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Water is Life

Part 2

Учебное пособие

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Учебное пособие разработано в соответствии с программой по иностранным языкам для неязыковых вузов. Включены аутентичные тексты по специальности, научно-популярные статьи из зарубежных периодических изданий, а также упражнения, направленные на развитие навыков говорения, чтения и перевода оригинальной литературы в профессиональной сфере.

Предназначено для студентов-магистрантов факультета водоснабжения и водоотведения, стремящихся расширить навыки владения английским языком.

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**Unit 4**

**WАTER CONTAMINATION**

*“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. Of all our planet's activities – geological movements,*

*the reproduction and decay of biota, and even the disruptive propensities of certain species (elephants and humans come to mind) – no force is greater than the hydrologic cycle”.*

Richard Bangs and Christian Kallen, Rivergods, 1985

**Preface**

**Read the text and say: why Baikal is called “the pearl of Siberia” and why it is in danger.**

**"The Pearl of Siberia"**

Baikal is surprising, and not without reason Siberians call it not the lake, but the sea. Water is unusually transparent so it is visible through it as through air; its color pleasant for an eye. Coast hills are covered with impenetrable, gloomy woods. Abundance of bears, sables, wild goats and any wild miscellanea …

Baikal gives us great and huge pleasure. It strikes with monumentalism of style, that fine, mighty and eternal that is put in its nature. It possesses remarkable property – than more you approach with it, the more deeply you learn its nature, the alluring it becomes and the more clearly you understand that it is absolutely unique and is bewitching is unique.

Lake Baikal is the largest (by volume) freshwater lake in the world, containing roughly 20 % of the world's unfrozen surface fresh water. Baikal is the world's deepest lake. It is considered among the world's clearest lakes and is considered the world's oldest lake – at 25 million years. It is the seventh-largest lake in the world by surface area.

Lake Baikal is rich in biodiversity. It hosts more than 1,000 species of plants and 2,500 species of animals based on current knowledge, but the actual figures for both groups are believed to be significantly higher. More than 80 % of the animals are endemic (found only at Lake Baikal). The Baikal seal or nerpa (Pusa sibirica) is found throughout Lake Baikal. It is one of only three entirely freshwater seal populations in the world, the other two being subspecies of ringed seals.

But more often we hear that Baikal is in danger.

Selenga River is the largest tributary of the lake. On the territory of Mongolia, the major sources of pollutants in the basin of the Selenga and in the future – into the lake is a city of Ulaanbaatar, as well as gold mines in Zaamar. In Russia, the main pollutant of the Selenga is the city of Ulan-Ude.

The Baykalsk Pulp and Paper Mill were constructed in 1966, directly on the shoreline, bleaching paper with chlorine and discharging waste into Baikal. After decades of protest, the plant was closed in November 2008 due to unprofitability.

According to The Moscow Times, increasing amount of invasive species of algae thrive in the lake from hundreds of tons of liquid waste, including fuel and excrement, regularly disposed into the lake by tourist sites, and up to 25,000 tons of liquid waste disposed every year by local ships.

Notes:

|  |  |
| --- | --- |
| Transparent | прозрачный |
| Impenetrable | непроглядный |
| Wild miscellanea | дикий |
| Biodiversity | биоразнообразие |
| Sable | соболь |
| Ringed seal | кольчатая нерпа |

**Warming up**

1. **Read and translate water proverbs and water**

**sayings.**

1*. To be in bad waters.* (To be in a difficult position.)

2*. To discover warm water.* (Something is very obvious.)

3. *To keep water in one's mouth*. (To keep a secret.)

4. *To lose oneself in a glass of water/To drown in a glass of water*. (To be easily discouraged.)

5. *To make a hole into the water/To pound water in a mortar*. (Making vain attempts.)

6. *To throw water on fire*. (To cool down a hot matter.)

7*. To work under water*. (Hiding one's real intentions.)

**2. Give Russian proverbs and sayings about water.**

**Reading for speaking and discussing**

1. **Give the Russian equivalents to the following**

**words:**

Overload, bay, waste, pure, separate, cancer, leaks, damage, lessen, spills, lubrication, harmful, penetrate, poison, feather, tissue, exhaust, mine, cell, lethal form, kidney, circumstance, accidental spill, liver, feed, infant, sewage, promote, abandon, cause.

**2. Read and translate the following international words:**

Organism, chemical, toxic, class, material, physical, biological, plastics, pesticides, herbicides, period, result, organ, process, reproductive, nitrates, phosphates, anemia, automobile, metal, problem, pathogens, thermal, temperature, radioactive, effect.

**3. Read the text and answer the question: What are the major water pollutants?**

**Water Pollution**

*“Water, water, everywhere,*

*And all the boards did shrink.*

*Water, water everywhere,*

*Nor any drop to drink”.*

Samuel Taylor Coleridge,

”The Rime of the Ancient Mariner”, 1798

Water pollution occurs mostly, when people overload the water environment such as streams, lakes, underground water, bays or seas with wastes or substances harmful to living beings.

Water is necessary for life. All organisms contain it, some drink it and some live in it. Plants and animals require water that is moderately pure, and they cannot survive, if water contains toxic chemicals or harmful microorganisms. Water pollution kills large quantity of fish, birds, and other animals, in some cases killing everything in an affected area.

Pollution makes streams, lakes, and coastal waters unpleasant to swim in or to have a rest. Fish and shellfish harvested from polluted waters may be unsafe to eat. People can become ill, if they drink polluted water for a long time, it may develop cancer or hurt their future children.

The major water pollutants are chemical, biological, and physical materials that lessen the water quality. Pollutants can be separated into several different classes:

The first class is petroleum products: oil, fuel, lubrication, plastics. The petroleum products get into water by accidental spills from ships, tanker trucks and when there are leaks from underground storage tanks. Many petroleum products are poisonous for animals. Spilled oil damages the feathers of birds and the fur of animals, often it causes death.

The second class is pesticides and herbicides. Farms often use large amounts of herbicides and pesticides, both of which are toxic pollutants. These substances are particularly dangerous to life in rivers, streams and lakes, where toxic substances can build up over a period of time.

Farms also frequently use large amounts of chemical fertilizers that are washed into the waterways and damage the water supply and the life within it. Fertilizers can increase the amounts of nitrates and phosphates in the water, which can lead to the process of eutrophication.

Allowing livestock to graze near water sources often results in organic waste products being washed into the waterways. This sudden introduction of organic material increases the amount of nitrogen in the water, and can also lead to eutrophication. There are chemicals used to kill harmful animals and plants. If they penetrate into streams, rivers, lakes, these chemicals can be very dangerous for a long time. When an animal eats a plant that's been treated with it, the poisons are absorbed into the tissues and organs of the animals.

When other animals feed on a contaminated animal, the chemicals are passed up to them. As it goes up through the food chain, the chemical becomes more harmful, so animals at the top of the food chains may suffer cancers, reproductive problems, and death. Nitrates can cause a lethal form of anemia in infants.

The third class is heavy metals, such as, mercury, selenium, uranium, radium, cesium, etc. They get into the water from industries, automobile exhausts, mines, and natural soil. Heavy metals also become more harmful as they follow the food chain. They accumulate in living being's cells and when they reach high levels of concentration in the organism, they can be extremely poisonous, or can result in long-term health problems. They can sometimes cause liver and kidney

damage.

The fourth class is fertilizers and other nutrients used to promote plant growth on farms and in gardens.

The fifth class is infectious organisms and pathogens. They enter water through sewage, storm drains, runoff from farms, etc.

The last one is thermal pollution. Many industrial and power plants use rivers, streams and lakes to dispose of waste heat. The resulting hot water can cause thermal pollution. Thermal pollution can have a dangerous effect on life in an aquatic ecosystem as temperature increases decrease the amount of oxygen in the water, thereby reducing the number of animals that can survive there.

Water can become contaminated with toxic or radioactive materials from industry, mine sites and abandoned hazardous waste sites. The water is usually returned to the source warmer than when it was taken. Even a small temperature change in a body of water can drive away the fish and other species that were originally there, and attract other species in place of them. It breaks a balance and can cause serious circumstances in future.

Notes:

|  |  |
| --- | --- |
| Feathers of birds | перья птиц |
| Fur of animals | мех животных |
| Tissues | ткани |
| Mercury | ртуть |
| Kidney | почка |

**4. Find the word in the text which is similar to:**

Dangerous, clean, contamination, harm, to eat, to build up, to come back, children, hard, dirty substances, to decline, to demand, various, quantity, liquid, to receive, to make

different.

**5. Match the verbs with the nouns according to the text:**

|  |  |
| --- | --- |
| To cause | problems |
| To suffer | plant growth |
| To lead to | animals |
| To result in | water |
| To break | illness |
| To promote | balance |
| To damage | pollution |
| To poison | death |

**6. Complete the statements:**

**The main water pollutants are…**

1. …chemical fertilizers, oil, fuel, lubrication, plastics, pesticides and herbicides, nitrogen.

2. …mercury, selenium, uranium, radium, cesium, pathogens.

3. …toxic chemical, biological, and physical materials, harmful microorganisms.

**The pollutants come from…**

1. …boats, farms, industries, cars, lorries, mines and all living organisms.

2. …people, animals, insects, plants, fields, gardens, industrial plants, mine sites.

3. …sewage, storm drains, farms runoff, industries, people, ships, tanker trucks, automobile exhausts, mines, natural soil.

**7. What statement answers the question: Why is pollution dangerous?**

1. Plants and animals require water that is moderately pure, the plants cannot survive, and the animals leave the places if water contains toxic chemicals or harmful microorganisms.

2. Water pollution becomes unpleasant to fish, birds, and other living organisms to swim in or to rest.

3. Water pollution kills large quantity of fish, birds, and other animals, in some cases killing everything in an affected area. People can become ill, if they drink polluted water for a long time, it may develop cancer or hurt their future children.

**8. What statement corresponds to the content of the text?**

1. Water pollution kills in some cases everything in an affected area.

2. Water pollution disturbs the lives of all living things.

3. Water pollution makes people think of their future life.

**9. Explain the quotation:** “Water, water, everywhere,

And all the boards did shrink.

Water, water everywhere,

Nor any drop to drink”.

**Do you agree/disagree with it? Give your reasons.**

1. **Translate the sentences from Russian into**

**English**.

1. Загрязнение воды происходит главным образом, когда люди перегружают водную окружающую среду, ручьи, озера, подземные воды, заливы и моря отходами или веществами, вредными для живых существ.

2. Загрязнение воды убивает большое количество рыбы, птиц и других животных, а в некоторых случаях в пострадавших районах убивает все живое.

3. Люди, которые пьют загрязненную воду, могут заболеть, если они пьют загрязненную воду в течение долгого времени, это может вызвать рак или навредить их будущим детям.

4. Пролитая нефть повреждает перья птиц и мех животных, часто это приводит к смерти.

5. Проникая вверх по пищевой цепочке, химикаты становятся все более и более вредоносными, так что животные на верхних ступенях пищевой цепочки могут страдать раковыми образованиями.

6. Тяжелые металлы накапливаются в клетках живых организмов и могут быть чрезвычайно ядовитыми или могут стать причиной серьезных проблем со здоровьем.

7. Даже малое температурное изменение воды может отпугнуть рыбу и другие виды животных, которые изначально жили там, и привлечь другие разновидности вместо них.

**11. Write the summary of the text.**

**12. Retell the text “Water Pollution”**

**Reading for understanding**

**1. Read the text and say how the acid rain occurs and what damage it causes.**

**Acid Rain**

Acid rain is a result of air pollution. When any type of fuel is burnt, lots of different chemicals are produced. The smoke that comes from a fire or the fumes that come out of a car exhaust don't just contain the sooty grey particles that you can see – they also contains lots of invisible gases that can be even more harmful to our environment.

Power stations, factories and cars all burn fuels and therefore they all produce polluting gases. Some of these gases react with the tiny droplets of water in clouds to form sulphuric and nitric acids. The rain from these clouds then falls as very weak acid – which is why it is known as “acid rain”.

Acid rain can be carried great distances in the atmosphere, not just between countries but also from continent to continent. The acid can also take the form of snow, mists and dry dusts. The rain sometimes falls many miles from the source of pollution but wherever it falls it can have a serious effect on soil, trees, buildings and water.

Forests all over the world are dying, fish are dying. In Scandinavia there are dead lakes, which are crystal clear and contain no living creatures or plant life.

It is in aquatic habitats that the effects of acid rain are most obvious. Acid rain runs off the land and ends up in streams, lakes and marshes – the rain also falls directly on these areas.

As the acidity of a lake increases, the water becomes clearer and the numbers of fish and other water animals decline. Some species of plant and animal are better able to survive in acidic water than others. Freshwater shrimps, snails, mussels are the most quickly affected by acidification followed by fish such as minnows, salmon and roach. The roe and fry (eggs and young) of the fish are the worst affected, the acidity of the water can cause deformity in young fish and can prevent eggs from hatching properly.

Lakes, rivers and marshes each have their own fragile ecosystem with many different species of plants and animals all depending on one another to survive. If a species of fish disappears, the animals which feed on it will gradually disappear too. If the extinct fish used to feed on a particular species of large insect, that insect population will start to grow, this in turn will affect the smaller insects or plankton on which the larger insect feeds.

In addition, acid rain accelerates the decay of building materials and paints, including irreplaceable buildings, statues, and sculptures that are part of our nation's cultural heritage.

“Acid rain” is a broad term used to describe several ways that acids fall out of the atmosphere. A more precise term is acid deposition, which has two parts: wet and dry.

Wet deposition refers to acidic rain, fog, and snow. As this acidic water flows over and through the ground, it affects a variety of plants and animals. The strength of the effects depend on many factors, including how acidic the water is, the chemistry and buffering capacity of the soils involved, and the types of fish, trees, and other living things that rely on the

water.

Dry deposition refers to acidic gases and particles. About half of the acidity in the atmosphere falls back to earth through dry deposition. The wind blows these acidic particles and gases onto buildings, cars, homes, and trees. Dry deposited gases and particles can also be washed from trees and other surfaces by rainstorms.

Notes:

|  |  |
| --- | --- |
| Marshes | болота |
| Shrimps | креветки |
| Snails | улитки |
| Mussels | мидии |
| Minnows | пескари |
| Salmon | лосось |
| Roach | плотва |

**2. Are the statements true or false? Correct** t**he false statements.**

1. When any type of fuel is burnt, a few different chemicals are produced.

2. The rain sometimes falls many miles from the source of pollution but wherever it falls it can have a little effect on soil, trees, buildings and water.

3. As the acidity of a lake increases, the water becomes clearer and the numbers of fish and other water animals decline.

4. Freshwater shrimps, snails, mussels are the most slowly affected by acidification followed by fish such as minnows, salmon and roach.

5. Dry deposition refers to acidic rain, fog, and snow.

6. Wet deposition refers to acidic gases and particles.

**3. Find in the text equivalents to the following words and word combinations.**

Невидимые газы; вредный для окружающей среды; капли воды; кислотный дождь; мертвые озера; живые существа; выживать в кислотной воде; виды растений и рыб; популяция насекомых; улитки; моллюски; болото; культурное наследие; вымершие животные и рыбы; дождевые потоки; точное определение; икринки и мальки рыб; в свою очередь; кристально чистый.

**4. Retell the text “The Acid Rain”.**

**5. Read the** **dialogue between two friends about water pollution and act it.**

Alex:Isn’t it very alarming that the water of our canals, rivers and tanks is getting polluted day by day?

Kevin: This polluted water causes much harm to us.

Alex: But man is mainly responsible for water pollution. They pollute water by throwing waste into it.

Kevin: Farmers use chemical fertilizer and insect ides in their fields. Rain and floods wash away some of the chemicals. They get mixed with the water of canals, ponds and rivers and pollute water.

Alex: Mills and factories also pollute water by the waste materials.

Kevin: Water pollution can be prevented in many ways. But the main way is to make the people aware of the importance of pure water.

Alex: Thank you for this important discussion.

Kevin: You’re most welcome. Bye.

**6. Discuss the problem of pollution in your own dialogues.**

**Reading for translating**

1. **Focus on grammar:** **Relative clauses.**

**What is a relative clause?**

We can use relative clauses to join two English sentences or to give more information about something.

|  |  |
| --- | --- |
| I bought a new car. It is very fast. → | I bought a new car that is very fast. |
| She lives in New York.  She likes living in New York. → | She lives in New York, which she likes. |

**Defining and Non-defining**

A defining relative clause tells which noun we are talking about:

I like the woman who lives next door.

(If I don't say “who lives next door”, then we don't know which woman I mean).

A non-defining relative clause gives us extra information about something. We don't need this information to understand the sentence.

I live in London, which has some fantastic parks.

(Everybody knows where London is, so “which has some fantastic parks” is extra information).

**Defining relative clauses:**

1: The relative pronoun is the subject:

First, let's consider when the relative pronoun is the subject of a defining relative clause.

We can use **who**, **which** or **that**. We use **who** for people and **which** for things. We can use **that** for people or things.

The relative clause can come after the subject or the object of the sentence. We can't drop the relative pronoun.

For example (clause after the object of the sentence):

I'm looking for a secretary who / that can use a computer well.

She has a son who / that is a doctor.

We bought a house which / that is 200 years old.

I sent a letter which / that arrived three weeks later.

More examples (clause after the subject of the sentence):

The people who / that live on the island are very friendly.

The man who / that phoned is my brother.

The camera which / that costs £100 is over there.

The house which / that belongs to Julie is in London.

A defining relative clause tells which noun we are talking about:

2: The relative pronoun is the object:

Next, let's talk about when the relative pronoun is the object of the clause. In this case we can drop the relative pronoun if we want to. Again, the clause can come after the subject or the object of the sentence. Here are some examples:

(Clause after the object)

She loves the chocolate (which / that) I bought.

We went to the village (which / that) Lucy recommended.

John met a woman (who / that) I had been to school with.

The police arrested a man (who / that) Jill worked with.

(Clause after the subject)

The bike (which / that) I loved was stolen.

The university (which / that) she likes is famous.

The woman (who / that) my brother loves is from Mexico.

The doctor (who / that) my grandmother liked lives in New York.

**Non-defining relative clauses:**

We don't use **that** in non-defining relative clauses, so we need to use **which** if the pronoun refers to a thing, and **who** if it refers to a person. We can't drop the relative pronoun in this kind of clause, even if the relative pronoun is the subject of the clause.

(Clause comes after the subject)

My boss, who is very nice, lives in Manchester.

My sister, who I live with, knows a lot about cars.

My bicycle, which I've had for more than ten years, is falling apart.

My mother's house, which I grew up in, is very small.

(Clause comes after the object)

Yesterday I called our friend Julie, who lives in New York.

The photographer called to the Queen, who looked annoyed.

Last week I bought a new computer, which I don't like now.

I really love the new Chinese restaurant, which we went to last night.

**2. Complete these sentences with a suitable relative pronoun or adverb**

That is the man \_\_\_ helped me when I fell down in the street.

Is that your car? No, mine is the one \_\_\_ is parked just opposite the bank.

That is the woman \_\_\_ complained about the room service.

This is the park \_\_\_ we first met. Do you remember?

So, James is the man \_\_\_ son came on the school trip with us? I didn't know.

If you have any question, ask the girl \_\_\_ is standing at the desk. She'll help you.

They had to put away the dog \_\_\_ bit the boy.

It was too dangerous.

I'm looking for a person \_\_\_ surname begins with a “k”.

Do you still go to that pub \_\_\_ we used to go as students?

The heating is not working. Do you know anyone \_\_\_ can fix it?

**3. Read and translate the text using a dictionary.**

**Sewage**

With billions of people on the planet, disposing of sewage waste is a major problem. According to 2013 figures from the World Health Organization, some 780 million people (11 percent of the world's population) don't have access to safe drinking water, while 2.5 billion (40 percent of the world's population) don't have proper sanitation (hygienic toilet facilities); although there have been great improvements in securing access to clean water, relatively little progress has been made on improving global sanitation in the last decade. Sewage disposal affects people's immediate environments and leads to water-related illnesses such as diarrhea that kills 760,000 children under five each year. In developed countries, most people have flush toilets that take sewage waste quickly and hygienically away from their homes.

Yet the problem of sewage disposal does not end there. When you flush the toilet, the waste has to go somewhere and, even after it leaves the sewage treatment works, there is still waste to dispose of. Sometimes sewage waste is pumped untreated into the sea. Until the early 1990s, around 5 million tons of sewage was dumped by barge from New York City each year. According to 2002 figures from the UK government's Department for the Environment, Food, and Rural Affairs (DEFRA), the sewers of Britain collect around 11 billion liters of waste water every day, some of it still pumped untreated into the sea through long pipes. The New River that crosses the border from Mexico into California once carried with it 20-25 million gallons (76–95 million liters) of raw sewage each day; a new waste water plant on the US-Mexico border, completed in 2007, substantially solved that problem. Unfortunately, even in some of the richest nations, the practice of dumping sewage into the sea continues. In early 2012, it was reported that the tiny island of Guernsey (between Britain and France) has decided to continue dumping 16,000 tons of raw sewage into the sea each day.

In theory, sewage is a completely natural substance that should be broken down harmlessly in the environment: 90 percent of sewage is water. In practice, sewage contains all kinds of other chemicals, from the pharmaceutical drugs people take to the paper, plastic, and other wastes they flush down their toilets. When people are sick with viruses, the sewage they produce carries those viruses into the environment. It is possible to catch illnesses such as hepatitis, typhoid, and cholera from river and sea water.

Grey water (sometimes spelled gray water in the United States) is the idea of having two separate household water systems. First, you have a normal household water supply of clean, fresh water (sometimes called whitewater or mains water), which you use for drinking, cooking, and so on. But you also have an extra tank that collects the used water from your bath tub, shower, washing machine. This is your grey water. It's used for flushing the toilet (automatically), but you can also use it for washing the car, watering the garden, and anything else that doesn't need absolutely clean water. Sometimes water from the kitchen sink (dark grey water) is reused too. Water from the toilet (known as black water) is never reused: it's discharged to the sewer in the usual way.

**4. Read, translate and remember.**

Some facts about water

Why water is in great need.

Water prevents attention deficit disorder in children and adults.

Water increases efficiency at work; it expands your attention span.

Water is a better pick-me-up than any other beverage in the world – and it has no side effects.

Water prevents stress, anxiety, and depression.

Water restores normal sleep rhythms.

Water prevents fatigue – it gives the energy of youth.

Water makes the skin smooth and prevents aging.

Water is used to transport all substances inside the body.

Water prevents glaucoma.

Water normalizes the blood-manufacturing systems in the bone marrow – it helps prevent leukemia and lymphoma.

Water increases the efficiency of red blood cells in collecting oxygen in the lungs.

When water reaches a cell, it brings the cell oxygen and takes the waste gases to the lungs for disposal.

The human body has no water storage to draw on during dehydration. This is why you must drink regularly throughout the day.

Water clears toxic waste from different parts of the body and takes it to the liver and kidneys for disposal.

Water is the main lubricant in the joint spaces and prevents arthritis and back pain.

Water decreases premenstrual pains and hot flashes.

Water increases the rate of absorption into the body of essential substances in food.

Soft drinks, coffee, and tea, while made up almost entirely of water, also contain caffeine. Caffeine can act as a mild diuretic, preventing water from traveling to necessary locations in the body.

**Unit 5**

**WATER PURIFICATION**

*“When the well's dry, we know the worth of water.”*

Benjamin Franklin

**Preface**

**Read the text and say: why humans tried to purify water.**

**Community Water Treatment**

Food and shelter are crucial for living, but nobody can survive for very long without water. That's why, since the beginning of history, civilizations have lived near abundant sources of H20.

But it's not enough just to have plenty of it. The same water that gives life can also make people sick or even kill them, if it contains dangerous substances or disease-causing microbes. And since people use water for activities such as irrigating crops, washing and waste disposal, sources of water close to a human population can easily become contaminated.

As a result, humans have been trying to purify water for thousands of years. As far back as 1500 B.C., Egyptians used the chemical alum to filter suspended sediment out of their drinking water. But it wasn't until the late 1800s and early 1900s that scientists figured out that microbes caused illnesses and that water could be treated with chlorine or ozone to eliminate them.

**Warming up**

1. **Read and translate water proverbs and water**

**sayings.**

*Clean water should be a necessity.*

*Save water before it’s too late.*

*Pollution – if you don’t kill it, it will kill you.*

*“Pure water is the world's first and foremost medicine”.*

Slovakian Proverb

*“Water is fluid, soft, and yielding. But water will wear away rock, which is rigid and cannot yield. As a rule, whatever is fluid, soft, and yielding will overcome whatever is rigid and hard. This is another paradox: what is soft is strong”.*

Lao-Tzu

*“Water is the most critical resource issue of our lifetime and our children's lifetime. The health of our waters is the principal measure of how we live on the land”.*

Luna Leopold

*“Water is the lifeblood of our bodies, our economy, our nation and our well-being”.*

Stephen Johnson

*“All the waters run to the sea and yet the sea is not full, and from the place where they began, thither they return again”.*

Ecclesiastes

*“In one drop of water are found all the secrets of all the oceans”.*

Khalil Gibran

**2. Give Russian proverbs and sayings about water.**

**Reading for speaking and discussing**

**1. Give the Russian equivalents to the following**

**words:**

suspended solids and gases, to fulfill, to include, carbon, particulate matter, to reduce, to derive, contaminants, intended purpose, expensive, to obtain, raw water, to avoid, to occur, turbidity, algae, subsequent, fungi, to store, a buffer, to remove large debris.

1. **Read and translate the following international**

**words:**

pharmacological, chemical, medical, physical, filtration, parasites, bacteria, biological, chlorination, radiation, ultraviolet, material, standards, minimum and maximum, practical, analysis, infrastructure, organisms, filter, effect.

**3. Read the text and do exercises after it.**

**Water Purification**

Water purification is the process of removing undesirable chemicals, biological contaminants, suspended solids and gases from contaminated water. The goal is to produce water fit for a specific purpose. Most water is disinfected for human consumption (drinking water), but water purification may also be designed for a variety of other purposes, including fulfilling the requirements of medical, pharmacological, chemical and industrial applications. The methods used include physical processes such as filtration, sedimentation, and distillation; biological processes such as slow sand filters or biologically active carbon; chemical processes such as flocculation and chlorination and the use of electromagnetic radiation such as ultraviolet light.

Purifying water may reduce the concentration of particulate matter including suspended particles, parasites, bacteria, algae, viruses, fungi, as well as reducing the amount of a range of dissolved and particulate material derived from the surfaces that come from runoff due to rain.

The standards for drinking water quality are typically set by governments or by international standards. These standards usually include minimum and maximum concentrations of contaminants, depending on the intended purpose of water use.

Visual inspection cannot determine if water is of appropriate quality. Simple procedures such as boiling or the use of a household activated carbon filter are not sufficient for treating all the possible contaminants that may be present in water from an unknown source. Even natural spring water – considered safe for all practical purposes in the 19th century – must now be tested before determining what kind of treatment, if any, is needed. Chemical and microbiological analysis, while expensive, are the only way to obtain the information necessary for deciding on the appropriate method of purification.

Drinking water sources are subject to contamination and require appropriate treatment to remove disease-causing agents. Public drinking water systems use various methods of water treatment to provide safe drinking water for their communities. Today, the most common steps in water treatment used by community water systems (mainly surface water treatment) include:

*Coagulation and Flocculation*

Coagulation and flocculation are often the first steps in water treatment. Chemicals with a positive charge are added to the water. The positive charge of these chemicals neutralizes the negative charge of dirt and other dissolved particles in the water. When this occurs, the particles bind with the chemicals and form larger particles, called floc.

*Sedimentation*

During sedimentation, floc settles to the bottom of the water supply, due to its weight. This settling process is called sedimentation.

*Filtration*

Once the floc has settled to the bottom of the water supply, the clear water on top will pass through filters of varying compositions (sand, gravel, and charcoal) and pore sizes, in order to remove dissolved particles, such as dust, parasites, bacteria, viruses, and chemicals.

*Disinfection*

After the water has been filtered, a disinfectant (for example, chlorine, chloramine) may be added in order to kill any remaining parasites, bacteria, and viruses, and to protect the water from germs when it is piped to homes and businesses.

1. **Match the words (1–5) with the definitions (A–E)**

|  |  |
| --- | --- |
| 1. desalination | **A** process of removing turbidity of color so that water is clear and colorless |
| 1. flocculation | **B** process during which floc settles to the bottom of the water supply |
| 1. distillation | **C** a process of adding chlorine or hypochlorite to water |
| 1. sedimentation | **D** a process of boiling water to produce vapor |
| 1. chlorination | **E** a process by which saline water is converted to fresh water |

**5. Complete the statement: Water is disinfected for…**

1. ...human consumption and farming.

2. ...household purposes.

3. ...drinking, cooking, sanitation, gardening, fulfilling the requirements of medical, agricultural and industrial applications.

1. **What statement expresses the main idea of**

**the text?**

1. Pure water is the world's first and foremost medicine.

2. Pure water is the necessity for human consumption, household purposes, agricultural and industrial applications.

3. Water can be clarified by any methods of water purification.

**7. What statement corresponds to the content of the text?**

1. The methods used include physical processes such as filtration, sedimentation, and distillation; biological processes such as slow sand filters or biologically active carbon; chemical processes such as flocculation and chlorination and the use of electromagnetic radiation such as ultraviolet light.

2. Purifying water may reduce the concentration of particulate matter including suspended particles, parasites, bacteria, algae, viruses, fungi, as well as reducing the amount of a range of dissolved and particulate material derived from the surfaces that come from runoff due to rain.

3. Drinking water sources are subject to contamination and require appropriate treatment to remove disease-causing agents.

**8. Write the summary of the text.**

**9. Retell the text “Water Purification”.**

**Reading for understanding**

**10. Read the text and say: why this method of water**

**purification is commonly used.**

**Water chlorination**

Water used for drinking and cooking should be free of pathogenic (disease causing) microorganisms that cause such illnesses as typhoid fever, dysentery, cholera, and gastroenteritis.

Whether a person contracts these diseases from water depends on the type of pathogen, the number of organisms in the water (density), the strength of the organism (virulence), the volume of water ingested, and the susceptibility of the individual. Purification of drinking water containing pathogenic microorganisms requires specific treatment called disinfection.

Although several methods eliminate disease-causing microorganisms in water, chlorination is the most commonly used. Chlorination is effective against many pathogenic bacteria, but at normal dosage rates it does not kill all viruses, cysts, or worms. When combined with filtration, chlorination is an excellent way to disinfect drinking water supplies.

Water chlorination is the process of adding chlorine (Cl2) or hypochlorite to water. This method is used to kill certain bacteria and other microbes in tap water as chlorine is highly toxic. In particular, chlorination is used to prevent the spread of waterborne diseases such as cholera, dysentery, typhoid etc.

The most common disinfection method involves some form of chlorine or its compounds such as chloramine or chlorine dioxide. Chlorine is a strong oxidant that rapidly kills many harmful microorganisms. Because chlorine is a toxic gas, there is a danger of a release associated with its use. This problem is avoided by the use of sodium hypochlorite, which is a relatively inexpensive solution that releases free chlorine when dissolved in water. Chlorine solutions can be generated on site by electrolyzing common salt solutions. A solid form, calcium hypochlorite, releases chlorine on contact with water. Handling the solid, however, requires greater routine human contact through opening bags and pouring than the use of gas cylinders or bleach which are more easily automated. The generation of liquid sodium hypochlorite is both inexpensive and safer than the use of gas or solid chlorine.

**11. Are the statements true or false? Correct the false statements.**

1. Chlorination is effective against many viruses, cysts, or worms.

2. Water used for drinking and cooking should be free of pathogenic (disease causing) microorganisms.

3. Chlorine is a toxic dangerous gas.

4. This problem is avoided by the use of calcium hypochlorite, which is a relatively inexpensive solution that releases free chlorine when dissolved in water.

5. The use of gas or solid chlorine is very expensive and unsafe.

6. When combined with flocculation, chlorination is an

excelent way to disinfect drinking water supplies.

**12. Find in the text equivalents to the following**

**words and word combinations.**

Стать причиной, вредный, твердый, избегать, вырабатывать, соединение, распространять, недорогой, требовать, заболевание, относительно, предотвращать, содержать, ликвидировать, плотность, раствор, освободить, глотать (употреблять) воду.

**Reading for translating**

**Water Treatment Devices for Disinfection of Drinking Water**

Public awareness of the potential for groundwater and surface water contamination and the growing interest in outdoor recreational activities in areas not serviced with safe drinking water have led to increased usage of water disinfection devices.

Private wells can become contaminated if they have been poorly constructed or improperly sited or if they have been infiltrated by contaminated surface water. In fact, the aquifer (the water-bearing underground layer of porous rock or sand) itself can even be the source of contamination. Surface waters and unprotected ground waters are susceptible to fecal contamination from humans, livestock, wild animals and even house pets.

Water taken from lakes, rivers, streams and ponds may look clean and have no undesirable odor or taste. Unfortunately, however, pathogens found in water not only are harmful, but also are invisible to the naked eye and may be odorless and tasteless. These bacteria, viruses and protozoa can cause mild nausea and fever or can develop into more serious illnesses, such as severe diarrhea, hepatitis or typhoid fever. Water from lakes, rivers, streams and ponds should always be disinfected before being used for drinking or cooking.

Microbiological contamination is the primary cause of disease outbreaks associated with drinking water.

*Disinfection of Water*

Depending on the source of the water, conditions of use, and magnitude and extent of microbiological contamination, disinfection may be needed occasionally over short periods of time or on a continuous basis.

For occasional, emergency or short-term disinfection, there are several simple methods that do not require special devices:

Bringing water to a rolling boil for one minute will destroy disease-causing organisms and disinfect the water.

Unscented household bleach, which contains four to five per cent sodium hypochlorite, will disinfect water when at least two drops are added to each litre of water and the water is left to stand for 30 minutes.

Water purification tablets that release iodine or chlorine are especially useful for travellers, when used according to manufacturers' directions.

Protozoan cysts are often present in surface waters. Because cysts are more resistant than bacteria and viruses, iodine and chlorine should not be relied upon to inactivate them. When water must be continuously disinfected because of the unacceptable quality of the supply, the possibility of sporadic contamination or the presence of cysts, a water treatment device incorporating filtration and disinfection should be used rather than short-term disinfection methods.

*Water Treatment Devices*

Water treatment devices can be divided into two groups, according to function. There are several types of devices within these two groups, each suited to a specific water quality problem.

Point-of-use devices are portable, plumbed-in or faucet-mounted and are used to treat the water at a single tap or multiple taps for drinking and cooking only. Point-of-entry devices are installed on the main water supply and treat all the water entering the home.

Iodine disinfection of drinking water, however, should be reserved for emergency and occasional use (e.g., at a weekend cottage or in recreational vehicles). Iodine should not be used for long-term continuous disinfection because it is physiologically active, and ingestion in excessive amounts may be harmful.

UV devices are also effective against bacteria, viruses and protozoa, add nothing to water and produce no taste or odor; in addition, only a few seconds' exposure to UV light is required if the water is clear. They do not, however, ensure the safety of the water beyond the point of application, so that flushing of the system is recommended after periods of non-use. Point-of-use UV light devices are also available. A pre-filter, however, should always be employed to reduce turbidity, thus improving the effectiveness of the UV light.

Ceramic or glass fibre filters handle smaller amounts of water and are useful when water from just one tap is to be treated for drinking and cooking or to provide drinking water while camping, boating or hiking. Such filters can remove bacteria and protozoa from mildly contaminated waters. However, they are not suitable for removing viruses or for treating highly contaminated water. Therefore, when treating surface waters, it is recommended that these filters be used in conjunction with disinfection. Portable glass fibre or ceramic filters with iodine- releasing resins are available to disinfect water for campers, etc., or for travellers in countries where the safety of the drinking water is questionable. Some iodine-releasing devices contain an activated carbon filter to remove excess iodine from the water.

Distillers and ozonators are point-of-use devices suitable where electric power is available, and where there is sufficient space to install the equipment. Distillation is commonly used to reduce the levels of all chemicals in drinking water. These distillation devices are effective for the removal of inorganic chemicals, including heavy metals, and some organic chemicals, but are often combined with activated carbon for the removal of certain "volatile" chemicals (e.g., trihalomethanes, tetrachloroethylene). The boiling process also kills any microorganisms (viruses, bacteria and protozoa) present in the water. There are no known beneficial or harmful health effects associated with the ingestion of demineralized or distilled water.

Ozonators produce small quantities of ozone, a strong oxidizing agent that is effective in killing pathogens over a short period of time. Ozonation produces no taste or odor in the water. The process is dependent, however, on good mixing of ozone with the water. Unlike chlorine and iodine, ozone does not protect the water after application. Ozonation is often combined with activated carbon filtration to achieve more complete water treatment.

*Conclusions*

When camping, canoeing or hiking, you should assume that all waters contain disease- causing organisms, and you should disinfect the drinking water before use. Care must also be taken to avoid ingestion of untreated water during other activities (for instance, when brushing your teeth).

**Speaking**

Case study method

Stages of student work with the case:

- familiarization with the situation;

- analysis of information;

- the search for solutions;

- identify advantages and disadvantages of each proposed solution;

- evaluation of alternatives;

- presentation of the results;

- evaluation of participants;

- summing up.

1. Familiarization with the situation.

**Water disinfection problems in Russia**

Water is everywhere. It’s an integral part of all living beings but there is no ocean or sea in the whole world which wouldn’t be used as a dump. Water pollution not only damages large populations of birds, fish and animals but also affects people in different ways. In several years there will be no beaches and recreational zones to have a rest and no safe water to drink.

There are different types of water pollution. One of the worst ones is petroleum products such as oil, fuel and plastic which are accidentally spilled from ships and tankers as a result of the leak. They are very dangerous for our sea world and often cause massive death.

Another type of pollutants is poisonous chemicals. When they get into rivers and lakes they may infect fish and animals and when harvested they become a serious threat to people’s health.

Pollutants represented by heavy metals such as uranium, radium, selenium and some others result from industry, car fumes and mines. When their concentration in the organism reaches quite a high level they may cause long-term health problems.

One more class of harmful pollutants is pathogens which penetrate into water by means of sewage, storm drains and runoff from farms.

Finally, thermal pollution is a great concern. Very often water used in factories and power plants is poured back into lakes and seas being much warmer which is not optimal for many species of fish, so they go away from those places. As a result, the whole balance is broken.

If people want to save our planet’s water resources, urgent measures must be taken to protect it.

In Russia drinking water is disinfected with chlorine. Derivatives of chlorine (chloroform, horfe-Nol, chlorides, etc.) have oncogenic (carcinogenic and mutagenic, i.e., capable of influencing the human genetic system. American and Finnish scientists Doc showed that chlorine derivatives cause from 5 to 15 % of all cancers. High chlorine content in water and its compounds often provokes respiratory disease, pneumonia, gastritis. We use chlorine and as a defense against microbial infection when the passer-Denia miles of water pipelines in the city, despite the fact that many virusi to the effects of chlorine resistant.

Another water disinfection method is its ionization.

Historic fact tells:

In the spring of 327 BC, the famous Greek General Alexander the great invaded India. But here his progress was opposed by not only the courageous resistance of the population, but also intestinal diseases. The soldiers broke down and rebelled. The hike was impossible to continue. From the description of the hike, it was found that the new-chiefs would get sick much less frequently than ordinary soldiers, even though they drank the same water.

The cause was later found 2250 years. Ordinary soldiers used the tin glasses, and commanders silver (Serebryanye).

Note: silver is used in particular for the treatment of chronic tonsillitis kataralee angina, stomach ulcer and duodenal ulcer.

2.Analysis of information.

The task is:

Analyze the information and suggest the most effective way would water disinfection. Prove your advantages. Highlight the advantages and disadvantages of those that currently have found wide practical application.

3. The search for solutions.

Students in the process should pay attention to the following aspects:

1. The problem of water disinfection in Russia.

2. Chlorination: the advantages and disadvantages.

–Methods of chlorination of drinking water.

–In-ranks various bactericidal effectiveness of chlorine-containing reagents.

3. Ozonation as a method of disinfection of drinking water.

4. The effect of silver ions on the pathogens of various diseases.

5. Oxidizing properties of potassium permanganate.

6. Alternative methods of disinfection of drinking water: an integrated method (lge-plan and chlorination), disinfection by ultraviolet rays, by using physical methods.

4. Presentation of the results

Use of language bank for communication expressing opinion:

My point of view is that…

It seems/appears to me that…

I think/believe…/must…/

In my opinion/view…

To me…/may/might

From my point of view…

To my mind/ way of thinking…

As far as I am concerned…

I am totally against…

I (do not) agree that /with…

I (completely) agree /disagree that /with…

I want to ask a question.

Sorry, could you repeat that?

I think we should leave this point and come back to it later.

So what you’re saying is you will …

Can we just summarize the points we’ve agreed so far?

1. Evaluation of participants according to table 1.

**Table 1 –** **Criteria for assessing student work**

|  |  |  |  |
| --- | --- | --- | --- |
| Критерии | | | Количество баллов |
| **Языковые умения и навыки** | | | 40 |
| Использование лексики по теме | | | 10 |
| Умение аргументировать их, делать выводы | | | 10 |
| Употребление коммуникативных клише согласно ситуации | | | 10 |
| Грамотность речи | | | 10 |
| **Содержание** | | | 40 |
| Достаточная глубина раскрытия проблемы | | | 10 |
| Умение принимать решения и аргументировать их. Умение делать выводы. | 10 | | |
| Умение задавать и отвечать на вопросы оппонентов. Умение аргументировать свои ответы | 10 | | |
| Умение работать в коллективе и принимать решения | 10 | | |
| **Организационные умения и навыки** | 20 | | |
| Соблюдение регламента | 5 | | |
| Активность | 5 | | |
| Рассуждения, выработка решений ведется только на английском языке | 10 | | |
| Общее количество баллов | 100 | | |
| **Несоблюдение правил дискуссии**.  Участники должны:  - корректно задавать вопросы и высказываться,  - не перебивать выступающих,  - задавать вопросы и делать комментарии только после окончания выступления группы | | -10 | |

1. Summing up.

**Unit 6**

**Water Efficiency**

*“If you could tomorrow morning make water clean in the world, you would have done, in one fell swoop,*

*the best thing you could have done for improving human health by improving environmental quality”.*

William C. Clark, speech, Racine, Wisconsin, April1988

**Preface**

**Read the text and say: why people face water shortages and what can they lead to.**

**Water shortages**

If world-wide water use and population growth continues to grow at the current rate many people in the world will face serious water shortages.

Two of the most serious problems facing humans today are shortages of fresh water and the lack of safe drinking water.

Humans use six times as much water today as we did a hundred years ago. As the number of people on Earth continues to rise, our demand for water grows. Also, people living in developed countries use more water per person than individuals in lesser developed countries. This is because most of our activities today, such as farming, industry, building, and lawn care, are all water-intense practices, practices that require large amounts of water.

Extended periods with lower than normal rainfall cause droughts. Droughts occur when for months or years, a region experiences unusually low rainfall Periods of drought naturally make water shortages worse. Human activities, such as deforestation, can contribute to how often droughts occur. Trees and other land plants add water back into the atmosphere through transpiration. When trees are cut down, we break this part of the water cycle. Some dry periods are normal and can happen anywhere in the world. Droughts are a longer term event and can have serious consequences for a region. Because it is difficult to predict when droughts will happen, it is difficult for countries to predict how serious water shortages will be each year.

Water shortages hurt human health, agriculture and the environment. What happens when water supplies run out? In undeveloped regions in the world, people are often forced to move to a place where there is water. This can result in serious conflicts, even wars, between groups of people competing for water.

**Warming up**

1. **Read and translate water proverbs and water sayings.**

1. You can lead a horse to water but you cannot *make him drink*. (You can tell someone something but they will not do it or remember it.)

2*. You draw water to your own mill*. (You only act in your own advantage.)

3*. You're a sitting duck*. (You're open to danger.)

4. *You're in hot water*. (You're in trouble.)

5*. You're walking on thin ice.* (You are close to getting in trouble.)

6*. You trouble the water*. (You make mischief.)

**2. Give Russian proverbs and sayings about water.**

**Reading for speaking and discussing**

**1. Give the Russian equivalents to the following**

**words:**

Amount, conveyance, define, deliver, incur, refer to, consume, volume, concurrently, roughly, foliage, retain, entire, pest, attainment, ensure, appropriate, partial, benefit, achieve, evidence, waste disposal, weed, fraction.

**2. Read and translate the following international words:**

Vegetative biomass, climate, atmosphere, process, percent, proportional, human, minimize, utilization, methods, control, systems, term, result, operations, photosynthesis, management, potential.

**3. Read the text and do exercises after it.**

**Improving water-use efficiency**

In general, the term efficiency is used to quantify the relative output obtainable from a given input.

In more restricted technical terms, what irrigation engineers often call conveyance efficiency is defined as the net amount of water delivered to a farm, as a fraction of the amount taken from some source. The difference between the two amounts represents the seepage and evaporative losses incurred on route from source to field. Not generally considered in the term conveyance efficiency is the possible loss of water quality through pollution – such as that caused by wading animals or by human use of the canal water for washing and waste disposal.

The term on-farm application efficiency or field application efficiency generally refers to the fraction of the water volume applied to a farm or a field that is ‘consumed’ by a crop, relative to the amount applied. Crop consumption consists of the amount of water actually absorbed by the crop, most of which is generally transpired to the atmosphere (only a small fraction, often less than 1 percent, being retained in the vegetative biomass). There is much evidence that, in a given climate, the growth of many crops is directly related to the amount of water they transpire. The explanation is that both carbon dioxide (CO2) for photosynthesis and transpiration occur concurrently through the same stomatal openings in the leaves, so the two processes should be roughly proportional.

Clearly, however, much of the water evaporated without entering the plant is consumed non-productively. Therefore, any method of irrigation that minimizes evaporation (but not transpiration) is likely to increase the efficiency of water utilization by the crop. Some of the irrigation methods are capable of doing just that: they introduce water directly into the root zone without sprinkling the foliage or wetting the entire soil surface. Such partial-area irrigation methods offer the additional benefit of keeping the greater part of the soil surface (between the rows of crop plants) dry. This discourages the growth of weeds, that would otherwise not only compete with crop plants for nutrients and moisture in the root zone and for light above ground, but also hinder field operations and the control of pests.

No irrigation method or technology in itself guarantees the attainment of high efficiency. How the system is operated is all important. With poor management, even the most sophisticated system can result in water loss and inefficiency. Only knowledgeable, experienced and caring management can ensure that appropriate irrigation systems achieve their full potential benefits.

Notes:

|  |  |
| --- | --- |
| The seepage | фильтрация |
| Wading animals | животные, живущие в болоте |
| Foliage | листва |
| Attainment | достижение |
| Weed | сорняк |
| Conveyance | транспортировка |
| A pest | паразит |
| A benefit | польза, выгода |

**4. Match the words (1–9) with the definitions (A–I).**

|  |  |
| --- | --- |
| 1. Input | **A.** the process of taking smb/smth from one place to another |
| 2. Atmosphere | **B.** the quality of doing smth well with no waste of time or money |
| 3. Efficiency | **C.** an advantage that smth gives you; a helpful or useful effect that smth has |
| 4. Photosynthesis | **D.** the mixture of gases that surrounds the earth |
| 5. Sophisticated | **E.** the process of changing a liquid into a gas, especially steam |
| 6. Evaporation | **F.** the act of putting smth in |
| 7. Benefit | **G.** the act of running or controlling a business or similar organization |
| 8. Management | **H.** the process by which green plants turn carbon dioxide and water into food using energy obtained from sunlight |
| 9. Conveyance | **I.** having a lot of experience of the world and knowing about fashion, culture, and other things that people think are socially important |

1. Input

;

**5. Complete the statement: To increase the efficiency**

**of water utilization…**

1. …the irrigation methods are used to introduce water directly into the root zone only.

2. …the irrigation methods are used to introduce water directly into the root zone, with sprinkling the foliage and wetting the entire soil surface.

3. …all irrigation methods guarantee the attainment of high

efficiency.

**6. What statement expresses the main idea of the text?**

1. With poor management, even the most sophisticated system can result in water loss and inefficiency.

2. Only knowledgeable, experienced and caring management can ensure that appropriate irrigation systems achieve their full potential benefits.

3. Therefore, any method of irrigation that minimizes evaporation (but not transpiration) is likely to increase the efficiency of water utilization by the crop.

**7. What statement corresponds to the content of the text?**

1. Water volume applied to a farm or a field that is “consumed” by a crop depends on only knowledgeable, experienced and caring management.

2. Water volume applied to a farm or a field that is “consumed” by a crop depends on climate, crops and the amount of water they transpire.

3. Water volume applied to a farm or a field that is “consumed” by a crop depends on partial-area irrigation methods.

**8. Translate the sentences from Russian into English.**

1. Разницу составляют потери воды, происходящие из-за ее фильтрации и испарения на маршруте следования от источника к области полива.

2. Существует много свидетельств того, что в данном климате рост многих культур напрямую связан с количеством воды, которую они испаряют.

3. Ясно, однако, что большая часть испаряемой воды потребляется непродуктивно.

4. Таким образом, любой метод полива, который сводит к минимуму испарение (но не само испарение) может повысить эффективность использования воды в культуре.

5. Метод частичного орошения препятствует росту сорняков, которые в противном случае могут конкурировать не только с культурными растениями за питательные вещества, влагу в корневой зоне и свет, но и препятствовать проведению полевых операций и работе по борьбе с вредителями.

6. Только знающий, опытный и заботливый менеджмент может гарантировать, что соответствующие оросительные системы будут особенно выгодны.

**9. Write the summary of the text.**

**10. Retell the text “Improving water-use efficiency”.**

**Reading for understanding**

**11. Read the text and remember important ways to save water.**

**Top 10 ways to save water in your landscape:**

1. Check your irrigation controller once a month, and adjust as necessary. Most plants require only one-third as much water in winter as they do in summer.

2. Fix leaking sprinklers, valves, and pipes. One broken spray sprinkler can waste 10 gallons per minute, or 100 gallons in a typical 10 minute watering cycle.

3. Move lawn away from sidewalks and pavement. Instead plant shrubs or groundcover next to the pavement, and water with low-flow drip or bubbler system to eliminate runoff from turf sprinklers. 4. You will avoid watering sidewalks and streets – they don't grow, no matter how much water you apply!

5. Check the soil moisture level before watering. You can reduce your water use 20 to 50 % by regularly checking the soil before watering. Another tip – do not water during rain storms.

6. Water high water-use plants separately from low water-use plants. Low water-use plants can grow with one-half the water needed by high water-use plants, and can be easily damaged from over watering.

7. Apply as little fertilizer as possible. If you use fertilizer, make sure it stays on the landscape. After applying it, carefully water to make sure the fertilizer soaks on, so there is NO runoff. Use less toxic products.

8. Replace turf with groundcover, trees, and drought tolerant or native shrubs. If you have areas where no one uses the grass, patches that do not grow well, or a turf area too small to water without runoff, consider replacing the turf with water-efficient landscaping.

9. Dig-up patches of weeds and undesirable grasses from turf areas. Use water to grow the plants you want, not weeds you don’t want! Once you have eliminated what you don’t want, add sod or over-seed to repair the bare areas.

10. If you irrigate, choose a water-efficient system. Change spray sprinklers to low-flow bubbler or drip systems. Shrubs and trees are ideal candidates for this type of irrigation because the water is applied directly to the root zones. Adjust the water pressure of your irrigation system.

Notes:

|  |  |
| --- | --- |
| Shrubs | кустарники |
| Groundcover | покрытие почвы |
| Turf | торф |
| Sod | дерн |

**12. Find in the text equivalents to the following words and word combinations.**

Лужайка; пешеходная дорожка; тротуар; отдельно; удобрение; применять; убедиться; сорняк; корневая система; ландшафт; устойчивый к засухе; полив; растения, требующие частого полива; выкопать; дорожное покрытие; распрыскиватель.

**13. Add some more ways to save water in your landscape.**

**Reading for translating**

1. **Focus on grammar: Relative clause.**

**Prepositions and relative clauses**

If the verb in the relative clause needs a preposition, we put it at the end of the clause:

For example:

listen to

The music is good. Julie listens to the music.

– The music (which / that) Julie listens to is good.

work with

My brother met a woman. I used to work with the woman.

– My brother met a woman (who / that) I used to work with.

go to

The country is very hot. He went to the country.

– The country (which / that) he went to is very hot.

come from

I visited the city. John comes from the city.

– I visited the city (that / which) John comes from.

apply for

The job is well paid. She applied for the job.

– The job (which / that) she applied for is well paid.

**Whose**

“Whose” is always the subject of the relative clause and can't be left out. It replaces a possessive. It can be used for people and things.

The dog is over there. The dog's / its owner lives next door.

– The dog whose owner lives next door is over there.

The little girl is sad. The little girl's / her doll was lost.

– The little girl whose doll was lost is sad.

The woman is coming tonight. Her car is a BMW.

– The woman whose car is a BMW is coming tonight.

The house belongs to me. Its roof is very old.

– The house whose roof is old belongs to me.

**Where / when / why**

We can sometimes use these question words instead of relative pronouns and prepositions.

I live in a city. I study in the city.

– I live in the city where I study.

– I live in the city that / which I study in.

– I live in the city in which I study.

The bar in Barcelona is still there. I met my wife in that bar.

– The bar in Barcelona where I met my wife is still there.

– The bar in Barcelona that / which I met my wife in is still there.

– The bar in Barcelona in which I met my wife is still there.

The summer was long and hot. I graduated from the university in the summer.

– The summer when I graduated from the university was long and hot.

– The summer that / which I graduated from the university in was long and hot.

– The summer in which I graduated from the university was long and hot.

**2. Choose the right relative pronoun to complete these sentences.**

Jim, \_\_\_ I've known for years, is my best friend.

My new coat, \_\_\_ I bought in New York, is very warm and comfortable.

My boss, \_\_\_ wife is French, travels to Paris regularly.

He didn't even say “thank you”, \_\_\_ I found really rude.

Next summer I'm going to India, \_\_\_ I've never been before.

My sister, \_\_\_ is five years younger than me, is a lawyer.

Galileo Galilei, \_\_\_ supported the heliocentric theory, was arrested by the Inquisition.

The hotel, \_\_\_ I stayed at, was rather large and comfortable.

The English language, \_\_\_ I am good at, is my favourite.

The exam, \_\_\_ all the students passed successfully, was not difficult.

I bought a picture \_\_\_ author is unknown.

**3. Read and translate the text using a dictionary**.

**Top 10 ways to save water in your home:**

1. Replace your old front loading clothes washer with a new high-efficiency model that saves 40 % on water use and 50–60 % on energy use per cycle.

2. Only wash full loads of laundry and dishes.

3. Replace your old water guzzling toilet with a new high-efficiency toilet (HET) that uses 70 % less water. HETs either use 1.28 gallons per flush or less or may also be dual flush toilets. Replace your old showerheads and faucet aerators with more efficient models.

4. When you hear a toilet running or a faucet dripping, fix it as soon as possible. Leaks can waste hundreds of gallons of day, especially the silent toilet leaks that can go unnoticed. To be sure your toilet isn't leaking use toilet dye tablets once a month to check for flapper leaks.

5. Know where water shut off valves are located for your fixtures. In case you need to repair a toilet or sink you can shut the water supply off to just that fixture. Most modern homes have a shut off valve beneath a sink or a toilet, behind the washing machine or at the pipe leading to the water heater.

6. Don't let the water run while brushing your teeth, shaving or washing your face. By just turning off the water while you brush your teeth you can save over 5 gallons a day.

7. Take shorter showers. Try to limit your time in the shower to 5 to 7 minutes.

8. Do a monthly leak check on your house. Start by checking your water meter. Turn off all water using fixtures in the home and don't run any water for about 20 minutes. Check the water meter, which is usually located in the front of your house by the sidewalk. If the triangular dial is spinning, you have water running somewhere in the home.

9. If you have an old water softener, switch to a demand initiated regeneration model that regenerates based on your usage and not just due to the set schedule. Make sure any water softener model has a shut-off switch to operate when going on vacations!

10. Purification, disinfection, and periodic draining clearly reduce the benefit of having a second water system – so much so that, for small households, there may be no benefit at all. You can probably achieve greater savings more quickly and economically simply by using fresh water more carefully: by flushing your toilet less often (or converting to a water-saving dual-flush), turning off the faucet (tap) while you brush your teeth, installing a low-flow shower nozzle (one that mixes a lot of air with the water), using a water butt to collect rainfall for your garden, and so on. Water savings like this are really easy to make; many are instant and free. One really good way to save water is to ask your utility company to install a water meter on your property (if you don't have one already). Seeing how much water you use each month or quarter (and how much it costs, on your bill) really focuses the mind on making savings – and you can see just how effective you're being.

**4. Read, translate and remember.**

Some facts about water

**Why water is in great need.**

Drinking water separates the sensations of thirst and hunger.

To lose weight, water is the best way to go – drink water on time and lose weight without much dieting. Also, you will not eat excessively when you are only thirsty for water.

Dehydration causes deposits of toxic sediments in the tissue spaces, fat stores, joints, kidneys, liver, brain, and skin. Water will clear these deposits.

Water takes away the morning sickness of pregnancy.

Water integrates mind and body functions. It increases the ability to realize goals and purpose.

Water prevents the loss of memory as we age. It prevents Alzheimer’s disease, multiple sclerosis, Parkinson’s disease, and Lou Gehrig’s disease.

Water reverses addictive urges, including those for caffeine, alcohol, and some addictive drugs.

Water Is A Reflection Of Your Heart And Soul!

Water is the best lubricating laxative and prevents constipation.

Water prevents heart attacks and strokes.

Water gives us power and electrical energy for all brain functions, particularly thinking.

Water is directly needed for the production of all hormones made by the brain, including melatonin.

Water dilutes the blood and prevents it from clotting during circulation.

**Speaking**

**Case study method**

**Stages of student work with the case:**

- familiarization with the situation;

- analysis of information;

- the search for solutions;

- identify advantages and disadvantages of each proposed solution;

- evaluation of alternatives;

- presentation of the results;

- evaluation of participants;

- summing up.

1. Familiarization with the situation.

**Irrigation types efficiency in Russia**

Drip (or micro) irrigation, also known as trickle irrigation, functions as its name suggests. In this system water falls drop by drop just at the position of roots. Water is delivered at or near the root zone of plants, drop by drop. This method can be the most water-efficient method of irrigation, if managed properly, since evaporation and runoff are minimized. The field water efficiency of drip irrigation is typically in the range of 80 to 90 percent when managed correctly.

In sprinkler or overhead irrigation, water is piped to one or more central locations within the field and distributed by overhead high-pressure sprinklers or guns. A system utilizing sprinklers, sprays, or guns mounted overhead on permanently installed risers is often referred to as a solid-set irrigation system. Higher pressure sprinklers that rotate are called rotors and are driven by a ball drive, gear drive, or impact mechanism. Rotors can be designed to rotate in a full or partial circle. Guns are similar to rotors.

Center pivot irrigation is a form of sprinkler irrigation consisting of several segments of pipe (usually galvanized steel or aluminium) joined together and supported by trusses mounted on wheeled towers with sprinklers positioned along its length. The system moves in a circular pattern and is fed with water from the pivot point at the center of the arc. These systems are found and used in all parts of the world and allow irrigation of all types of terrain.

Sub-irrigation has been used for many years in field crops in areas with high water tables. It is a method of artificially raising the water table to allow the soil to be moistened from below the plants' root zone.

Most commercial and residential irrigation systems are “in ground” systems, which mean that everything is buried in the ground. With the pipes, sprinklers, emitters (drippers), and irrigation valves being hidden, it makes for a cleaner, more presentable landscape without garden hoses or other items having to be moved around manually. This does, however, create some drawbacks in the maintenance of a completely buried system.

2. Analysis of information.

The task is:

– Analyze the information and suggest the most effective way would water irrigation

– Prove your advantages. Highlight the advantages and disadvantages of those that currently have found wide practical application.

3. The search for solutions.

Students in the process should pay attention to the following aspects:

1. The problem of irrigation in Russia.

2. Drip (or micro) irrigation, also known as trickle irrigation, functions as its name suggests.. Advantages or disadvantages in this system when water falls drop by drop just at the position of roots.

3. Sprinkler irrigation or center pivot irrigation. Which method is better?

4. The effect of sub-irrigation.

5. Irrigation “in ground” systems.

6. Alternative methods of drip, sprinkler, center pivot, sub-irrigation or “in ground” irrigation.

4. Presentation of the results.

Useful language bank for communication expressing opinion:

My point of view is that…

It seems/appears to me that…

I think/believe…/must…/

In my opinion/view…

To me…/may/might

From my point of view…

To my mind/ way of thinking…

As far as I am concerned…

I am totally against…

I (do not) agree that /with…

I (completely) agree /disagree that /with…

I want to ask a question.

Sorry, could you repeat that?

I think we should leave this point and come back to it later.

So what you’re saying is you will …

Can we just summarize the points we’ve agreed so far?

5. Evaluation of participants according table 1.

6. Summing up.

**SUPPLEMENTARY READING TEXTS:**

**Text 1**

**The science of water**

Pour yourself a glass of water and you could be drinking some of the same molecules that passed through the lips of Julius Caesar, Joan of Arc, Martin Luther King, or Adolf Hitler. Indeed, since the human body is about 60 percent water you might even be drinking a tiny part of one of those people! Water is one of the most amazing things about Earth; without it, there would be no life and our planet would be a completely different place. One of the truly amazing things about water is that it's never used up: it's just recycled over and over again, constantly moving between the plants, animals, rivers, and seas on Earth's surface and the atmosphere up above. Let's take a look at this life-giving liquid and find out what makes it so special!

**What is water?**

We can answer that question in many different ways. Water is what wets windows when it rains, what we drink when we feel thirsty, and what covers about 70 % of Earth's surface. But what exactly is it?

Chemically speaking, water is a liquid substance made of molecules – a single, large drop of water weighing 0.1g contains about 3 billion trillion (3,000,000,000,000,000,000,000) of them! Each molecule of water is made up of three atoms: two hydrogen atoms locked in a sort of triangle with one oxygen atom – giving us the famous chemical formula H2O. The slightly imbalanced structure of water molecules (explained in the box below) means they attract and stick to many different substances. That's also why all kinds of things will dissolve in water, which is sometimes called a “universal solvent”. Water can even dissolve the solid rocks from which our planet is made, though the process does take many years, decades, or even centuries.

Three states of water: solid snow on a beach, with liquid sea, and gaseous steam (clouds) up above.

Most of the water in our world is a combination of “ordinary” hydrogen atoms with “ordinary” oxygen atoms, but there are actually three different isotopes (atomic varieties) of hydrogen and each of those can combine with oxygen to give a different kind of water. If deuterium (hydrogen whose atoms contain one neutron and one proton instead of just one proton by itself) combines with oxygen, we get something called heavy water, which is about 10 % heavier than normal water. Similarly, tritium (hydrogen with two neutrons and one proton) can combine with oxygen to make something called super heavy water.

Water has no end of amazing properties. It comes in three wildly different kinds, it's heavy, it expands in a funny way, it can climb up walls, and... oh, let's find out more!

**Water, ice, and steam**

One of the unique things about water in the world around us is that it exists in three very different forms (or states of matter as they are known): solid, liquid, and gas. Ordinary, liquid water is the most familiar to us because water is a liquid under everyday conditions, but we're also very familiar with solid water (ice) and gaseous water (steam and water vapor) as well.

Converting water between these three different states is remarkably easy. All you have to do is change its temperature or pressure. Take some ice and heat it up and you'll soon have a pool of liquid water. Carry on heating it and the water will evaporate and become steam. It takes a terrific amount of energy to turn ice into water and water into steam because you have to physically rearrange the structure of the substance in each case and push the molecules further apart. That's why kettles take so long to boil. (There's an easier way to turn water from a solid or liquid into a gas and that's simply to leave it out in the open air; gradually, the more energetic molecules in the water will escape and turn into a cool vapor up above it.)

**Steam and geothermal energy from geysers**

When you heat water to make steam, there comes a point where you keep heating the water but the temperature doesn't increase. The energy you supply seems to be vanishing into thin air, but it's actually pushing apart the molecules in liquid water and turning them into a gas. In the process, that energy is becoming locked inside the steam as something called latent heat (the word latent just means “hidden”). Latent heat is like an immense reserve of energy locked in steam that the inventors of yesteryear used to power factory machines and vehicles using their mighty steam engines.

**Why does water take so long to heat up?**

Has that kettle boiled yet? Well tell it to hurry up – I'm dying for a cup of tea! It may be a nuisance if you're cooking or making drinks, but the length of time it takes water to absorb heat is very useful to us in other ways. Water has a high specific heat capacity and that means it can hold or carry more heat per kilogram (or pound) than virtually any other substance. That's why we use water in heating systems such as radiators, because each liter of water that trickles through the pipes carries and delivers more heat. Of course the drawback is that the water takes some time to heat up in the first place.

**Why can insects walk on water?**

You've probably seen insects that can walk on water. They're supported by a kind of invisible "structure" on the surface known as surface tension. It happens because water molecules attract very strongly to one another – that's also why water forms droplets on windows rather than spreading out in a perfectly thin film, as oil would. Imagine all the drops in a basin full of water trying to attract one another. Effectively, they're "linking arms" and forming an invisible skin on the surface that's strong enough to support things like needles and razor blades that are heavy enough to sink. All kinds of insects, including spiders, pond skaters and water boatmen, use surface tension to move across water. In theory, you could walk on water too if you could spread your weight across a big enough area to take advantage of surface tension.

**How does water climb up a tube?**

Put some water in a glass and you'll see that it doesn't form a perfectly straight surface: it actually climbs up the glass slightly more at the edges, forming a downward curving surface called a concave meniscus. The thinner you make the glass (that is, the smaller the diameter it is), the more the water will climb. Put water in a narrow glass rod and you can make it climb up quite a distance. This is known as capillary action or capillarity. It's how blood moves through our veins and how water is sucked up through the stems of plants and trees. Capillarity helps a large oak tree to suck up something like 380 liters (100 gallons) of water each day!

**Text 2**

**Why Water is in Great Need?**

Water sustains all forms of life, including human life. Water is one of the most mysterious substances on this planet. Scientists are still discovering amazing facts about water. More than 70 % of our body weight is water. You are a bundle of water wrapped in skin and walking around. Understanding water and drinking the right kind of water will give us health and longevity.

Water is a strong solvent: therefore, it carries many invisible ingredients, such as minerals, oxygen, nutrients, waste products, and pollutants. Inside the human body, blood (which is 90 % water) circulates throughout the body distributing nutrients and oxygen, and collecting waste and carbon dioxides. Every substance deep inside the body was brought there by the blood and can be brought out by the blood.

Unlike any other substance, water is lighter in its solid state than in its liquid state. That why ice floats in water. Otherwise, lakes and ponds would freeze from bottom up in the winter time, killing all living things in them. Water not only sustains life but also protects life.

More than two thirds of the surface of our planet is covered by water. Water is also an essential element of the atmosphere of Earth, and it has been for billions of years playing an important role in shaping the surface of our planet. This means that the biosphere making life and survival possible owes its existence to the simple and yet fantastic compound the molecules of which consist of two hydrogen atoms and one oxygen atom.

This compound, known as H2O plays a key role in the structure of living organisms and in their metabolism. It is essential to both flora and fauna, and not one specie is able to survive without it. It is especially true in regard to the human organism, which is able to survive without water for a mere three days.

The presence of water is also decisive in the emergence and survival of the climate system of Earth. The climate of Earth played a key role in the evolution of life. Even today, our rich and colorful flora and fauna is provided with adequate conditions of life by the climate system being in constant change and yet ensuring the continuous circulations of water. Accordingly, the constant circulation of water is the essential catalyst of the constant circulation of life.

As much as we know about this special material considered to be a natural part of our life, one of its important secrets is still well hidden. We cannot explain how water came to be on Earth. This question has not been yet answered unequivocally, no commonly accepted scientific explanation has thus far been given. But everyone agrees that no known form of life is able to survive without this “element natural” one of the elements of Universe much older than our life giving Earth itself, i.e., without water – this colorless and tasteless matter that, sometimes takes up the state of either liquid, solid or gas.

**Text 3**

**Freshwater Storage**

**Freshwater existing on the Earth's surface**

One part of the water cycle that is obviously essential to all life on Earth is the freshwater existing on the land surface. Just ask your neighbor, a tomato plant, a trout, or that pesky mosquito. Surface water includes the streams (of all sizes, from large rivers to small creeks), ponds, lakes, reservoirs (man-made lakes), and freshwater wetlands. The definition of freshwater is water containing less than 1,000 milligrams per liter of dissolved solids, most often salt.

The amount of water in our rivers and lakes is always changing due to inflows and outflows. Inflows to these water bodies will be from precipitation, overland runoff, ground-water seepage, or tributary inflows. Outflows from lakes and rivers include evaporation and discharge to ground water. Humans get into the act also, as people make great use of diverted surface water for their needs. So, the amount and location of surface water changes over time and space, whether naturally or with human help. Certainly during the last ice age when glaciers and snow packs covered much more land surface than today, life on Earth had to adapt to different hydrologic conditions than those which took place both before and after. And the layout of the landscape certainly was different before and after the last ice age, which influenced the topographical layout of many surface-water bodies today. Glaciers are what made the Great Lakes not only “great,” but also such a huge storehouse of freshwater.

**Surface water keeps life going**

From space, the Nile Delta in Egypt appears green, showing that life can even bloom in the desert if there is a supply of surface water (or ground water) available. Water on the land surface really does sustain life, and this is as true today as it was millions of years ago. I'm sure dinosaurs held their meetings at the local watering hole 100 million years ago, just as antelopes in Africa do today. And, since ground water is supplied by the downward percolation of surface water, even aquifers are happy for water on the Earth's surface. You might think that fish living in the saline oceans aren't affected by freshwater, but, without freshwater to replenish the oceans they would eventually evaporate and become too saline for even the fish to survive.

**Usable freshwater is relatively scarce**

Freshwater represents only about three percent of all water on Earth and freshwater lakes and swamps account for a mere 0.29 percent of the Earth's freshwater. Twenty percent of all freshwater is in one lake, Lake Baikal in Asia. Another twenty percent is stored in the Great Lakes (Huron, Michigan, and Superior). Rivers hold only about 0.006 percent of total freshwater reserves. You can see that life on Earth survives on what is essentially only a "drop in the bucket" of Earth's total water supply!

**Text 4**

**Groundwater storage**

Large amounts of water are stored in the ground. The water is still moving, possibly very slowly, and it is a part of the water cycle. Most of the water in the ground comes from precipitation that infiltrates downward from the land surface. The upper layer of the soil is the unsaturated zone, where water is present in varying amounts that change over time, but does not saturate the soil. Below this layer is the saturated zone, where all of the pores, cracks, and spaces between rock particles are saturated with water. The term ground water is used to describe this area. Another term for ground water is ‘aquifer”, although this term is usually used to describe water-bearing formations capable of yielding enough water to supply peoples' uses. Aquifers are a huge storehouse of Earth's water and people all over the world depend on ground water in their daily lives.

To find water, look under the table ... the water table. A hole, dug at the beach, is a great way to illustrate the concept of how at a certain depth the ground, if it is permeable enough to hold water, is saturated with water. The top of the pool of water in this hole is the water table. The water level in the hole is the same as the level of the ocean. Of course, the water level at the beach changes by the minute due to the movement of the tides, and as the tide goes up and down, the water level in the hole moves too.

In a way, the hole is like a dug well used to access ground water, albeit saline in this case. But, if this was fresh water, people could grab a bucket and supply themselves with the water they need to live their daily lives. You know that at the beach if you took a bucket and tried to empty the hole, it would refill immediately because the sand is so permeable that water flows easily through it, meaning our “well” is very “high-yielding” (too bad the water is saline). To access freshwater, people have to drill wells deep enough to tap into an aquifer. The well might have to be dozens or thousands of feet deep. But the concept is the same as our well at the beach – access the water in the saturated zone where the voids in the rock are full of water.

Some of the precipitation that falls onto the land infiltrates into the ground to become ground water. Once in the ground, some of this water travels close to the land surface and emerges very quickly as discharge into streambeds, but, because of gravity, much of it continues to sink deeper into the ground. If the water meets the water table (below which the soil is saturated), it can move both vertically and horizontally. Water moving downward can also meet more dense and water-resistant non-porous rock and soil, which causes it to flow in a more horizontal fashion, generally towards streams, the ocean, or deeper into the ground.

The direction and speed of ground-water movement is determined by the various characteristics of aquifers and confining layers (which water has a difficult time penetrating) in the ground. Water moving below ground depends on the permeability (how easy or difficult it is for water to move) and on the porosity (the amount of open space in the material) of the subsurface rock. If the rock has characteristics that allow water to move relatively freely through it, then ground water can move significant distances in a number of days. But ground water can also sink into deep aquifers where it takes thousands of years to move back into the environment, or even go into deep ground-water storage, where it might stay for much longer periods.

**Text 5**

**Spring**

**What is a spring?**

A spring is a water resource formed when the side of a hill, a valley bottom or other excavation intersects a flowing body of ground water at or below the local water table. A spring is the result of an aquifer being filled to the point that the water overflows onto the land surface. They range in size from intermittent seeps, which flow only after much rain, to huge pools with a flow of hundreds of millions of liters per day.

Springs may be formed in any sort of rock, but are more prevalent in limestone and dolomite, which fracture easily and can be dissolved by rainfall that becomes weakly acidic. As the rock dissolves and fractures, spaces can form that allow water to flow. If the flow is horizontal, it can reach the land surface, resulting in a spring.

Spring water is not always clear. Water from springs usually is remarkably clear. Water from some springs, however, may be “tea-colored”. Spring water can be colored red, indicating iron and metals enrichment from ground water coming in contact with naturally occurring minerals present as a result of ancient volcanic activity in the area. In Florida, many surface waters contain natural tannic acids from organic material in subsurface rocks, and the color from these streams can appear in springs. If surface water enters the aquifer near a spring, the water can move quickly through the aquifer and discharge at the spring vent. The discharge of highly colored water from springs can indicate that water is flowing quickly through large channels within the aquifer without being filtered through the limestone.

**Thermal springs**

Thermal springs are ordinary springs except that the water is warm and, in some places, hot, such as in the bubbling mud springs in Yellowstone National Park, Wyoming. Many thermal springs occur in regions of recent volcanic activity and are fed by water heated by contact with hot rocks far below the surface. Even where there has been no recent volcanic action, rocks become warmer with increasing depth. In such areas water may migrate slowly to considerable depth, warming as it descends through rocks deep in the Earth. If it then reaches a large crevice that offers a path of less resistance, it may rise more quickly than it descended. Water that does not have time to cool before it emerges forms a thermal spring. The famous Warm Springs of Georgia and Hot Springs of Arkansas are of this type. Warm springs can even coexist in Greenland alongside of icebergs.

**Text 6**

**What is Acid Rain and What Causes It?**

“Acid rain” is a broad term used to describe several ways that acids fall out of the atmosphere. A more precise term is acid deposition, which has two parts: wet and dry.

Wet deposition refers to acidic rain, fog, and snow. As this acidic water flows over and through the ground, it affects a variety of plants and animals. The strength of the effects depend on many factors, including how acidic the water is, the chemistry and buffering capacity of the soils involved, and the types of fish, trees, and other living things that rely on

the water.

Dry deposition refers to acidic gases and particles. About half of the acidity in the atmosphere falls back to earth through dry deposition. The wind blows these acidic particles and gases onto buildings, cars, homes, and trees. Dry deposited gases and particles can also be washed from trees and other surfaces by rainstorms. When that happens, the runoff water adds those acids to the acid rain, making the combination more acidic than the falling rain alone.

Prevailing winds blow the compounds that cause both wet and dry acid deposition across state and national borders, and sometimes over hundreds of miles. Scientists discovered, and have confirmed, that sulfur dioxide (SO2) and nitrogen oxides (NOx) are the primary causes of acid rain.

Acid rain occurs when these gases react in the atmosphere with water, oxygen, and other chemicals to form various acidic compounds. Sunlight increases the rate of most of these reactions. The result is a mild solution of sulfuric acid and nitric acid.

**How Do We Measure Acid Rain?**

Acid rain causes acidification of lakes and streams and contributes to damage of trees at high elevations (for example, red spruce trees above 2,000 feet) and many sensitive forest soils. In addition, acid rain accelerates the decay of building materials and paints, including irreplaceable buildings, statues, and sculptures that are part of our nation's cultural heritage. Prior to falling to the earth, SO2 and NOx gases and their particulate matter derivatives, sulfates and nitrates, contribute to visibility degradation and harm public health.

There are several ways to reduce acid deposition, more properly called acid deposition, ranging from societal changes to individual action.

To solve the acid rain problem, people need to understand how acid rain causes damage to the environment. They also need to understand what changes could be made to the air pollution sources that cause the problem. The answers to these questions help leaders make better decisions about how to control air pollution and therefore how to reduce – or even eliminate – acid rain. Since there are many solutions to the acid rain problem, leaders have a choice of which options or combination of options are best.

**Text7**

**The Black Dragon River**

The Amur is a main river in the Far Eastern region. The Amur River basin covers a vast territory, more than 1.8 million square kilometers of Russian, Chinese and Mongolian lands. Such major waterways as the Zeya, the Bureya, the Ussuri, the Songhua River are its tributaries.

The name of the river comes from the Tungusic language “amar”, “Damour” and means “big river”. The Chinese called the Amur “heiho”, that is “Black River”, then “Heilongjiang” – “Black Dragon River”. The Mongols called the Amur “Amur Khara-Muren” – “black water”. Actually the Amur river begins after the joining of the Shilka – “narrow valley” in Evenki and the Argun – “wide” (ergun) in

**Mongolian.**

The length of the river is 2824 km from the joining of the Shilka and the Argun with the Gulf of Sakhalin of the Okhotsk Sea. In the area of the pool (1855 km ²) The Amur is the fourth largest river in Russia (after the Yenisei, the Ob and the Lena) and the tenth among the world's rivers. The peculiarities of the valley the river is divided into three main sections: the upper Amur River (to the Zeya mouth, 883 km), the middle Amur River (from the Zeya mouth, to the Ussuri mouth, 975 km) and the lower Amur River (from the Ussuri mouth to Nikolaevsk-na-Amur, 966 km).

Flora and fauna of the Amur basin is very diverse. There are more than 5,000 species of plants, about 400 species of birds, 70 species of mammals, including the Amur tiger. In the basin of the river there are more than 130 species of freshwater fish. It is still here that one can meet the biggest sturgeon of the world, Kaluga, whose weight can exceed a ton.

**Water quality**

The Amur River has experienced notable episodic water pollution events, particularly in the year 2005. Particular contaminants of concern include benzene, benzopyrene, nitrobenzene, anthracene and pyrene. The 2005 incident occurred as a massive pollutant release in the Songhua River in China, with major health risk impacts to the Russian city of

**Khabarovsk.**

Because of a series of explosions on a chemical plant in the Sungari – the right inflow of Amur being a source of drinking water supply of Khabarovsk, poisonous substances, namely benzene and nitrobenzene have got. Extent of a poisonous stain about 80 km, a level of pollution in it in 29 times exceeds an allowable level. The poisonous substances which have got in water can result in infection with a hepatites, and, probably, to a cancer. Since November, 22 in an administrative centre Harbin – city with the 9-million population, all water supply from it stopped. Local residents in a panic have rushed to shops and on the markets to buy up all water in bottles and other drinks.

Supplying clean drinking water to Amur riverside settlements is one of the most critical issues facing Khabarovsk Krai. The continuing pollution of the key waterway of this region both from the Chinese side and by reviving Russian industrial facilities calls for a set of measures to provide communities in small settlements located along the river with safe sources of drinking water. However, local self-government lacks adequate resources for addressing this challenge in full. After the tragic events at the chemical factory in Jilin (Northern China) in 2006, all the problems in this sphere have come to the surface.

“A most difficult, dangerous river,” said a former steersman, Mikhail Sergeevich Kile, who now administers a village 50 miles down-river from Khabarovsk. “A stormy and uneasy stream feared and loathed by most of us. It is difficult to keep a boat to the midpoint of the channel, which changes every day, every hour”.

**Text 8**

**Grey Water and Waste Water**

Grey water (sometimes spelled gray water in the United States) is the idea of having two separate household water systems. First, you have a normal household water supply of clean, fresh water (sometimes called whitewater or mains water), which you use for drinking, cooking, and so on. But you also have an extra tank that collects the used water from your bath tub, shower, clothes washing machine, (and sometimes your outside roof). This is your grey water. It's used for flushing the toilet (automatically), but you can also use it for washing the car, watering the garden, and anything else that doesn't need absolutely clean water. Sometimes water from the kitchen sink (dark grey water) is reused too, but it's more contaminated and unhygienic than water from your bath or shower. Water from the toilet (known as black water) is never reused: it's discharged to the sewer in the usual way. Trials by the UK's Environment Agency (a similar organization to the US EPA) have found that systems like this can save 5–36 percent of total household water consumption, though much less (a maximum of about 20 percent) in efficient new homes.

Wastewater is used water. Wastewater may contain substances such as human waste, food scraps, oils, soaps and chemicals. In houses, wastewater can include the water from sinks, showers, bathtubs, toilets, washing machines and dishwashers. Businesses and industries also use water for a wide variety of other purposes. Wastewater can include storm water (rainfall) runoff. Although many people assume that storm water runoff is clean, it isn’t. Contaminants such as hydrocarbons wash off urban surfaces such as roadways, parking lots and rooftops and can harm our rivers, lakes and marine waters. We also waste water when we don’t use it wisely. For instance, when we fill a glass of water to drink, we may run the water to make sure it’s cold. It is perfectly clean but once it disappears down the drain it mixes with sewage and polluted water from other households, businesses and industries. When we pull the plug in the bathtub or flush the toilet, few of us give much thought to where the wastewater is going but wastewater doesn’t just disappear when it leaves our homes and businesses. There are three types of sewer systems:

1 sanitary sewers carry wastewater from sinks, toilets, tubs and industry;

2 storm sewers carry runoff from rainfall, called storm water;

3 combined sewers carry wastewater and storm water through the same pipe.

Together, these form our wastewater collection system.

–In the USA each day, the average person produces about 220–450 l of wastewater. That’s enough to completely fill a bathtub two times.

–We all produce sludge. An adult is responsible for about 32 kg per year.

–If everyone installed water-saving toilets and showerheads, we could substantially reduce domestic water consumption.

–Each day, in the USA the average person uses 260 l of water for domestic purposes. That’s about 7 million l of water in a lifetime.

–A leaky tap will waste in excess of 90 l of water each day.

**Text 9**

**Water Purification**

The processes below are the ones commonly used in water purification plants. Some or most may not be used de-pending on the scale of the plant and quality of the raw (source) water.

**Pre-treatment**

1. Pumping and containment. The majority of water must be pumped from its source or directed into pipes or hold-ing tanks. To avoid adding contaminants to the water, this physical infrastructure must be made from appropriate materi-als and constructed so that accidental contamination does not occur.

2. Screening (screen filter). The first step in purifying surface water is to remove large debris such as sticks, leaves, rubbish and other large particles which may interfere with subsequent purification steps. Most deep groundwater does not need screening before other purification steps.

3. Storage. Water from rivers may also be stored in bankside reservoirs for periods between a few days and many months to allow natural biological purification to take place. This is especially important if treatment is by slow sand filters. Storage reservoirs also provide a buffer against short periods of drought or to allow water supply to be maintained during transitory pollution incidents in the source river.

4. Pre-chlorination. In many plants the incoming water was chlorinated to minimize the growth of fouling organisms on the pipe-work and tanks. Because of the potential adverse quality effects this has largely been discontinued.

**Flocculation**

Flocculation is a process which clarifies the water. Clarifying means removing any turbidity or colour so that the water is clear and colourless. Clarification is done by causing a precipitate to form in the water which can be removed using simple physical methods. Initially the precipitate forms as very small particles but as the water is gently stirred, these particles stick together to form bigger particles – this process is sometimes called flocculation. Many of the small particles that were originally present in the raw water absorb onto the surface of these small precipitate particles and so get incorporated into the larger particles that coagulation produces. In this way the coagulated precipitate takes most of the suspended matter out of the water and is then filtered off, generally by passing the mixture through a coarse sand filter or sometimes through a mixture of sand and granulated anthracite (high carbon and low volatiles coal).

**Sedimentation**

Waters exiting the flocculation basin may enter the sedimentation basin, also called a clarifier or settling basin. It is a large tank with low water velocities, allowing floc to settle to the bottom. The sedimentation basin is best located close to the flocculation basin so the transit between the two processes does not permit settlement break up. Sedimentation basins may be rectangular, where water flows from end to end or circular where flow is from the centre outward. Sedimentation basin outflow is typically over a weir so only a thin top layer of water – that furthest from the sludge – exits.

**Ultrafiltration**

Ultrafiltration membranes are a relatively new development; they use polymer film with chemically formed microscopic pores that can be used in place of granular media to filter water effectively without coagulants. The type of membrane media determines how much pressure is needed to drive the water through and what sizes of micro-organisms can be filtered out.

**Text 10**

**Other Water Purification Techniques**

Other popular methods for purifying water, especially for local private supplies are listed below. In some countries some of these methods are also used for large scale municipal supplies. Particularly important are distillation (desalination of seawater) and reverse osmosis.

1. Boiling: Bringing it to its boiling point at 100 °C (212 °F), is the oldest and most effective way since it eliminates most microbes causing intestine related diseases, but it cannot remove chemical toxins or impurities. For human health, complete sterilization of water is not required, since the heat resistant microbes are not intestine affecting. The traditional advice of boiling water for ten minutes is mainly for additional safety, since microbes start getting eliminated at temperatures greater than 60 °C (140 °F). Though the boiling point decreases with increasing altitude, it is not enough to affect the disinfecting process. In areas where the water is “hard” (that is, containing significant dissolved calcium salts), boiling decomposes the bicarbonate ions, resulting in partial precipitation as calcium carbonate. This is the “fur” that builds up on kettle elements, etc., in hard water areas. With the exception of calcium, boiling does not remove solutes of higher boiling point than water and in fact increases their concentration (due to some water being lost as vapour). Boiling does not leave a residual disinfectant in the water. Therefore, water that is boiled and then stored for any length of time may acquire new pathogens.

2. Granular Activated Carbon filtering: a form of activated carbon with a high surface area adsorbs many compounds including many toxic compounds. Water passing through activated carbon is commonly used in municipal regions with organic contamination, taste or odors. Many household water filters and fish tanks use activated carbon filters to further purify the water. Household filters for drinking water sometimes contain silver as metallic silver nanoparticle. If water is held in the carbon block for longer period, microorganisms can grow inside which results in fouling and contamination. Silver nanoparticles are excellent anti-bacterial material and they can decompose toxic halo-organic compounds such as pesticides into non-toxic organic products.

3. Distillation involves boiling the water to produce water vapour. The vapour contacts a cool surface where it condenses as a liquid. Because the solutes are not normally vaporised, they remain in the boiling solution. Even distillation does not completely purify water, because of contaminants with similar boiling points and droplets of unvapourised liquid carried with the steam. However, 99.9 % pure water can be obtained by distillation.

4. Reverse osmosis: mechanical pressure is applied to an impure solution to force pure water through a semi-permeable membrane. Reverse osmosis is theoretically the most thorough method of large scale water purification available, although perfect semi-permeable membranes are difficult to create. Unless membranes are well-maintained, algae and other life forms can colonize the membranes.

5. Electrodeionization: water is passed between a positive electrode and a negative electrode. Ion selective membranes allow the positive ions to separate from the water toward the negative electrode and the negative ions toward the positive electrode. High purity deionized water results. The water is usually passed through a reverse osmosis unit first to remove non-ionic organic contaminants.

6. The use of iron in removing arsenic from water.

7. Direct contact membrane distillation (DCMD). It is applicable to desalination. Heated seawater is passed along the surface of a hydrophobic polymer membrane. Evaporated water passes from the hot side through pores in the membrane into a stream of cold pure water on the other side. The difference in vapour pressure between the hot and cold side helps to push water molecules through.

8. Desalination is a process by which saline water (generally sea water) is converted to fresh water. The most common desalination processes are distillation and reverse osmosis. Desalination is currently expensive compared to most alternative sources of water, and only a very small fraction of total human use is satisfied by desalination. It is only economically practical for high-valued uses (such as household and industrial uses) in arid areas.

9. Gas hydrate crystals centrifuge method. If carbon dioxide or other low molecular weight gas is mixed with contaminated water at high pressure and low temperature, gas hydrate crystals will form exothermically. Separation of the crystalline hydrate may be performed by centrifuge or sedimentation and decanting. Water can be released from the hydrate crystals by heating.

10. In Situ Chemical Oxidation, a form of advanced oxidation processes and advanced oxidation technology, is an environmental remediation technique used for soil and/or groundwater remediation to reduce the concentrations of targeted environmental contaminants to acceptable levels. ISCO is accomplished by injecting or otherwise introducing strong chemical oxidizers directly into the contaminated medium (soil or groundwater) to destroy chemical contaminants in place. It can be used to remediate a variety of organic compounds, including some that are resistant to natural

degradation.

**Text 11**

**The Food Industry**

A large amount of water is used in the food industry – much of it in obvious ways such as a component of food or in cleaning and cooking the food, but much of the water is used in ways we never see or think about. We can’t talk about water usage in the food industry without discussing the term water footprint. The water footprint of any product is the volume of fresh water used to produce that product, and it usually breaks down into three parts.

1. The blue water footprint is the volume of fresh water that is evaporated from the global surface and groundwater.

2. The green water footprint is the volume of water that evaporates from the global rainwater stored in the soil.

3. The gray water footprint is the volume of polluted water – the volume of water required to dilute pollutants to such an extent that the quality of the surrounding water remains above-agreed water quality standards.

4. The water footprint of any animal product is larger than the water footprint of a wisely chosen agricultural product with equivalent nutritional value.

Consider that the supply chain of an animal product starts with the cultivation of the feed crop and ends with the consumer. In each step of the chain, there is a direct water footprint, which refers to the water consumption in that step, but also an indirect water footprint, which refers to the water consumption in the previous steps. In the production of meat for human consumption, six to twenty times more water is required than for the production of cereals. Although food and drink are big factors in this figure, the water needed to produce feed is the major factor behind the water footprint of animal products; in fact, about 98 % of the water footprint of animal products relates to water used to grow feed.

**APPENDIX**

**Grammar and Vocabulary Tests**

**Test 1**

**Task 1(Water Cycle)**

|  |  |
| --- | --- |
| 1. **Where does the energy that powers the water cycle come from?** | |
| A: plants | C: electrical outlets |
| B: animals | D. the sun |
| 1. **What is evaporation?** | |
| A: Water freezes. | C: Water gets warm and  changes from liquid water to water vapor. |
| B: Water vapor meets cold air and changes back into liquid. | D: Plants take in water from the soil. |
| 1. **What is the correct term for moisture that falls to the ground from clouds?** | |
| A: condensation | C: hibernation |
| B: precipitation | D: evaporation |
| 1. **From where does most water evaporate?** | |
| A: puddles | C: lakes |
| B: rivers | D: oceans |
| 1. **What is the correct term for rising water vapor meeting colder air and turning back into water droplets?** | |
| A: condensation | C: precipitation |
| B: dehydration | D: evaporation |
| 1. **What is the only thing in nature that can be a solid, a liquid, or a gas?** | |
| A: helium | C: oxygen |
| B: water | D: hydrogen |
| 1. **What are the three stages of the water cycle?** | |
| A: evaporation, condensation, precipitation | C: precipitation, dehydration, evaporation |
| B: condensation, precipitation, hibernation | D: transpiration, dehydration, condensation |
| 1. **Where is water vapor found?** | |
| A: in the air around you | C: in steam from a kettle |
| B: in your breath | D: all of the above |
| 1. **What are the drops of water that form on cool surfaces during the night called?** | |
| A: dew | C: steam |
| B: rain | D: snow |
| 1. **What is the correct term for plants releasing water from their leaves, which then evaporates?** | |
| A: evaporation | C: transpiration |
| B: precipitation | D: condensation |
| 1. **Where does some water from the water cycle collect underground?** | |
| A: aquariums | C: aqueducts |
| B: aquifers | D: aquatic parks |

**Task 2 (Complex Object/Subject)**

**1. Choose the sentence with complex object**

A. I did not expect my business partner send me a bouquet of flowers.

B. I did not expect my business partner to send me a bouquet of flowers.

C. I did not expect my business partner to have send me a bouquet of flowers.

**2. Rewrite the following sentence using complex object:** They know that Tom’s friend is an excellent professional.

A. They know Tom’s friend to be an excellent professional.

B. They know Tom’s friend be an excellent professional.

C. They know Tom’s friend as an excellent professional.

**3. Rewrite the following sentences using complex object:** Anastasia saw a professor. He was explaining students’ mistakes.

A. Anastasia saw a professor explaining students’ mistakes.

B. Anastasia saw a professor to be explaining students’ mistakes.

C. Anastasia saw a professor who was explaining students’ mistakes.

**4. Rewrite the following sentences using complex object:** The governor of South Carolina was calling for removal from a ceremonial place at the state house. We heard it.

A. We heard the governor of South Carolina called for removal from a ceremonial place at the state house.

B. We heard the governor of South Carolina to call for removal from a ceremonial place at the state house.

C. We heard the governor of South Carolina calling for removal from a ceremonial place at the state house.

**5. Combine the following sentences into one using complex objects**: I heard him. He was speaking English fluently.

A. I heard him who was speaking English fluently.

B. I heard him speaking English fluently.

C. I heard him speak English fluently.

**6. Which sentence contains complex object?**

A. Didn’t you hear her sang a pop song?

B. Didn’t you hear her singing a pop song?

C. Didn’t you hear that she was singing a pop song?

**7. Combine sentences using Complex Object:** Tom saw him. He opened the door of the house in the dark.

A. Tom saw him open the door of the house in the dark.

B. Tom saw him to open the door of the house in the dark.

C. Tom saw him opening the door of the house in the dark.

**8. Which sentence is correct?**

A. I noticed him behave badly and asked to settle down.

B. I noticed him to behave badly and asked to settle down.

C. I noticed him behaved badly and asked to settle down

**9. Remake sentences using complex object:** I was so nervous. I felt that my heart was beating very fast.

A. I was so nervous that I felt my heart beating very fast.

B. I was so nervous that I felt my very fast beating heart.

C. I was so nervous that I felt my heart beat very fast.

**10. Choose the right variant.**

A. They didn’t want their luggage carried upstairs.

B. They didn’t want their luggage to be carried upstairs.

C. They didn’t want their luggage carry upstairs.

**11. Choose the right variant.**

A. I want some fresh orange squeezed juice.

B. I want some fresh orange juice to be squeezing.

C. I want some fresh orange juice to be squeezed.

**12. Choose the right variant.**

A. He wanted to have his documents preparing on Monday morning.

B. He wanted to have his documents prepared on Monday morning.

C. He wanted to have his documents prepare on Monday morning.

**13. Which sentence is correct?**

A. They were considered to be the best architects in the city.

B. They were consider the best architects in the city.

C. They were considered to being the best architects in the city.

**14. Choose the right variant: The number of the unemployed people in the world is reported \_\_\_ with every year.**

A. to be increasing

B. to be increased

C. to have been increased

**15. Choose the right variant.**

A. It is expected a new bestseller of Doydzh Norman will be published in 2016.

B. A new bestseller of Doydzh Norman is expected to be published in 2016.

C. A new bestseller of Doydzh Norman expected to be published in 2016.

**16. Rewrite the following sentence:** It is believed that the mountain gorillas are very calm and shy.

A. The mountain gorillas are believing to be very calm and shy.

B. The mountain gorillas believe to be very calm and shy.

C. The mountain gorillas are believed to be very calm and shy.

**17. Rewrite the following sentence:** It is said that a lot of weightlifters have enormous muscles.

A. A lot of weightlifters said to have enormous muscles.

B. A lot of weightlifters are said to have enormous muscles.

C. A lot of weightlifters have said to have enormous muscles.

**18. Choose the right variant:**

A. Sandra is seemed to have been dreaming of no one else but John since their first meeting.

B. Sandra to be seemed to have been dreaming of no one else but John since their first meeting.

C. Sandra seemed to have been dreaming of no one else but John since their first meeting.

**19. Rephrase the following sentence:** It appeared that he had spent the night in mountains.

A. He appeared to have spent the night in the mountains.

B. He appeared to had spent the night in the mountains.

C. He appeared to have been spent in the mountains.

**20. Translate the following sentence into English: Я хочу подстричься.**

A. I want to cut my hair.

B. I want to have my hair cut.

C. I want to have my haircut.

**Task 3**

**Put the sentences with the right words in the right order.**

1. Я хочу, чтобы родители купили мне машину.

|  |  |  |  |
| --- | --- | --- | --- |
| 1. to buy | 2. I | 3. a car | 4. my parents |
| 5. Bought | 6. Want | 7. that | 8. me |

1. Мама не хотела, чтобы мы шли на эту вечеринку.

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Mother | 2. That | 3. to go | 4. Want |
| 5. Went | 6. Us | 7. did not | 8. we |
| 9. to this party |  |  |  |

3.Я не хотел, чтобы они опоздали на поезд.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. them | 2. for the train | 3. I | 4. that | 5. want |
| 6. did | 7. they | 8. not | 9. to be late | 10. were late |

4.Они хотят, чтобы Питер пригласил ее на вечеринку?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. him | 2. that | 3. Do | 4.invited her | 5. They |
| 6. they | 7. to the party | 8. Peter | 9. want | 10. to invite her |

5. Я хотел, чтобы он послушал прогноз погоды.

|  |  |  |  |
| --- | --- | --- | --- |
| 1. listened | 2. that | 3. I | 4. to listen |
| 5. had | 6. to the weather forecast | 7. him | 8. he |
| 9. wanted |  |  |  |

6. Учитель хотел, чтобы вы сделали доклад.

|  |  |  |  |
| --- | --- | --- | --- |
| 1. that | 2. you | 3. made | 4. wanted |
| 5. to make a report | 6. You | 7. The teacher |  |

7. Вы хотели, чтобы она навестила вас в воскресенье?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. you | 2. that | 3. want | 4. on Sunday | 5. visited |
| 6. her | 7. she | 8. Did | 9. to visit | 10. wanted |

8. Я хочу, чтобы ее попросили приготовить обед.

|  |  |  |  |
| --- | --- | --- | --- |
| 1. her | 2. that | 3. I | 4. to be asked |
| 5. asked | 6. want | 7. she | 8. to cook dinner |
| 9. was asked |  |  |  |

9. Мне бы хотелось, чтобы текст перевели сегодня.

|  |  |  |  |
| --- | --- | --- | --- |
| 1. to be translated | 2. translated | 3.the text | 4. was  translated |
| 5. today | 6. I'd like | 7. that |  |

10. Мой друг хочет, чтобы тебя пригласили в театр.

|  |  |  |
| --- | --- | --- |
| 1. to the theatre | 2. that | 3. to invite |
| 4. wants | 5. were invited | 6. you |
| 7. My friend | 8. want | 9. to be invited |

**Test 2**

**Task 1 (Water Pollution)**

**1.** Water pollution has become a major problem in the world today. It has an adverse affect on both the environment and health. **What are the main sources of water pollution in India?**

A. Municipal sewage

B. Bathing

C. Industrial discharge

D. Both a and c

**2. What minerals are found in the run-off from agricultural land and treated and untreated sewage effluents, which are highly responsible for eutrophication of water bodies?**

A. Phosphorous and carbon

B. Nitrogen and phosphorus

C. Potassium and arsenic

D. Iron and manganese

**3.** Aquaculture is the controlled cultivation and harvesting of freshwater or marine aquatic species of plants and animals. **Name an area along the Indian coast, where aquaculture and prawn culture activities are a major source of coastal pollution as well as a threat to the endangered sea turtles.**

A. East Coast, especially Orissa

B. Maharashtra

C. Kerala

D. All of the above

**4.** The GAP (Ganga Action Plan) – a project to clean up the polluted waters of the Ganga – plans to intercept and divert municipal sewage falling into the river from 25 large urban conglomerates in three states. **Name them.**

A. UP, Haryana and Punjab

B. UP, Bihar and West Bengal

C. Himachal Pradesh, UP, and Haryana

D. Orissa , Bihar and West Bengal

**5. Of the following indications of the health of a water body, which is the most widely accepted means of measuring how polluting an effluent is?**

A. COD (chemical oxygen demand)

B. BOD (biological oxygen demand)

C. Chloroform content

**6.** Wetlands are very rich and diverse ecosystems. Of the wetlands of international importance in the world, a large number are subject to moderate or high threat. **Which convention signed in Iran protects this specific ecosystem (wetlands) on a global basis?**

A. The Vienna Convention

B. The Ramsar Convention

C. The Basel Convention

**7.** In a survey recently conducted by the CGWA (Central Ground Water Authority) and CPCB (Central Pollution Control Board), the groundwater samples in one-fourth of the neighborhood tested in New Delhi were unfit for drinking. They contained high levels of two minerals that are not eliminated by ordinary water filters and are extremely harmful at high concentrations. **Name them.**

A. Mercury and zinc

B. Fluoride and arsenic

C. Nitrate and flouride

**8.** “Water harvesting” has emerged as a sensible method of meeting the water shortfall in a cost-effective manner and is now being applied in most cities to raise the groundwater levels. **Water harvesting is the…**

A. Collection of water from river

B. Collection of rainwater in storage tanks or putting back into the soil to recharge groundwater

C. Harvesting of water from tube wells

**9. Which sector is the single-largest consumer of fresh water in India?**

A. Industry

B. Power

C. Domestic

D. Agriculture

**10.** The report of a UNEP/ILEC joint project has identified water-level fluctuation as one of the six major problems confronting the world’s lakes and reservoirs. **The water level in which the sea has been rising rapidly in the recent years making it necessary to protect cities, railways, and roads from the rising water?**

A. The Caspian Sea

B. The Black sea

C. The Mediterranean sea

D. The Arabian sea

**11.** The greatest ecological threat in the history of the Antarctic continent was the sinking of the Argentinian supply ship carrying one million litres of diesel oil off its western peninsula. The unique flora and fauna of the region faced the threat of extinction and the effects of this oil spill are likely to be felt till 2100 AD. This year also saw the famous Alaska oil spill. **State the year.**

A. 1985

B. 1989

C. 1992

D. 1994

**12.** The greatest ecological threat in the history of the Antarctic continent was the sinking of the Argentinian supply ship carrying 1 million litres of diesel oil off its western peninsula. The unique flora and fauna of the region faced the threat of extinction and the effects of this oil spill are likely to be felt till 2100 AD. This year also saw the famous Alaska oil spill. **State the year.**

A. 1985

B. 1989

C. 1992

D. 1994

**13. From 1947 to 1997, the waste-water discharge by industries grew by about \_\_\_ times.**

A. 43

B. 100

C. 30

D. 53

**14. Materials of biological origin which are commonly used to maintain and improve soil fertility are:**

A. green manure

B. biofertilizers

C. bioinsecticides

D. both A and B

**Task 2 (Relative Clause)**

**1. Bay to Breakers, \_\_\_\_, is a marathon race held annually in San Francisco. (Its runners wear hilarious costumes.)**

A. its runners wear hilarious costumes

B. the runners of which wear hilarious costumes

C. which the runners wear hilarious costumes

D. runners of which wear hilarious costumes

E. which its runners wear hilarious costumes

**2. The 12 km race route, \_\_\_, goes from San Francisco Bay across town to the Pacific Ocean. (Most of it is lined with people.)**

A. most of its lined with people

B. most of people which line it

C. which most of it is lined with people

D. which most of people line it

E. most of which is lined with people

**3. The word "breakers" refers to the ocean \_\_\_. (Its waves break onto the shore.)**

A. the waves break onto the shore

B. the waves of which break onto the shore

C. its waves break onto the shore

D. which its waves break onto the shore

E. its waves which break onto the shore

**4. Along with the race, there is a giant street party \_\_\_. (Some of it takes place before the race.)**

A. some of which takes place before the race

B. which some of it takes place before the race

C. some of its take place before the race

D. whose takes place before the race

E. which some of takes place before the race

**5. At the pre-race gathering, I saw a man \_\_\_. (His costume was a banana.)**

A. whose costume was a banana

B. who his costume was a banana

C. his costume was a banana

D. whose his costume was a banana

E. which he costume was a banana

**6. The runners \_\_\_ gather at the starting line near the Ferry Building at 8:00 a.m. (Their registrations have been received.)**

A. theirs registrations have been received

B. who their registrations have been received

C. whose registrations have been received

D. whose their registrations have been received

E. their registrations have been received

**7. The race officials allowed the serious runners \_\_\_ to line up at the start line. (Their T-shirts were numbered from 1 to 100.)**

A. their T-shirts were numbered from 1 to 100

B. whose their T-shirts were numbered from 1 to 100

C. whose T-shirts were numbered from 1 to 100

D. who their T-shirts were numbered from 1 to 100

E. theirs T-shirts were numbered from 1 to 100

**8. The 2007 event was the first Bay to Breakers race to track the times of individual racers \_\_\_. (The racer’s shoes were equipped with timing chips.) chip = device**

A. who their shoes were equipped with a timing chip

B. whose their shoes were equipped with a timing chip

C. shoes of whose were equipped with a timing chip

D. whose shoes were equipped with a timing chip

E. their shoes were equipped with a timing chip

**9. The marathon race, \_\_\_, passes by the famous Hayes Street Hill houses. (Its theme is “Painted Ladies”.)**

painted ladies – a term for “ladies of the night” or in this case the painted old Victorian houses located on Hayes Street.

A. whose theme was “Painted Ladies”

B. whose its theme was “Painted Ladies”

C. its theme who was “Painted Ladies”

D. who its theme was “Painted Ladies”

E. it theme “Painted Ladies”

**10. One man \_\_\_ lost his costume half way through the race. All of his balloons popped.**

A. all of whose balloons popped

B. whose all balloons popped

C. all his balloons popped

D. who all his balloons popped

E. his balloons all of them popped

**11. Another group of women \_\_\_ ran by in tight short and t-shirts.** (The group name was “Weapons of Mass Distraction”, a play on words: destruction – distraction.)

A. its name was “Weapons of Mass Distraction”

B. their name was “Weapons of Mass Distraction”

C. which name was “Weapons of Mass Distraction”

D. which was its name “Weapons of Mass Distraction”

E. whose name was “Weapons of Mass Distraction”

**12. One man \_\_\_ ran with a bouquet of flowers over his “privates”.** (His body was naked.)

A. who his body was naked

B. the body of which was naked

C. the body whose was naked

D. whose body was naked

E. his body was naked

**13. The winner \_\_\_ ran the 12 km race in 34 minutes and 24 seconds.** (His origin is Kenya.)

A. whose origin is Kenya,

B. whose origin is Kenya

C. who his origin is Kenya,

D. who his origin is Kenya

E. his origin was Kenya

**14. San Francisco \_\_\_\_\_\_ was warm and sunny on the day of the marathon run.** (Its weather is often foggy)

A. the weather of which is often foggy,

B. the weather of which is often foggy

C. which the weather is often foggy,

D. which the weather is often foggy

E. its weather is often foggy

**15. Bay to Breakers, also known as B2B, is a crazy**

**event \_\_\_** (Its winner is shown on national news.)

A. its winner is shown on national news.

B. who its winner is shown on national news.

C. the winner of which is shown on national news.

D. which winner often is shown on national news.

E. winner of which is shown on national news.

**Tests Keys**

**Test 1**

Task 1 (Water Cycle)

1 D, 2 C, 3 B, 4 D, 5 A, 6 B, 7 A, 8 D, 9 D, 10 C, 11 B.

Task 2 (Complex Object/Subject)

1 B, 2 A, 3 A, 4 C, 5 B, 6 B, 7 A, 8 A, 9 A, 10 B, 11 C, 12 B, 13 A, 14 A, 15 B, 16 C, 17 B, 18 C, 19 A, 20 B.

**Test 2**

Task 1 (Water Pollution)

1 A, 2 B, 3 A, 4 B, 5 B, 6 B, 7 C, 8 B, 9 D, 10 A, 11 B, 12 B, 13 A, 14 D.

Task 2 (Relative Clause)

1 B, 2 E, 3 B, 4 A, 5 A, 6 C, 7 C, 8 D, 9 A, 10 A, 11 E, 12 D, 13 A, 14 A, 15 C.

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**Тарасенко** Наталья Николаевна

**Water is Life**

**Part 2**

*Учебное пособие*

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