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METHODOLOGY OF TEACHING TO SOLVE PROBLEMS RELATED TO MOVEMENT FROM MATHEMATICS IN ELEMENTARY GRADES

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Abstract
This article discusses and analyzes the methodology for teaching solving problems related to the movement from mathematics in the lower grades. Movement tasks are the kind of tasks that can be included at different levels of problem-solving skills. The movement process is multifaceted; in different situations it can be performed under different conditions and have different results. As a result, movement tasks can range from simple tasks to tasks of increased complexity.

Keywords: methodology, elementary school, movement tasks, mathematics, skills, learning to solve problems, different levels.

Preparatory work for solving problems related to movement includes: generalization of children's ideas about movement, acquaintance with a new value - speed, disclosure of relationships between quantities: speed, time, distance.

In order to generalize the ideas of children about the movement, it is useful to conduct a special excursion to observe the movement of transport, and then conduct the observation in a classroom where the movement will be demonstrated by the children themselves. During the excursion and while working in the class, observe the movement of one body and two bodies relative to each other. So, one body (a car, a person, etc.) can move faster and slower, it can stop, it can move in a straight line or a curve. Two bodies can move in the same direction, or they can move in opposite directions: either approaching each other (moving towards one another), or moving away from one another. Observing these situations in class conditions, it is necessary to show the children how the drawings are made: the distance is usually denoted by a segment; the place of departure, meeting, arrival is indicated either by a dash or a flag; the direction of movement is indicated by an arrow.

An important result of introducing students to simple tasks for movement in one direction is the assimilation of the simplest formulas relating such quantities as speed, time and distance (v, t, s).

Let us consider the main ways of assimilation of the dependence between these quantities characterizing uniform motion.

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At the first of the lessons, it is necessary, based on the life experience and observations of students, to draw the attention of children to the fact that some objects can move faster and slower. For example, a cyclist can overtake a pedestrian, a car can overtake a cyclist, an airplane can overtake a car, and so on. Objects can move evenly. So, for example, a pedestrian can walk 3 km every hour; a car can travel 100 km per hour; a runner can run 8 meters in every second, and so on. In this case, they say that the speed (respectively) of a pedestrian is 3 km per hour (recorded 3 km / h), a car is 100 km / h, a runner is 8 m / s.

When getting acquainted with the speed, it is necessary to organize the work of students in such a way that they themselves find the speed of their movement on foot. Children walk the distance in one minute. The teacher also reports that the distance that the student traveled in 1 minute is called speed. Students name their speeds. Then the teacher calls the speeds of some modes of transport and leads the children to the conclusion: the speed of movement is the distance that a moving object travels per unit of time. After that, simple tasks are considered, on the basis of which it is concluded that in order to find the speed of an object, you need to divide the distance that the object has traveled by the time spent for this. If the speed is denoted by the letter v, the path is denoted by the letter s, and the time is denoted by the letter t, then this conclusion can be written in the form of a formula: v= s : t.

In subsequent lessons, by solving the corresponding simple problems, it is established that the distance is equal to the speed multiplied by the time: s = v *.t.

Based on the solution of the following type of problems, it is established that time is equal to distance divided by speed: t = s : v. You can draw students' attention to the relationship between these three formulas (for example, the last formula can be derived from the first).

As a result of solving the corresponding simple problems, students should learn the following connections:

if the distance (s) and time (t) of the movement are known, then the speed (v) can be found by dividing: v=s: t

if the speed (v) and time (t) of movement are known, then you can find the distance (s) by multiplying: s=v*t

if the distance (s) and speed (v) are known, then you can find the time (t) of movement by dividing: t=s: v.

Thus, the specificity of these problems is determined by the introduction of such a quantity as the speed of movement, as well as the use in solving them of schemes that reflect not the relationship between the quantities, but the process of movement and greatly facilitate the search for a solution.

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Among the composite tasks, special attention should be paid to tasks for oncoming traffic and in opposite directions. The content of these problems includes a new element: here the joint motion of two bodies is represented, which requires special consideration.

Prior to the introduction of tasks for oncoming traffic, it is important to carry out appropriate preparatory work. It is necessary to acquaint with the movement of two bodies towards each other. Such a movement can be demonstrated in the class by called students. For example, two students start moving simultaneously from two opposite walls towards each other, and stop when they meet. Classmates observe that the distance between pedestrians has been decreasing all the time, that, having met, they have traveled the entire distance from wall to wall, and that each of them has spent the same time on the movement before meeting. Drawing under the guidance of a teacher. You can also monitor the movement of pedestrians, cyclists, cars on the street. You can expand students' ideas about oncoming traffic along with solving problems from the textbook. With the help of exercises, it is necessary to find out what it means to 'leave at the same time' pedestrians, cars, etc., and that at the same time they were on the way to the meeting for the same time. It is also necessary that children firmly master the connection between the quantities: speed, time and distance with uniform movement, that is, they are able to solve the corresponding simple problems.

Before introducing tasks for the oncoming movement, it is very important to form the correct concepts of the simultaneous movement of two bodies. It is important that the children understand that if two bodies left at the same time towards each other, then before the meeting they will travel the same time and cover the entire distance. In order for children to realize this, tasks-questions similar to the following should be included:

From two cities, two ships sailed towards each other at the same time and met after 3 hours. How long did each ship take?

A pedestrian left the village for the city and at the same time a cyclist left the city towards him, who met the pedestrian after 40 minutes. How long did it take for the pedestrian to meet?

Now you can familiarize the children with solving problems for oncoming traffic. It is advisable to introduce all 3 types in one lesson, getting new tasks by converting the data into inverse ones. This technique allows children to independently find a solution, since a new type of problem will be obtained from a problem already solved by children.

In subsequent lessons, work is carried out to consolidate the ability to solve problems of the types considered.

Here, as well as in solving other problems, it is useful to offer various exercises of a creative nature. In particular, a question of the form is posed: “Could cyclists (motor ships, pedestrians, etc.) meet in the middle of the way? Under what conditions? If the cyclists continue to move after the meeting, then which of them will come earlier to the exit point of the other cyclist if he moves at the same speed, etc.?

Also in the 4th grade, tasks for the opposite movement are introduced. Each of these tasks has 3 types depending on the data and what you are looking for.

Type I - the speed of each of the bodies and the time of movement are given, the desired is the distance;

II type - the speed of each of the bodies and the distance are given, the required one is the time of movement;

Type III - the distance, time of movement and speed of one of the bodies are given, the required one is the speed of the other body.

Familiarization with tasks for movement in opposite directions can be carried out similarly to the introduction of problems for oncoming traffic. Carrying out preparatory work, it is necessary that the children observe the movement of two bodies (pedestrians, cars, boats, etc.) while leaving one point at the same time. They should notice that with such a movement, the distance between the moving bodies increases. In this case, it is necessary to show how the drawing is performed. When familiarizing himself with solving problems of this type, he can also solve three mutually inverse problems in one lesson, and then first compare the problems, and then their solutions.

At the stage of consolidating the ability to solve such problems, students perform various exercises, as in other cases, including comparing the corresponding tasks for oncoming movement and movement in opposite directions, as well as comparing the solutions to these problems.

Next, students will solve compound problems for finding the fourth proportional, for proportional division, for finding the unknown by two differences with values s, t, v.

Problems for proportional division are introduced in different ways: you can offer a ready-made problem for solving, or you can first compose it, transform the problem of finding the fourth proportional into a problem for proportional division, and after solving them, compare both the problems themselves and their solutions. The generalization of the ability to solve problems of the considered type is helped by creative exercises. Before solving it, it is useful to ask which of the questions of the problem gives a larger number in the answer and why, and after solving it, check

whether the numbers obtained correspond to this type, which is one of the ways to check the solution. You can further find out whether the same numbers could be obtained in the answer and under what conditions.
When solving motion problems, as a rule, schematic drawings are used as visual aids, since the drawing helps to correctly identify and represent the life situation reflected in the problem. However, in some tasks in the drawing it is not always possible to show all the quantities and relationships between them, as well as to identify the question.
Let's take the problem as an example: "A motorboat traveled from one pier to another in 20 minutes at a speed of 625 m/min. On the way back, she spent 5 minutes more. How much slower was the speed of the boat on the way back?
Having found out that the quantities appearing in the problem - this is time, speed, distance, and reference words - back and forth, the record is performed in the following form:

	Distance	Time	Speed
There and back	The same	20 minutes ? for 5 min >	625 m/min ? on ? <

Further, it turns out that in order to answer the question of the problem, it is necessary to find the speed with which the boat moved back, and for this you need to know the time and distance. The time spent on the return trip is found by adding:
20 + 5 = 25 (min). Now we find the distance. Distance is equal to speed multiplied by time, and since it is the same when moving back and forth, then 625 x 20 = 12500 (m), and speed is equal to distance divided by time: 12500: 25 = 500 (m / min). Now you can answer the question of the problem. To do this, subtract the smaller speed from the higher speed: 625 - 500 = 125 (m / min).
Having made such a record, it is easier for students to navigate in choosing the order of performing actions and the sign of the action being performed, since it requires knowledge not only about the relationship between the quantities "speed", "time", "distance", but also the ability to solve simple tasks to increase the number for several units and tasks for differential comparison.
Thus, after getting acquainted with the speed of movement and studying the relationship between the quantities, speed, time, distance, it is necessary to form in elementary school students the skills and abilities to solve problems for oncoming traffic and movement in opposite directions of various types, as well as the ability to solve and compose tasks according to drawings and tables.
Tasks for movement are the kind of tasks that can be included at different levels of the formation of the ability to solve problems. The movement process is multifaceted; in

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different situations it can be performed under different conditions and have different results. In this regard, tasks for movement can vary from simple tasks to tasks of increased complexity.

After getting acquainted with the speed of movement and studying the relationship between quantities, speed, time, distance, it is necessary to form in the lower grades the skills and skills of solving problems for the oncoming movement of various types, as well as the ability to solve and compose tasks according to drawings and tables. Students should learn to compare tasks and identify similarities and differences, make tasks by expressions.

The complexity of learning to solve motion problems has several reasons. First, there are many types of motion tasks. Secondly, in motion tasks, not one "frozen" situation is described, but the process of motion in the dynamics of its development, that is, several interconnected situations. This causes difficulties for elementary school students at the very first stage of solving the problem, that is, even during analysis, since not all children can connect the described situations in the right sequence. Therefore, the preparatory stage is of great importance, which should begin long before the learning itself begins to solve problems for movement.

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