საერთაშორისო სამეცნიერო კონფერენცია „ეკოლოგიის თანამედროვე პრობლემები“
შრომები, ISSN 1512-1976, ტ. 7, თბილისი-თელავი, საქართველო, 26-28 სექტემბერი, 2020
International Scientific Conference „Modern Problems of Ecology“
Proceedings, ISSN 1512-1976, v. 7, Tbilisi-Telavi, Georgia, 26-28 September, 2020
Международная научная конференция „Современные проблемы экологии“
Труды, ISSN 1512-1976, т. 7, Тбилиси-Телави, Грузия, 26-28 сентября, 2020

ACTIVE TEACHING USING THE SYSTEMS OF MATHEMATICAL PROBLEMS WITH THE ENVIRONMENTAL CONTENTS AND HAVING THE CROSS-DISCIPLINARY LINKS FOR PUPILS IN PRIMARY SCHOOL (PART II)

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Summary: When composing the system of mathematical problems with the environmental content, we use a scheme that we have developed: “transferring the oretical knowledge on environmental issues from other (not from mathematics) subject solving the set mathematical problem after writing down the solution of this problem, putting such pre-formulated questions for pupils, which strengthen the pupils’ environmental knowledge”.

We have written more than 1200 mathematical problems with the environmental contents having the developmental and cross-disciplinary links for active teaching of pupils of all classes in primary school, on single-digit and multi-digit numbers, a puzzle and logical problems, the problems of multiplication and division of numbers by several times, the problems on motion, the entertaining mathematical problems with the environmental content, the problems of finding the percentage, finding the sum of two products, combinatorial problems, the problems on birds, fish, animals, plants, insects, the problems associated with the country's nature reserves, including their flora, fauna and so on. We brought and examined a small part of these problems and made relevant methodological conclusions.

Our pedagogical experiments have demonstrated that the inclusion of the system of mathematical problems with the environmental contents having the developmental and cross-disciplinary links, makes the lower grade pupils teaching active, interesting and versatile, the need for all teaching disciplines is clearly seen. The scientific view and skills of pupils are expanding, there is no need for additional time and it facilitates in-depth and thorough mastering of all disciplines in primary school.

Key words: environment, mathematical problems, primary school, teaching process.

Problems on motion

1. What is the distance between Tbilisi and Kutaisi, if bus arrives from Tbilisi to Kutaisi in 3 hours and runs at a speed of 78 km/h?
2. The distance from Batumi to Tbilisi is 370 kilometers. At what speed did the bus run, if it arrived in Tbilisi in 5 hours?
3. The autoboat went from Poti to Batumi by sea. The distance between Poti and Batumi is 90 km. How many hours will it take the autoboat to arrive in Batumi if it runs at a speed of 30 km/h?
4. A group of tourists went from Tbilisi to Bakuriani. What is the distance from Tbilisi to Bakuriani, if the tourists reached Bakuriani in 4 hours and the average speed of bus was 50 km/h?
5. The bus went from Telavi to Kutaisi, and the minibus went from Kutaisi to Telavi. What is the distance between Telavi and Kutaisi, if the bus and minibus met each other 4 hours after departure and the speed of the bus was 45 km/h and the speed of the minibus was 55 km/h?
6. At 8 a.m., a group of tourists went from from Zugdidi to Vardzia, who arrived in Vardzia at 1 p.m. What is the distance from Zugdidi to Vardzia, if the minibus, by which the tourists traveled had the speed of 68 km/h.
7. After the tour to the Bagrati Cathedral, a group of tourists went by bicycles from Kutaisi at 3 p.m. to visit the Skanda Fortress. The riding speed of bicyclists was about 15 km/h. What time did they come to the Skanda Fortress, if they had to cover a 45-kilometer distance?
8. The total area of Georgia is 69 700 square kilometers, and its fifth is occupied by Russia. How many thousand kilometers of Georgian territory is occupied by Russia?

9. The total area of Georgia is 69 700 square kilometers. About a third of its area is covered by forests. How many thousands of hectares of Georgian territory is covered by forests?

A puzzle and logical problems

1. 5 swallows and 7 sparrows were on the cable. 6 birds went. Was the sparrow among them?

2. One poplar tree absorbs 50 liters of water per day. How many days is required for two poplar trees to absorb 100 liters of water? How many water can be absorbed from the soil by three such trees in two days?

3. Two crows are sitting in a tree on different sides, one to the south, and another one to the north.

- Your feet are muddy – says one crow to another one.

- But your beak is in mud – answers another crown to the first one.

How can that be? They are looking on opposite directions and see each other?

4. If it's raining at 12 midnight, can there be sunny weather in 48 hours?

5. When hen stands on one foot, its weight is 3 kg. How much does the hen weigh when it stands on two feet?

6. The bee has as many eyes as you do, as many again and half of that. How many eyes does the bee have?

7. 3 beetles are sitting on the birch leaf, while 4 spiders are sitting on the poplar leaf, 2 hedgehogs are looking for food in the leaves under the pine tree, and 5 blackbirds are singing on the oak branch. Count the number of feet having by all birds described in the problem: (the beetle has 6 feet, so 3 beetles have 18 feet, the spider has 8 feet, that is 4 spiders have have 32 feet, and 5 blackbirds have 10 feet, and they all have a total of 68 feet).

An entertaining mathematical problem with the environmental content

There is a stony silence in the swamp in the reeds. The heads of the mosquito family, mother and father mosquitoes are resting. There were a lot of little mosquitoes around them. Father mosquito tells mother mosquito:

– Count our youngs, see if we missed anyone.

– How do I count – says mother moscito, they are not listening to me, they do not line up and this is very difficult for me, and besides, I have to make dinner.

Mother moscito counted fourty pairs and went to make dinner. Father mosquito continued to count and kept counting until the evening, as a result of which a total of nine thousand forty-eight mosquitoes have been counted.

Now children, let's know how many moscitoes are in this family.

The problems associated with the natural reserves existing in Georgia

1. The Ajameti Reserve is one of the oldest reserves in Georgia. Ajameti was formed as a natural reserve in 1946, and its purpose was to preserve rare relics - the Imeretiэы oak and zelkova. The famous oak forest of Ajameti is very old. Some trees are over 250 years old. How many years ago was the Ajameti Reserve founded?

2. Get acquainted with the information about Borjomi-Kharagauli Park and answer the question: How many centuries does the Borjomi-Kharagauli Park exist?

The mathematical problems of multiplication and division of numbers by several times with environmental contents

1. In the Kolkheti National Park, the height of the young pine-tree is 3 meters, and the height of the adult pine-tree is 10 times higher. What is the height of the adult pine-tree?

2. 80 kg of honey fungus were dried and 10 kilograms of dried mushrooms were obtained. How many kilograms of dried mushrooms can be obtained from 240 kilograms of honey fungus?

3. The length of the adult viper is 80 centimeters, the length of the little viper is 5 times less. How many centimeters is the length of the little viper?

4. In the warm Gulf Stream waters, 25 million cubic meters of water flow every minute. How much water will flow through the the warm Gulf Stream waters per minute?

5. Technical equipment that enabled us to study the life of fishes in the middle of the twentieth century, allowed to conduct studies at the depth of up to 200 meters. Such studies can be carried out by modern equipment at the depth of 2000 meters. How many times has the area of study of the life of fishes increased in modern conditions compared to the mid-twentieth century?

Finding the amount of two products

1. In the XVIII century in Europe, sailors used to catch fish from the flotilla composed of 12 large ships, each of which was served by 48 sailors and 5 shipboys. How many fishermen were engaged in fishing?

2. The puppy weighs 2 kilograms, the kitten weighs 1 kilogram. How much do 2 puppies weigh? How much do 3 kittens weigh? How much do 3 puppies 3 dog puppies and 2 kittens weigh?

3. The cat has 4 kittens. The weight of the cat is 3 kilograms, while each kitten weighs 1 kilogram. How many kilograms do the cat with kittens weigh?

The problems of finding the percentage

There are 26 060 rivers in Georgia, and their total length is approximately 60 thousand km. The lengths of the rivers flowing through the territory of Georgia are as follows: Mtkvari -351 km, Rioni-327 km, Tekhuri-101 km, Enguri -213 km, Kodori-117 km, Alazani -391 km, Bzipi -110 km, Kvirila -140 km, Tskhenistskali -176 km , Ktsiakhrami -187 km, Aragvi -112 km, Khobistskali -150 km, Liakhvi -115 km, Supsa -109 km, Iori-183 km, Algeti -116 km, Paravani -74 km, Chorokhi -28 km. What is the percentage of the listed lrivers' lengths in the total length of the rivers of Georgia?

Problems on birds and animals

1. The swallow can fly over 3000 kilometers within 5 days. How long can the swallow fly in 24 hours, if its flying speed is always constant?

2. The swift flies at the speed of 28 km/h, while the falcon flies 4 times faster. What is the falcon's flying speed?

3. There have been discovered and described 19056 species of fish, 9040 species of birds and 4010 species of animals throughout the world. Write down these numbers in ascending order and separate the degrees in each number.

Combinatorial problems

1. The hedgehog has 6 apples. 4 apples of them are red and 2 are green. The hedgehog ate 3 apples. What color apples can be eaten? How many different options have you received?

2. The squirrel has 4 acorns of different sizes and 3 mushrooms of different varieties. How many different couples of acorn and mushroom can be made by the squirrel?

3. Three little piggies, Nif-Nif, Nuf-Nuf and Naf-Naf decided to build houses. Three excellent places were chosen: the riverside, the lakeside and the mountain. Find all the possible options, where the piggies can build their houses and type in the table. How many different options did you get?

4. The wasp, the beetle, the dragonfly, the butterfly and the fly are sitting on the flower. Make up all possible couples of insects. How many pairs of insects did you get? Two insects went. Which insects could go?

5. The squirrel, the fox, the duck, the turtle, and the mouse decided to hold the party and invite the wolf, the rabbit, the bear, the hedgehog, and the raccoon. How many different dance couples can be made up from the hosts and guests?

6. In order to dress the cake, the squirrel decided to mix two different products. How many different types of dressings can be made by the squirrel, if it has blackberries, grapes, apples and mushrooms?

7. Six field mice rented a two-seater boat. How many different couples of mice can ride the boat?

8. 5 friends: the rabbit, the hedgehog, the badger, the polecat and the raccoon agreed to send one SMS to each other and get recommendations on how to escape the hunters, wolves and foxes. How many SMSs in total will send friends to each other?

9. The fox decided to invite the badger, rabbit and the hedgehog for a walk, and to walk around with each of them alone. In what order the fox can invite them? How many options are available?

10. The fox has 2 pants and 3 shirts. All items are of different colors. Can the fox wear the different sets of pants and shirts daily, within a week?

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