[10] and home faucets[11] is transported by the same system of water mains[12], pumps and storage tanks.

Support for the economy. A safe, reliable water supply is central to the economic success of our communities. Tap water is critical to the day-to-day operations of existing businesses and to the viability of new commercial enterprises and residential developments[13]. From foods and beverages to toothpastes and perfumes, water is the primary ingredient in hundreds of thousands of everyday products. An increasing number of communities are using recycled water[14] for non-drinking purposes such as industrial cooling or irrigation.

Quality of life. Tap water is more than a convenience – it is central to our life. We can hardly imagine our everyday life without bathing, cook-ing, washing up, cleaning, washing, garden watering, air conditioning, car washing, carrying away wastes. What is more, any measure of a suc-cessful society – low mortality rates[15], economic diversity, productivity, public safety – is in some way related to access to safe water.

*** [1]tap water (running water) – водопроводная вода [2]public health – здоровье населения

[3]benefit – выгода; польза; прибыль; преимущество

[4]reclamation of wastewater – использование сточных вод *(для по-лезных целей)*; обработка сточных вод

[5]controversial issue – спорный вопрос

[6]scaling – выпадение осадка *(из воды при нагревании)* [7]odoriferous – вонючий, зловонный

[8]public health officials – органы здравоохранения

[9]well-maintained – хорошо обслуживаемый; содержащийся в ис-правности; поддерживаемый в порядке

[10]fire hydrant – пожарный гидрант

[11]faucet – водопроводный кран; регулирующий кран; вентиль; раструб; втулка; затычка

[12]water main – водопроводная магистраль; магистральный водо-провод

[13]residential development – жилищное строительство, строитель-ство жилья, жилая застройка

[14]recycled water – оборотная вода

[15]mortality rate – смертность, коэффициент смертности, уровень смертности

2. Choose the right variant according to the text.

1) Indoor plumbing became … in the developed world in the mid-20th century.

A. usual B. uncommon C. unique D. unavailable

2) Calcium carbonate, metal ions such as magnesium, iron, or hydrogen sulfide are examples of natural but relatively … contami-nants contained in tap water.

A. hazardous B. dangerous C. harmless D. harmful

3) Tap water … bottled water.

A. is as safe as B. isn't safer than C. is much safer than D. is safer than

4) Water flowing to fire hydrants and home faucets is transport-ed by … water main and pump systems.

A. some B. the same C. different D. various

5) Industrial cooling and irrigation use … water for non-drinking purposes.
A. drinking B. safe and clean C. recycled D. contaminated

6) So, tap water provides … ***(several answers possible)***
A. quality of life B. public health C. fire protection D. economic de-velopment

3. Agree or disagree with the following statements (True / False).

1. Running water became available in the developing countries in the late 19th century and common in the mid-20th century.
2. The provision of running water is a massive infrastructure which includes pipe systems, pumps, and water purification stations.
3. The improvement of public dental health by adding chemicals containing fluoride still remains a controversial issue.
4. Local geographical conditions affecting groundwater determine the presence of various contaminants in running water.
5. Lined aluminum or stainless steel bottles are the safest alternative to plastic bottles.
6. Safe tap water is more than just a convenience – it is part of our everyday life activities.

4. Match the synonyms.

1. Central	A. Critical
2. Contaminant	B. Faucet
3. Discharge	**C.** Harmless
4. Safe	D. Pollutant
5. Tap	E. Purification
6. Treatment	**F.** Release

5. Match the opposites.

1. Increasing	A. Absence
2. Low	B. Decreasing
3. Natural	C. Harmful
4. Presence	D. High
5. Safe	E. Man-made / Artificial
6. Safety	F. Unsafeness

6. Form the plural of the following nouns.

1. Pump, fire, gas, enterprise, ingredient, business. bottle, alternative, issue, substance
2. Community, supply, country, society, industry, century, responsibility

7. Translate the following "stone wall constructions" into Russian.

Water purification system, water treatment plant, wastewater discharge and reclamation, tap water availability, contaminating agents, leakage, water supplies pollution, water main and pump systems provision

8. Translate the sentences taking into consideration the grammar phenomenon of conversion.

1. Industrial cooling and irrigation **use** recycled water for non-drinking purposes. – Industrial cooling and irrigation make **use** of recycled water for non-drinking purposes.
2. **Chemicals** containing fluoride are added to the tap water to improve public dental health. – **Chemical** substances containing fluoride are added to the tap water to improve public dental health.
3. Lined aluminum or stainless steel bottles are the safest **alternative**. – Lined aluminum or stainless steel bottles are the safest **alternative** variant.
4. A water **main** transports water to fire hydrants and home faucets. – Water is the **main** convenience without which we can hardly imagine our everyday life.
5. The treatment includes mechanical **means** to create contact between wastewater, cells and oxygen. – It **means** that chlorine is a toxic gas.

9. Choose the right variant paying attention to the degrees of comparison of the adjectives.

1) Chemicals containing fluoride are sometimes added to the tap water to make our tooth … .
A. more healthy **B**. healthier **C**. the most healthy **D**. the healthiest

2) Running water must be as … as possible.
A. cleaner and safer **B**. clean and safe **C.** more clean and safe . **D** . cleanest and safest

3) … leakages of dangerous biological or chemical contaminating agents into local water supplies take place (происходят), … people concern about their health.
A. More frequent; more **B**. The more frequent; the more **C**. The most frequent; the most **D**. Frequent; much

4) Tap water is … river water.

A. cleaner and less dangerous than **B**. less clean and more dangerous than **C**. as clean and safe as **D**. not as/so clean and safe as

5) The producers of bottled water must make their product as … as possible.
A. safer **B**. safe **C**. more safe **D**. safest

6) Stainless steel bottles for water are … plastic ones. *(several answers possible)*
A. less dangerous than **B**. more dangerous than **C**. not so dangerous as **D.** not as dangerous as

10. Choose the right tense form of the verbs in the Active and the Passive Voices.

1) Several years ago, the leakage of dangerous chemical contaminants … place. *(to take place – происходить)*
A. was taking **B**. takes **C.** took **D**. had taken

2) Today the issue of adding chemicals containing fluoride … controversial.
A. are **B**. has been **C**. is **D**. is being

3) More and more communities … recycled water for non-drinking purposes such as industrial cooling or irrigation.
A. are using **B**. use **C**. will use **D**. used

4) Several years ago, the problem of the contamination of bottled wa-ter with harmful chemicals … .

A. was studying **B**. study **C**. had studied **D.** was studied

5) After filtration, the water ……. into a disinfection tank.
A. is moved **B.** moves **C.** is moving **D**. has been moved

11. Determine the function of the verbs "to be" and "to have" in the following sentences.

a. main verb (смысловой глагол)
b. auxiliary (вспомогательный глагол)
c. modal (модальный глагол)
d. linking verb (глагол-связка)

1. Tap water is considered more than just a convenience in our homes – it is to provide quality of life of any community, so water is central to our life.
2. We have to admit that experts have controversial views on the addition of chemicals containing fluoride to the tap water, and they haven't come to a common opinion.
3. Some time ago they had to test their bottled water for contamination to see if their product was satisfactory. They had negative results. By now nothing has resulted from their efforts to make their bottled water safe enough.
4. Factors such as the development of human society, social and technological progress have resulted in changing of water resources.
5. Water pollution is contamination of water by foreign matters.
6. Chlorine has limited effectiveness against protozoans that form cysts in the water.

12. Translate the following sentences with the construction "THERE + TO BE".

1) **There are** harmful, as well as relatively harmless substances in groundwater.
2) **There isn't** enough water even for everyday washing, cleaning, drinking, cooking, bathing and carrying away wastes in many countries of the world.
3) **There will be** the ever-present threat of fire in any community.
4) **There were** such metal ions as magnesium and iron in the water sample.
5) **There are** also some nonpathogenic microorganisms in water. **There is** usually a wide variation in total water demand among differen**t** communities.

It is easy for us to take the quality of our drinking water for granted — when we turn on the tap, we expect safe, pleasant-tasting water to flow out. Long before water reaches our tap, carefully man-aged systems are in place protecting our water and making it safe to drink, from the water falling as rain to the point when it reaches our tap.

Safe water is essential to sustain life — we all have a responsibility to make every effort to en-sure the quality of our drinking water.

Water is essential for life. Our health depends on having an adequate supply of safe water — every day.

It is important that we all take responsibility for the management of our water resources and work together with those responsible for the pro-vision of drinking water to ensure its use is sustainable.

Water is important; let's work together to maintain this precious resource!

SUPPLEMENTARY READING

Text 1

Urbanization

Before an area is urbanized, rain would have infiltrated the soil and recharged groundwater or slowly runoff into streams and coastal environments. Water quality would only be influenced by natural processes.

How does urbanization change things? Urban areas have large areas of hard surfaces such as concrete, bitumen and roofs, which don't allow rain to percolate into the soil. Instead, rainwater runs off these hard surfaces very quickly, becoming what is called stormwater. As stormwater travels across roads, carparks, gardens, etc, it collects many pollutants that are produced in cities. These pollutants include litter (e.g. plastic bags and drink bottles), nutrients (e.g. phosphate and nitrate in fertilizers and detergents), heavy metals (e.g. copper from motor cars and zinc from metal roofs), suspended solids (e.g. through soil erosion on building sites) and disease-causing bacteria (often from overflowing sewage pipes).

How does urbanization affect water quality? As urbanization has reduced water infiltration and groundwater recharge, urban streams now don't flow for long periods. Now, during rain events, urban areas quickly generate stormwater, inducing fast stream flows of short duration. This urban stormwater carries many pollutants that are quickly transported to downstream water bodies such as the creeks which run through an urban area. The effects of these polluted stormwater discharges can include significant ecological changes to the plant and animal communities in both urban streams and coastal waters, as well as rendering water unsafe for recreational activities.

Text 2

Silt.

Silt is soil or rock derived granular material of a specific grain size. Silt may occur as a soil or alternatively as suspended sediment in a water column of any surface water body. It may also exist as deposition soil at the bottom of a water body.

Source. Silt is generated by a variety of mode capable of breaking and splitting up generally sand-sized quartz crystals of primary rocks by exploiting deficiencies in their lattice. These involve chemical weathering of rock and a number of physical weathering processes. Silt is sometimes known as 'rock flour' or 'stone dust', especially when produced by glacial action. Mineralogically, silt is composed mainly of quartz and feldspar. Sedimentary rock composed mainly of silt is known as siltstone. Silt, deposited by annual floods along the Nile River, created the rich and fertile soil that sustained the ancient Egyptian civilization. This silt was depended on for this purpose. A decrease in silt deposited by the Mississippi River throughout the 20th century has contributed to the disappearance of protective wetlands and barrier islands in the delta region surrounding New Orleans.

Environmental impacts. Silt can occur as a deposit or as material transported by a stream or by a current in the ocean. Silt is easily transported in water and is fine enough to be carried long distances by air as 'dust'. Thick deposits of silty material resulting from *aeolian* deposition are often called *loess* (a German term) or *limon* (French). Silt and clay contribute to turbidity in water. One of the main causes of river siltation in the year 2006 is the result of slash and burn treatment of tropical forests. When the total ground surface is stripped of vegetation and then seared of all living organisms, the upper soils are vulnerable to both wind and water erosion. In a number of regions of the earth, entire sectors of a country have been rendered unproductive; for example, on the Madagascar high central plateau, comprising approximately ten percent of that country's land area, virtually the entire landscape is sterile of vegetation, with gully erosive furrows typically in excess of 50 meters deep and one kilometer wide. Shifting cultivation is a farming system which sometimes incorporates the slash and burn method in some regions of the world. The resulting sediment load in rivers flowing to the west is ongoing, with most rivers a dark red brown colour. The resulting fish kills in most of these rivers have resulted in the process of extinction of a variety of Madagascar's fish species.

Text 3

Pesticides.

Pesticides can be defined as chemicals to kill pests. Pesticides used in agricultural regions can be washed into rivers and streams after rain. Some pesticides are persistent and can be detected in water long after use. In South Australia pesticides have been found in waterways and groundwater, and historical contamination of soil is common around cattle and sheep dip sites. Pesticides have caused fish and aquatic invertebrate kills in inland and estuarine waters. Bird deaths have been attributed to pesticides, and spraying to kill locusts has been shown to affect other organisms.

Pest species. Pests or invasive species are usually introduced by humans. They threaten the survival of native plants and animals, and can also damage valuable agricultural and personal resources. Terrestrial and aquatic pests affect the health of our waterways as well as native animals and plants. For example, the mosquito fish (*Gambusia holbrooki*) was introduced from the USA to control mosquitoes. However, it now outnumbers native fish in many parts of south eastern Australia, as they out compete indigenous species for food. Exotic trees such as willows (*Salix* sp.) are another problem. Willows produce dense shade, suppressing under storey growth, resulting in bare banks that are susceptible to erosion. The trees are a poor habitat for land animals, and the population and diversity of aquatic invertebrates and native fish is greatly reduced under their canopy.

Text 4

Alteration of natural flows (hydroenergy)

Water is pumped from rivers and underground water supplies for use by rural towns, farms, industries and cities. Many rivers also feed dams and reservoirs for public water supplies and hydro-power, and are used as transport routes for boats.

While these activities provide economic and social benefits, there are many adverse environmental effects caused by altering the natural flow of rivers (river regulation). These include the decline and loss of native species of plants and animals, encouragement of habitats favourable to pest species (carp, gambusia and redfin), declining water quality, and loss of amenity.

It is now widely recognised that changes to the flow regime have severely degraded most, if not all, regulated rivers in some way. The River Murray highlights this. So much water is removed from the river that less than 20% of the normal annual volume reaches the river mouth at Goolwa.

River regulation in the Murray-Darling Basin is so severe that giant river redgums which rely on frequent flooding are dying and the Murray Cod is threatened.

Major efforts are now under way to understand the impact of river regulation, and to develop strategies to restore and/or protect the natural flow regime of rivers and creeks to improve the environmental condition of our waterways.

To permit automobile traffic to travel along a road at any time of the year at high speeds and with economic fuel consumption, the road pavement must be of an adequate rigidity, uniformity and resistance to wear. These requirements can be satisfied by means of various combinations of pavement structural layers consisting of different road-building materials. The pavement service qualities, i.e., permissible speed and traffic comfort, are determined mainly by the nature of the surfacings, which can be divided into the following basic structural types, given in consecutive order of their development.

РАЗДЕЛ КОНТРОЛЯ ЗНАНИЙ

ОБРАЗЦЫ ТЕМАТИЧЕСКИХ ТЕСТОВ

Entry Test.

1. The surface of the Earth is 70% … to an average depth of over 4 kilometers.
a) water; b) soil; c) sewage;

2. In the dry parts of Africa there are … water.
a) running; b) surface; c) ground;

3. The presence of an oil film with a thickness of only one thousandth of a millimeter may reduce the rate at which … is transferred from the air to water.
a) sun; b) heat; c) oxygen;

4. Water is a vital resource because of its physical and chemical …
a) features; b) properties; c) characteristics;

5. Heat accumulation in the hydrosphere in summer time and heat withdrawal in winter time make milder the … of the Earth.
a) atmosphere; b) climate; c) weather;

6. … destructs rocks dissolves inorganic compounds and carries them over great distances.
a) Gas; b) Energy; c) Water;

7. River water has some … for self-purification, but some pollutants are objectionable because they overload the self-purification processes of the river.
a) capacity; b) possibility; c) ability;

8. Most municipal water found in a city or community today has been treated …
a) property; b) extensively; c) in a wrong way;

9. The water emerging from some … may have fallen as rain many decades, hundreds, thousands or in some millions of years ago.
a) surface water; b) reservoirs; c) deep ground water.

10. People began to build large scale water projects only in the … century.
a) 20^{th}; b) 11^{th}; c) 17^{th}.

11. Water taken from its natural sources contains … harmful elements.
a) a lot of; b) few; c) not many;

12. … and rock layers naturally filter the ground water to a high degree of clarity before it is pumped to the treatment plant.
a) treatment systems; b) chemicals; c) soil.

13. … doesn't need screening before other purification steps.
a) groundwater; b) surface water; c) lake water;

14. Water from rivers may be stored in bankside reservoirs for periods between a few days and many … to allow natural biological purification to take place.
a) years; b) weeks; c) months.

15. Water service is …
a) the main pipe delivering water to a portable water system;
b) a water dealing organization;
c) water treatment.

16. Water used for any purpose … returned to the potable water supply.
a) should be; b) shouldn't be; c) could be;

17. Every day the world shortage of fresh water …
a) increases; b) decreases; c) changes.

18. The idea of using iceberg as a source of fresh water is…
a) new; b) impressive; c) not new;
19. All devices used to treat or convey … water must be protected against contamination.
a) portable; b) run-off; c) flood.

20. Natural water sources can wholly … the need for water in the town.
a) satisfy; b) supply; c) provide.

EXAMINATION TEST

(Water-Resources Engineering)

Part 1

№ 1 Skim the text.

THE JEBEL AULIA PROJECT

In 2003, VA Tech Hydro received its first large contract for a Hydromatrix power plant. (VA Tech Hydro presents a new technology of hydraulic energy generation.) The contract was placed by the National Electricity Corporation (NEC), the Sudanese state owned electricity producer and distributor. The total contract value is worth €30 million. The NEC awarded VA Tech Hydro with the supply of 40 Hydromatrix power modules, each with two turbine generator sets, for 40 of the 50 openings of the Jebel Aulia dam in Sudan on the White Nile, about 40 km south of the capital, Khartoum. The contract also included the required mechanical and electrical auxiliary systems as well as a new dam crane.

The Jebel Aulia dam was built in 1933-37 and is used mainly for irrigation purposes and flood control. In March 2004 the first 20 Hydromatrix turbines were handed over to the customer for commercial service and have been supplying electricity into the grid of the NEC. Installation work on the next units is already in full swing, every two months ten turbine generator units will be commissioned. Full **operation** of the power plant is scheduled for early 2007. The new Hydromatrix power plant at Jebel Aulia will contribute considerably with 30.4 MW to the generation **capacity** in Sudan by means of environmentally clean hydropower.

Sudan currently has an installed electricity **generation** capacity of 580 MW, managed by the NEC. It is composed almost equally of the thermal (mainly oil) and hydropower. Hydroelectric power generation varies greatly over time, due to rainfall patterns. The main generating **facility** is the Roseires dam located on the Blue Nile river basin approximately 500 km southeast of Khartoum. Roseires has an installed capacity of 280 MW, but output varies greatly as water **levels** on the river rise and fall **throughout** the year.

VA Tech Hydro Hydromatrix coordinator said that the excellent business relations between the NEC and VA Tech Hydro went back to 1968, when the NEC had ordered the original equipment for the Roseires hydropower plant. The original turbines were supplied and installed by VA Tech Hydro for the NEC and just recently VA Tech Hydro has been awarded contracts to rehabilitate these turbines. The modernization and rehabilitation of the turbines became necessary because of the wear and tear caused by the aggressive and heavy silt load of the Blue Nile.

So VA Tech Hydro provides supplies, expert services and consultations in order to effectively support and assist the NEC in its effort to maintain and improve electricity supply to Sudan's growing economy and private consumers.

Financing was one of the key issues of the project. It was agreed with the customer that periodical payments would be made, while VA Tech Hydro will only perform according to milestone events. This procedure has turned out to be the best for both parties and is based on the long lasting excellent relationship between the NEC and VA Tech Hydro.

to award – дать подряд на поставку
to hand over – передавать, поставлять
thermal – термический
a milestone event – ключевой этап
MW – мегаватт
wear – износ
tear – разрыв

№ 2 Decide whether the following statements are true (T) or false (F).

1) In 2003 VA Tech Hydro received its second largest contract for a Hydromatrix power plant.
2) The contract was placed by the Sudanese state electricity producer.
3) The total contract value is less than €30 million.
4) Only the required mechanical and electrical auxiliary systems were included in the contract.
5) VA Tech Hydro ordered the original equipment for the Roseires hydropower plant in 1968.
6) The output of the Roseires dam doesn't vary greatly when water level on the river changes.
7) The total generation capacity in Sudan will be 610.4 MW when the Hydromatrix power plant at Jebel Aulia is placed in operation.
8) The original turbines supplied and installed by VA Tech Hydro for NEC don't need rehabilitation.

9) The Blue Nile is characterized by the aggressive and heavy silt load.
10) Supplies, expert services and consultations are also provided in order to support the NEC in its effort to improve electricity supply of the country

№ 3 Choose the best alternative to complete these sentences.

1. VA Tech Hydro is …
   a) a turbine ordered by the NEC.
   b) a power plant.
   c) a new technology of hydraulic energy generation.

2. The contract received by VA Tech Hydro for a Hydromatrix power plant included…
   a) not only 40 power modules, each with two turbine generator sets but also some additional systems and a dam crane.
   b) only 50 power modules, each with two turbine generator sets.
   c) some of the auxiliary systems as well as a new dam crane.

3. The Jebel Aulia dam is …
   a) sometimes used for irrigation purposes and flood control.
   b) chiefly used for the control of the flood and for irrigation.
   c) never used for irrigation purposes.

4. Installation work on the next units…
   a) is being rapidly developed.
   b) is gradually collapsing.
   c) has already been stopped.

5. The modernization and rehabilitation of the turbines became necessary…
a) because of the wear and tear of the trash racks.
b) because of the wear and tear caused by the aggressive and heavy silt load of the White Nile.
c) (no right answer)

№ 4 Choose the contextual meaning of the words.

1. **operation**	a) операция	b) процесс	c) эксплуатация
2. **capacity**	a) объём	b) способность	c) грузоподъемность
3. **generation**	a) поколение	b) образование	c) выработка
4. **facility**	a) способность	b) установка	c) канал связи
5. **level**	a) уровень	b) равнина	c) этаж

Part 2

№ 5 Which sentence means exactly the same?

1) Having established from the results obtained that it is acceptable to build a dam of the size required, the engineer noted the exact siting of the dam and its type to require detailed investigation.

A. *После того как по полученным результатам инженер установил, что допустимо построить плотину указанного размера, он отметил, что точное местоположение плотины и ее тип требуют досконального исследования.*
B. *Устанавливая по получаемым результатам, что это допустимо построить плотину указанного размера, инженер отметил, что точное местоположение плотины и ее тип требовали досконального исследования.*
C. *Установив по полученным результатам, что построить плотину указанного размера являлось возможным, инженер отметил точное местоположение плотины и ее тип и потребовал доскональных исследований.*

2) Very thin concrete arch construction proved to be suitable for a high cofferdam which has to withstand high velocity of water.

A. *Оказывается, что очень тонкая бетонная арочная конструкция применима для высокой перемычки, которая должна выдерживать высокую скорость воды.*
B. *Очень тонкая бетонная арочная конструкция, как окажется, применима для высокой перемычки,*

которая сможет выдерживать высокую скорость воды.
C. *Очень тонкая бетонная арочная конструкция, как оказалось, применима для высокой перемычки, которая должна выдерживать высокую скорость воды.*

№ 6 Choose the correct form of the words.

1. By using the Hydromatrix technology, construction and start-up schedules _____ by years.
a) will have to reduce *b) can reduce* *c) can be reduced*

2. If the capacity of the existing crane _____ sufficient to lift the modules, a new crane will be supplied and installed.
a) is not *b) will not be* *c) was*

3. The problems _____ are of great magnitude and the importance.
a) to involve *b) involving* *c) involved*

4. Earth-fill dams are found _____ the simplest and cheapest dams of all.
a) to be *b) to have been* *c) was*

5. This source of energy is as _____ as that one.
a) more necessary *b) the most necessary* *c) necessary*

Part 3

№ 7 Fill in the missing words from the list. There are some extra words which you do not need to use.

a) power station *c) are* *e) was damaged* *g) flat*
b) area *d) were built* *f) small*

The best sites for hydropower in the Baltic region are found in the mountainous northern areas. The first hydroelectric power stations 1) _____ in the rivers in northern Sweden and Norway at the end of the 19th century. The development of large-scale power stations continued in this 2) _____ up to the 1980s. In comparison, the landscape in the south is very 3) _____. The Wisla River in Poland has thus only one large power station, while there 4) _____ two power stations on the Daugava River, one in Latvia and a small one in Belarus. Recently, the construction of a large 5) _____ in northern Finland has been debated much.

Part 4

№ 8 Read the text. Choose the best summary.

In many parts of the world irrigation is primarily carried out by surface methods. In northern Europe where irrigation is a supplementary practise different types of sprinkler systems dominate. Sprinkler irrigation generally needs less water and labour than surface methods and can be adapted to all types of soils, crops and topographic conditions.

Hand-moved irrigation systems with rotary sprinklers on portable pipes were the most frequent system until twenty years ago. Their capital cost was low and they were simple to use.

Then labour-saving mobile raingun systems became popular because of their relatively low capital cost and their low demand for labour. The most popular type is the hose-reel machine, which has a raingun, mounted on a sledge or wheeled carriage. One disadvantage of sprinkler systems is uneven water distribution under windy conditions. In order to improve water distribution, hose-reel machines can be equipped with a boom that has spray nozzles.

Drip irrigation systems consist of small-diameter plastic piping placed in rows with spaced emitters. The piping slowly delivers water to the root zone. The capital cost is high but the systems need very little labour since they are permanent.

The method of attaining subsurface irrigation by maintaining high water levels in ditches during summer is used in some areas. The method improves the crop water supply by capillary rise into the root zone. An example of successful subsurface irritation of this kind is the polder region in the Netherlands.

a) Different types of sprinkler system used all over the world are dealt with. Their disadvantages are also stressed.

b) The irrigation techniques dominating in northern Europe are under discussion. Their advantages and disadvantages are depicted as well.

c) The types of surface and subsurface irrigation used in the polder regions of Netherlands are under discussion.

TOTAL: 30 marks

ПРЕДМЕТНО-ТЕМАТИЧЕСКОЕ СОДЕРЖАНИЕ ЗАЧЁТА И ЭКЗАМЕНА

СПИСОК

экзаменационных тем по учебной дисциплине

«Иностранный язык (английский)»

для специальности факультета транспортных коммуникаций

1 - 70 04 03 «Водоснабжение, водоотведение и охрана водных ресурсов»

1. **Water for life.**
   1. What is water?
   2. In what physical states does water exist on the Earth?
   3. How long can man exist without water?
   4. Who experiences water shortage most?
   5. What are water resources in Belarus?
2. **Properties of water.**
   1. What characteristics determine the properties of a water sample?
   2. What are physical properties of water?
   3. What is a chemical water quality characteristic?
3. **Water supply.**
   1. What are the definitions of the term “water supply”?
   2. What is a water supply system, or water supply network?
   3. How is public supplied water delivered to our houses?
4. **Domestic water supply.**
   1. What are the purposes of domestic water?
   2. How much water is spent on cooking and cleaning?
   3. Water delivered to our houses should be free from the following impurities, shouldn’t it? What are they?
5. **Industrial water supply.**
   1. What are the purposes of water in industry?
   2. What can you say about the quality of water for industrial purposes?
   3. What do industrial water supply systems consist of?
6. **Water supply in Belarus.**
   1. What is the average daily consumption of water per capita in Belarus?
   2. What are water problems in Belarus?
   3. What can the shortcomings of the sector be characterized by?
   4. Is it worth installing water meters?
7. **Water treatment. Preliminary treatment and coagulation.**
   1. What is water treatment?
   2. What is the primary objective of water treatment?
   3. What is palatable potable water?
   4. What is pretreatment (preliminary treatment)?
   5. What is coagulation? What is the purpose of this method?
8. **Sedimentation, flotation and filtration.**
   1.Where does sedimentation take place?
   2. What types of sedimentation tanks exist?
   3. What is filtration?
   4. What types of filters do you know?
   5. What is flotation?

9. Disinfection and additional treatment.

1. How is disinfection accomplished?
2. What disinfecting agents are used for disinfection?
3. What methods of additional treatment do you know?

10. Water distribution.

1. What does the pipeline system of a municipal water distribution system consist of?
2. How are the pipelines typically arranged?
3. What can you say about pipeline materials?

11. Wastewater.

1. What is wastewater?
2. Why does sewage need to be made safe before sending it back into the environment?
3. Where is sewage usually treated?
4. What is the main purpose of sewage treatment?
5. What types of sewage are there? What are the sources of these types of sewage?

12. Wastewater treatment.

1. What is sewage (wastewater) treatment?
2. What is the purpose of sewage treatment?
3. What amazing ability does nature have?

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ВСПОМОГАТЕЛЬНЫЙ РАЗДЕЛ

УЧЕБНАЯ ПРОГРАММА БНТУ ПО УЧЕБНОЙ ДИСЦИПЛИНЕ «ИНОСТРАННЫЙ ЯЗЫК (АНГЛИЙСКИЙ)»

В ЭУМК представлены выдержки из учебной программы по учебной дисциплине «Иностранный язык (английский)» для специальности 1-70 04 03 «Водоснабжение, водоотведение и охрана водных ресурсов».

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Белорусский национальный технический университет

УТВЕРЖДАЮ
Проректор по учебной работе
Белорусского национального
технического университета
_____ А.Г. Баханович
_____
Регистрационный № УД-_____ /уч.

ИНОСТРАННЫЙ ЯЗЫК
(английский)

Учебная программа учреждения высшего образования

по учебной дисциплине для специальностей:

1-37 03 02 Кораблестроение и техническая эксплуатация внутреннего водного транспорта;

1-70 04 02 Теплогазоснабжение, вентиляция и охрана воздушного бассейна;

1-70 04 03 Водоснабжение, водоотведение и охрана водных ресурсов;

1-70 07 01 Строительство тепловых и атомных электростанций;

1-70 04 01 Водохозяйственное строительство;

1-27 01 01 Экономика и организация производства (по направлениям)

Минск 2017 г.

Учебная программа составлена на основе типовой учебной программы «Иностранный язык», утв. 15.04.2008, рег. № ТД-СГ.013/тип.

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Кафедрой английского языка №2 Белорусского национального технического университета

(протокол №____ от _____ 2017 г.)

Заведующий кафедрой _____ Н.П. Мартысюк

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(протокол №____ от _____ 2017 г.)

Председатель методической _____ В.А. Евдокимов

комиссии

Научно-методическим советом Белорусского национального технического университета (протокол №____ секции №1 от _____ 2017 г.)

ПОЯСНИТЕЛЬНАЯ ЗАПИСКА

Учебная программа по учебной дисциплине «Иностранный язык (английский)» разработана для специальностей 1-37 03 02 «Кораблестроение и техническая эксплуатация внутреннего водного транспорта», 1-70 04 02 «Теплогазоснабжение, вентиляция и охрана воздушного бассейна», 1-70 04 03 «Водоснабжение, водоотведение и охрана водных ресурсов», 1-70 07 01 «Строительство тепловых и атомных электростанций», 1-70 04 01 «Водохозяйственное строительство», 1-27 01 01 «Экономика и организация производства».

Целью изучения дисциплины является формирование иноязычной коммуникативной компетенции будущего специалиста, позволяющей использовать иностранный язык как средство профессионального и межличностного общения.

В процессе достижения главной цели решаются следующие **задачи**:

- *познавательные*, позволяющие сформировать представление об образе мира как целостной многоуровневой системе (этнической, языковой, социокультурной и т.п.); об уровне материальной и духовной культуры; системе ценностей (религиозно-философских, эстетических и нравственных); особенностях профессиональной деятельности в изучаемых странах;
- *развивающие*, позволяющие совершенствовать речемыслительные и коммуникативные способности, память, внимание, воображение, формирование потребности к самостоятельной познавательной деятельности и т.д.;
- *воспитательные*, связанные с формированием общечеловеческих, общенациональных и личностных ценностей, таких как: гуманистическое мировоззрение, уважение к другим культурам, патриотизм, нравственность, культура общения;
- *практические*, предполагающие овладение иноязычным общением в единстве всех его компетенций (языковой, речевой, социокультурной, компенсаторной, учебно-познавательной), функций (этикетной, познавательной, регулятивной, ценностно-ориентационной) и форм (устной и письменной), что осуществляется посредством взаимосвязанного обучения всем видам речевой деятельности в рамках определенного программой предметно-тематического содержания, а также овладения технологиями языкового самообразования.

Учебная дисциплина базируется на знаниях курса средней общеобразовательной школы и связана с «Обзорными лекциями по специальности». Знания и умения, полученные студентами при изучении данной дисциплины, позволяют осуществлять коммуникацию на английском языке в различных ситуациях профессиональных и деловых взаимоотношений, а также выполнять реферирование, аннотирование и перевод профессионально значимых англоязычных текстов и научных работ.

В результате изучения учебной дисциплины «Иностранный язык

(английский)» студент должен:

знать:

- систему иностранного языка в его фонетическом, лексическом и грамматическом аспектах;
- социокультурные нормы бытового и делового общения в современном поликультурном мире;
- историю и культуру страны изучаемого языка;
- основные формы культурной коммуникации;

уметь:

- вести общение профессионального и социокультурного характера на иностранном языке, сочетая диалогические и монологические формы речи;
- читать литературу на иностранном языке по профилю обучения (изучающее, ознакомительное, просмотровое и поисковое чтение);
- использовать иностранный язык в качестве инструмента профессиональной деятельности: перевод, реферирование и аннотирование профессионально ориентированных и научных текстов, выступление с публичной речью, составление деловой документации;
- использовать стилистические нормы иностранного языка в соответствии с ситуацией профессиональных или деловых взаимоотношений;

владеть:

- системой иностранного языка в его фонетическом, лексическом и грамматическом аспектах;
- правилами речевого этикета;
- рациональным и эффективным языковым поведением в ситуациях межкультурной коммуникации.

Освоение данной учебной дисциплины обеспечивает формирование следующих компетенций:

АК-2. Владеть системным и сравнительным анализом.

АК-4. Уметь работать самостоятельно.

АК-5. Быть способным порождать новые идеи (обладать креативностью).

АК-6. Владеть междисциплинарным подходом при решении проблем.

АК-7. Иметь навыки, связанные с использованием технических устройств, управлением информацией и работой с компьютером.

АК-8. Обладать навыками устной и письменной коммуникации.

АК-9. Уметь учиться, повышать свою квалификацию в течение всей жизни.

АК-10. Иметь лингвистические и коммуникативные навыки.

СЛК-2. Быть способным к социальному взаимодействию.

СЛК-3. Обладать способностью к межличностным коммуникациям.

СЛК-5. Быть способным к критике и самокритике.

СЛК-6. Уметь работать в команде.

ПК-15. Использовать информационные, компьютерные технологии.

ПК-35. Готовить доклады, материалы к презентациям.

Согласно учебным планам для специальности *1-70 04 01 «Кораблестроение*

и техническая эксплуатация внутреннего водного транспорта»

на изучение учебной дисциплины отведено:

- для очной формы получения высшего образования всего 324 часа, из них аудиторных – 136 часов;

Распределение аудиторных часов по курсам, семестрам и видам занятий приведено ниже (Таблица 1).

Таблица 1.

Очная форма получения высшего образования					
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации
1	1			68	экзамен
1	2			34	зачет
2	3			34	экзамен

Согласно учебным планам для специальности *1-70 04 02 «Теплогазоснабжение, вентиляция и охрана воздушного бассейна»*

на изучение учебной дисциплины отведено:

- для очной формы получения высшего образования всего 309 часов, из них аудиторных – 136 часов;
- для заочной формы получения высшего образования 18 аудиторных часов.

Распределение аудиторных часов по курсам, семестрам и видам занятий приведено ниже (Таблица 2, Таблица 3).

Таблица 2.

Очная форма получения высшего образования					
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации
1	1			51	зачёт
1	2			51	экзамен
2	3			34	зачёт

Таблица 3.

Заочная форма получения высшего образования					
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации
1	1			6	зачёт
1	2			6	зачёт
2	3			6	экзамен

Согласно учебным планам для специальности ***1-70 04 03 «****Водоснабжение, водоотведение и охрана водных ресурсов»* на изучение учебной дисциплины отведено:

- для очной формы получения высшего образования всего 300 часов, из них аудиторных – 136 часов;
- для заочной формы получения высшего образования всего 255 часов, из них аудиторных – 18 часов.

Распределение аудиторных часов по курсам, семестрам и видам занятий приведено ниже (Таблица 4, Таблица 5).

Таблица 4.

Очная форма получения высшего образования					
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации
1	1			51	зачёт
1	2			51	зачёт
2	3			34	экзамен

Таблица 5.

Заочная форма получения высшего образования					
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации
1	1			6	зачёт
1	2			6	зачёт
2	3			6	экзамен

Согласно учебным планам для специальности *1-70 07 01 «Строительство тепловых и атомных электростанций»* на изучение учебной дисциплины отведено всего 294 ч., из них аудиторных – 136 часа.

Распределение аудиторных часов по курсам, семестрам и видам занятий приведено в Таблице 6.

Таблица 6.

Очная форма получения высшего образования					
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации
1	1			68	зачёт
1	2			68	экзамен

Согласно учебным планам для специальности 1-70 04 01 «Водохозяйственное строительство» на изучение учебной дисциплины отведено всего 294 ч., из них аудиторных – 136 часа.

Распределение аудиторных часов по курсам, семестрам и видам занятий приведено в Таблице 7.

Таблица 7.

Очная форма получения высшего образования					
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации
1	1			68	зачёт
1	2			68	экзамен

Согласно учебным планам для специальности 1-27 01 01 «Экономика и организация производства (по направлениям)» на изучение учебной дисциплины отведено всего 330 ч., из них аудиторных – 152 часа.

Распределение аудиторных часов по курсам, семестрам и видам занятий приведено в Таблице 8.

Таблица 8.

Очная форма получения высшего образования					
Курс	Семестр	Лекции, ч.	Лабораторные занятия, ч.	Практические занятия, ч.	Форма текущей аттестации
1	1			84	зачёт
1	2			68	экзамен

<…>

СОДЕРЖАНИЕ УЧЕБНОГО МАТЕРИАЛА

РАЗДЕЛ I. МОДУЛЬ СОЦИАЛЬНОГО ОБЩЕНИЯ

Тема 1.1. Социально-бытовое общение

Личностные характеристики (биографические сведения, работа, хобби и т.д.)

Тема 1.2. Роль иностранного языка в профессиональном общении

Роль иностранного языка в профессиональной деятельности инженера. Роль международного сотрудничества в профессиональной деятельности.

Тема 1.3. Современные технологии и окружающая среда

Экологическая культура. Технический прогресс и глобальные проблемы человечества. Пути решения проблем защиты окружающей среды с точки зрения инженера. Экологические проблемы Беларуси, Великобритании и США в сопоставлении.

Раздел II. МОДУЛЬ ПРОФЕССИОНАЛЬНОГО ОБЩЕНИЯ

Тема 2.1. Учебно-профессиональное общение

Вклад белорусов в мировую науку и технику. Организация инженерного образования в Республике Беларусь и странах изучаемого языка: США и Великобритании. Обучение в университете. БНТУ.

Тема 2.2. Профессиональное общение

Предмет и содержание специальности. Общее представление о структуре и характере профессиональной деятельности. Избранная специальность как отрасль инженерии.

Тема. 2.3. Обмен научно-технической информацией

Обмен-научно-технической информацией (на выставке, конференции). Электронная и постерная презентации.

Тема 2.4. Аннотирование статьи по специальности

Составные части аннотации на иностранном языке. Клишированные фразы для написания аннотации.

Тема 2.5. Реферирование статьи по специальности

Основные части реферата на иностранном языке. Клишированные фразы для написания реферата.

Тема 2.6. Производственное общение

Типичные ситуации производственного общения. Социокультурные нормы делового общения. Профессиональная этика.

Раздел III. ЯЗЫКОВОЙ МАТЕРИАЛ

Тема 3.1. Фонетика

Звуковой строй иноязычной речи в сопоставлении с фонетической системой родного языка: особенности произнесения отдельных звуков (гласных, согласных), звукосочетаний, слов и фраз; расхождение между произношением и написанием; фонетическая транскрипция. Интонационное оформление фраз различного коммуникативного типа: повествования, вопроса, просьбы, приказа, восклицания. Фразовое и логическое ударение в сложном предложении.

Тема 3.2. Имя существительное

Категории числа, падежа, определённости.

Тема 3.3. Имя прилагательное

Категория степеней сравнения. Сравнительные конструкции.

Тема 3.4. Местоимение

Типы местоимений (личные, притяжательные, указательные, вопросительные, неопределённые, возвратные).

Тема 3.5. Числительное

Типы числительных (простые, производные, сложные; количественные порядковые; дробные).

Тема 3.6. Наречие

Типы наречий. Категория степеней сравнения.

Тема 3.7. Глагол

Видо-временная система (действительный, страдательный залог). Модальные глаголы и их эквиваленты. Согласование времён.

Тема 3.8. Неличные формы глагола

Инфинитив. Причастие. Герундий. Конструкции с неличными формами глагола.

Тема 3.9. Словообразование

Словообразовательные модели (существительное, прилагательное, наречие, глагол).

Тема 3.10. Служебные слова

Предлоги. Союзы. Союзные слова.

Тема 3.11. Простое предложение

Типы простых предложений; порядок слов. Члены предложения: способы выражения, правила согласования подлежащего и сказуемого. Специфические конструкции и обороты.

Тема 3.12. Сложное предложение

Типы сложного предложения (сложносочинённое и сложноподчинённое). Типы придаточных предложений. Условные предложения. Бессоюзное подчинение.

Тема 3.13. Прямая и косвенная речь

Правила перевода в косвенную речь предложений разных типов.

Тема 3.14. Профессиональная лексика

Наиболее употребительные слова и словосочетания по предметно-тематическому содержанию курса. Сочетаемость слов; свободные и устойчивые словосочетания. Общенаучная лексика и терминология.

Тема 3.15. Разговорные клише

Знакомство. Установление, поддержание контакта. Выражение просьбы. Выражение согласия, несогласия с мнением автора (собеседника). Начало, продолжение, завершение беседы. Выражение собственного мнения. Запрос о мнении собеседника. Уверенность, неуверенность.

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УЧЕБНО-МЕТОДИЧЕСКАЯ КАРТА УЧЕБНОЙ ДИСЦИПЛИНЫ
***очная форма* получения высшего образования для направлений специальности**
1-70 04 03 «Водоснабжение, водоотведение и охрана водных ресурсов»

Номер раздела, темы	Название раздела, темы	Количество аудиторных часов			
		Лекции	Практические занятия	Семинарские занятия	Лабораторные занятия
1	2	3	4	5	6
	1 семестр				
1.1	Социально-бытовое общение		4		
1.2	Роль иностранного языка в профессиональном общении		4		
1.3	Современные технологии и окружающая среда		4		
2.1	Учебно-профессиональное общение		8		
3.1	Фонетика		4		
3.2	Имя существительное		4		
3.3	Имя прилагательное		4		
3.10	Служебные слова		2		
3.11	Простое предложение		4		
3.12	Сложное предложение		4		
3.14	Профессиональная лексика		6		
3.15	Разговорные клише		3		
	Итого за семестр		51		
	2 семестр				
2.2	Профессиональное общение		9		
2.3	Обмен научно-технической информацией		8		
3.4	Местоимение		4		
3.5	Числительное		4		
3.6	Наречие		4		
3.7	Глагол		4		
3.8	Неличные формы глагола		4		
3.9	Словообразование		4		
3.14	Профессиональная лексика		8		
3.15	Разговорные клише		2		
	Итого за семестр		51		
	3 семестр				
2.4	Аннотирование статьи по специальности		6		
2.5	Реферирование статьи по специальности		6		
2.6	Производственное общение		10		

3.13	Прямая и косвенная речь		6		
3.14	Профессиональная лексика		6		
3.15	Разговорные клише		2		
	Итого за семестр		34		
	Всего аудиторных часов	136			

Номер раздела, темы	Название раздела, темы	Количество аудиторных часов	Форма контроля знаний
		Практические занятия	
1.	2	3	4
	1 семестр		
1.1	Социально-бытовое общение	4	
1.2	Роль иностранного языка в профессиональном общении	4	
1.3	Современные технологии и окружающая среда	4	
2.1	Учебно-профессиональное общение	8	
3.1	Фонетика	4	
3.2	Имя существительное	4	
3.3	Имя прилагательное	4	
3.10	Служебные слова	2	
3.11	Простое предложение	4	
3.12	Сложное предложение	4	
3.14	Профессиональная лексика	7	
	Итого за семестр	51	зачет
	2 семестр		
2.2	Профессиональное общение	8	
2.3	Обмен научно-технической информацией	4	
3.4	Местоимение	4	
3.5	Числительное	4	
3.6	Наречие	4	
3.14	Профессиональная лексика	8	
3.15	Разговорные клише	2	
	Итого за семестр	34	зачёт
	3 семестр		
2.4	Аннотирование статьи по специальности	6	

2.5	Реферирование статьи по специальности	6	
2.6	Производственное общение	6	
3.7	Глагол	6	
3.8	Неличные формы глагола	6	
3.9	Словообразование	6	
3.13	Прямая и косвенная речь	6	
3.14	Профессиональная лексика	6	
3.15	Разговорные клише	3	
	Итого за семестр	51	экзамен
	Всего аудиторных часов	**136**	

СРЕДСТВА ДИАГНОСТИКИ РЕЗУЛЬТАТОВ УЧЕБНОЙ ДЕЯТЕЛЬНОСТИ (МОДУЛЬ КОНТРОЛЯ)

Средства диагностики результатов учебной деятельности (модуль контроля)

Для оценки достижений студента рекомендуется использовать следующий диагностический инструментарий:

– устный и письменный опрос во время практических занятий;

– проведение текущих контрольных работ (заданий) по отдельным темам;

– защита выполненных в рамках управляемой самостоятельной работы индивидуальных заданий;

– зачет;

– экзамен.

Требования к различным этапам диагностики компетенций студентов

Проверка знаний и умений осуществляется в форме текущего, промежуточного и итогового контроля. *Текущий контроль* предусмотрен программой и осуществляется на аудиторных занятиях с целью проверки уровня владения пройденной частью языкового и речевого материала и степени сформированности коммуникативных навыков и умений. Текущий контроль осуществляется в форме комплексных заданий, лексико-грамматических тестов, коллоквиумов, собеседований.

Промежуточный контроль проводится в конце прохождения каждой темы в виде лексико-грамматических тестов и самостоятельной работы по текстам по специальности.

Итоговый контроль носит комплексный характер и проводится в двух формах: зачета и экзамена.

Оценка учебных достижений студентов на экзаменах по дисциплине «Иностранный язык (английский)» производится по десятибалльной шкале. Для оценки учебных достижений студентов используются критерии, утвержденные Министерством образования Республики Беларусь.

ЗАЧЁТ по дисциплине «Иностранный язык (английский)» основывается на результатах текущего и промежуточного контроля и направлен, с одной стороны, на проверку умения работы с текстом, а с другой стороны, – на проверку коммуникативных навыков и умений, приобретенных студентами на соответствующем этапе обучения.

Требования к зачету:

Письменная часть

1. Лексико-грамматический тест.

2. Чтение и письменный перевод оригинального общенаучного или общетехнического текста с иностранного языка на родной со словарем. Объем – 1000 печатных знаков. Время выполнения – 45 мин.

Устная часть

1. Подготовленное высказывание по заданной ситуации (10-12 предложений) и неподготовленная беседа с преподавателем в рамках данной ситуации (6-7 реплик).

2. Реферирование оригинального или частично адаптированного культурологического или научно-популярного текста на иностранном языке; беседа на иностранном языке по содержанию текста. Объем текста – 700 печатных знаков. Время выполнения – 10 мин.

ЭКЗАМЕН включает следующие задания:

Письменная часть

1. Лексико-грамматический тест.

2. Чтение и письменный перевод оригинального профессионально ориентированного текста с иностранного языка на родной со словарем. Объем – 1300-1500 печатных знаков. Время – 45 мин.

Устная часть

1. Подготовленное высказывание по заданной ситуации и неподготовленная беседа с преподавателем в рамках данной ситуации (по предметно-тематическому содержанию дисциплины).

2. Реферирование аутентичного или частично адаптированного общественно-политического, культурологического, научно-популярного текста; беседа на иностранном языке по содержанию текста. Объем текста – 900 печатных знаков. Время – 5-7 мин.

МЕТОДИЧЕСКИЕ РЕКОМЕНДАЦИИ ПО ОРГАНИЗАЦИИ И ВЫПОЛНЕНИЮ САМОСТОЯТЕЛЬНОЙ РАБОТЫ СТУДЕНТОВ

При изучении дисциплины рекомендуется использовать следующие формы самостоятельной работы:

- подготовка сообщений, тематических докладов, презентаций по заданным темам;
- проработка тем (вопросов), вынесенных на самостоятельное изучение.

МЕТОДЫ (ТЕХНОЛОГИИ) ОБУЧЕНИЯ

Основными методами (технологиями) обучения, отвечающими целям изучения дисциплины, являются:

- *проектная технология*, представляющая самостоятельную, долгосрочную групповую работу по теме-проблеме, выбранную самими студентами, включающую поиск, отбор и организацию информации. В процессе работы над проектом речевое иноязычное общение «вплетено в интеллектуально-эмоциональный контекст другой деятельности»;
- *кейс-технология*, основу которой составляют осмысление, критический анализ и решение конкретных социальных проблем. Кейс-технология ориентирована на развитие способности студентов решать определенные жизненные ситуации, важные повседневные проблемы, с которыми они непосредственно сталкиваются в жизни;

– *симуляция*, которая применительно к иностранному языку представляет собой подражательное, разыгранное воспроизведение межличностных контактов, организованных вокруг проблемной ситуации, максимально приближенной к реальной;

– *технология обучения в сотрудничестве*, предполагающая создание условий для активной совместной учебной деятельности студентов в разных учебных ситуациях. Это обучение в процессе общения студентов друг с другом и с преподавателем при наличии общей цели и индивидуальной ответственности каждого члена группы за собственный вклад в общее дело, за выполнение общего задания;

– *технология дебатов*, представляющая собой полемический диалог, проходящий по определенному сценарию и имеющий целью убеждение третьей стороны – судей или аудитории.

– *компьютерные технологии*, предполагающие широкое использование Интернет-ресурсов и мультимедийных обучающих программ. Компьютерные технологии позволяют интенсифицировать и активизировать учебно-познавательную деятельность студентов, эффективно организовать и спланировать самостоятельную работу, совершенствовать контрольно-оценочные функции (компьютерное тестирование).

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