SOLVE MOVEMENT PROBLEMS IN A VARIETY OF WAYS.

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Annotation: The paper deals with motion problems, the problem of finding the connections between the three quantities that characterize motion — velocity, time, and distance — in which the said quantities participate as directed quantities. It is considered that the quantities that characterize the motion, that is, the problems involving speed, time and distance, are problems of motion.

Key words: distance, problem, arithmetic operations, speed, time, collision motion, inverse problem **.**

The problem of motion includes the problem of finding the connections between the three quantities that characterize motion — velocity, time, and distance — in which the said quantities participate as directed quantities. Hence, the quantities that characterize motion, that is, the issues that include speed, time, and distance, are issues of motion. The following issues are among the issues related to the action.

1. Simple and complex problems related to the motion of an object. In these matters, one of the quantities participates in relation to the other two in speed, time, and distance.
2. Meeting action issues.
3. Issues related to the motion of two bodies in opposite directions.
4. Issues related to the motion of two bodies in one direction.

It is well known that in order to organize the solution of complex problems, the reader must first know how to solve simple problems. Therefore, work on action issues should start with solving simple problems.

For example: 1. Two trains departed from two cities facing each other, one at 8 o'clock and the other at 9 o'clock. They met at 11 p.m. How long had each train been on the road before it met.

2. Two trains departed from the two cities at the same time, looking at each other at 8 o'clock. They met at 11 p.m. How long was it on the road before each train met?

In order to solve problems related to the encounter movement, children need to have a good idea of the encounter movement, to understand it. To do this, the teacher takes the students out into the school air where the students have to see the collision movements of pedestrians and street vehicles. In elementary school, students are given questions about encounter motion, in which objects begin to move at the same time and stop moving at the same time. In these matters, four interrelated quantities are involved.

S, V, V2, t where s is the distance between the starting points of the motion, v and v2, are the velocities of the moving bodies, t is the time of motion. It follows that this group includes four different issues.

However, finding the velocities of the first and second bodies requires the same solution, so it is accepted to include three different problems in this group of problems:

1) to find the distance according to the velocities and time of motion of a given object
2) to find the time according to the known velocity and distance of each object
3) Problems of finding the speed of one of the moving objects at a given distance, time of movement and speed of one of the objects.

It is recommended to include all three of these different issues in the same lesson by turning the given problem into inverse problems.

For example: Two pedestrians from two villages walk towards each other at the same time and meet in 3 hours. The first pedestrian walked 4 km per hour and the second 5 km per hour. Find the distance between the villages?

3 hours 4 km / h → ← 5 km / h
The problem can be solved in two different ways.
Method I. $4 \cdot 3 + 5 \cdot 3 = 12 + 15 = 27$ (km)
Method II $(4 + 5) \cdot 3 = 9 \cdot 3 = 27$ (km) Answer 27 km
This represents the approach of pedestrians to the same distance every hour, ie equal to the sum (4 + 5).
After solving the problem, students should be asked such questions.
1. How far (it is useful to ask questions) how far did each pedestrian meet?

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2. Why did the infantry shoot at different distances before they met?

3. Do pedestrians meet in the middle of the road or not?

Why not meet in the middle of the road?

These questions help to understand the essence of the problem and its solution. After solving this problem, the teacher introduces to the students the inverse problem, that is, the unknown distance is known (27 km), and the time of movement is unknown. Two pedestrians set off at the same time from two villages 27 km apart. The speed of the first pedestrian is 5 km per hour. The speed of the second pedestrian is 4 km per hour How many hours did the pedestrian meet?

? 4 km / h → ← 5 km / h 7 km

Depending on the drawing, the issue is analyzed as follows.

To meet, pedestrians must cover a total distance of 27 km between villages, with the first pedestrian covering the distances from place A to the meeting place and the second pedestrian covering the distance from place B to the meeting place.

How many hours do they need to meet, i.e. how many hours do they need to shoot all the way?

At one hour the pedestrians approach (4 + 5) km, at the second hour they approach another (4 + 5) km and at how many hours do the pedestrians have to walk to cover the distance of 27 km? The number of hours they have to walk (4 + 5) km to 27 km is written as follows:

4 + 5 = 9 (km) approach of pedestrians per hour

2) 27: 9 = 3 hours (time elapsed before meeting) J: 3 hours

The condition of the problem is once again changed in such a way that a problem is formed in which it is necessary to find the speed of one of the pedestrians.

From the two villages, which were 27 km apart, two pedestrians set out at the same time, facing each other, and met 3 hours later. The first pedestrian walked at a speed of 4 km per hour. How fast did the two pedestrians walk per hour?

3 s 4 km / h → ← 5 km / h 27 km

Depending on the drawing, the problem can be analyzed as follows: The second pedestrian needs to know how many kilometers he is walking per hour. To do this, you need to know the time he was on the road and the distance he traveled before the meeting, the time he was on the road is known, it is 3 hours. The distance is unknown, but it can be found, it is equal to all distances except the first pedestrian. The total distance is 27 km, the distance traveled by the first pedestrian can be found according to the given time and given speed.

Solution:

Method I.1) 4 · 3 = 12 km is the distance covered before the first pedestrian encounters

2) 27-12 = 15 (km) distance covered before the second pedestrian encounters

3) 15: 3 = 5 km / h second pedestrian speed

Method II. The solution can be written to increase the expression.

(27-4 · 3): 3 = (27-12): 3 = 5km / s (5 km / h per hour)

The problem can be solved in another way.

1) 27: 3 = 9 km (distance traveled by two pedestrians per hour)

2) 9-4 = 5 km / h second pedestrian speed.

Method III. This problem can also be solved by constructing an equation.

x is the speed of the second pedestrian

4 · 3 first walking distance

4 · 3 + 3x distance traveled before pedestrians meet

4 · 3 + 3 · x = 27

12 + 3x = 27

3x = 27-12 3x = 15 x = 5 Answer: 5 km / h

For example, two cars from Samarkand set off in opposite directions at the same time. The speed of one is 60 km / h. The second is 70 km / h. What is the distance between them in 3 hours?

Method I.1) 60 · 3 = 180 km (distance traveled by 1 car in 3 hours)

2) 70 · 3 = 210 km (distance traveled by 2 cars in 3 hours)

3) 180 + 210 = 390 km (distance covered by both pedestrians together in 3 hours)

There are also ways to solve the problem:

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Method II. 60 · 3 + 70 · 3 = 390 km

Method III: 1) 60 + 70 = 130 km (distance between cars after 1 hour)

2) 130 · 3 = 390 km (distance between cars after 3 hours)

The solution of the problem by the second method can be done by constructing such an expression.

(60 + 70) · 3 = 390 km Answer: 390 km

By comparing the solution methods, it can be shown that the second method of solution is the most convenient method.

For example: From two cities with a distance of 200 km, two trains departed in opposite directions at the same time. One of them was traveling at 55 km per hour and the other at 65 km per hour. How far apart are these trains 5 hours after the start of the movement?

I-method: 1) 5 · 65 = 325km

2) 5 · 55 = 275 km

3) (325 + 275) + 200 = 800 km Answer: 800 km

Method II: 1) 65 + 55 = 120 km

2) 120 · 5 = 600 km

3) 600 + 200 = 800 km Answer: 800 km

In order to develop students 'thinking activities and speech, it is important to teach them to analyze the problem and its solution, to justify each action in solving the problem. They can understand what is given in the problem, what is sought, what arises from the question, what arithmetic operations are used to find the answer to the problem, and in what order they should be performed, as well as be able to justify each selected action and explain the results. They need to be able to formulate expressions, solve problems and check the correctness of the solution. To do this, it is important to develop students' ability to solve problems in different ways.

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