

Some Aspects Of Proportional Problems Solving In Primary School

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Abstract – The article discusses important aspects of the studied problems of mathematics in primary school. He explores the importance of teaching proportional problem solving and student achievement. The effectiveness of creative approaches depends on the specifics of the problem.

Keywords – Task, Analysis, Proportional Value, Method Of Ratios, Inverse And Correct To Units.

Even in elementary school, it is necessary to do a lot of work on observation and comparison in children, the similarity and difference of compared events, analysis, synthesis, generalization, abstraction, identification.

Text questions are very important to familiarize children with existing relationships, such as between ratings and values, time, speed and distance, and so on. The importance of teaching children to solve word problems depends on the method of working with them.

The type of task that children in our lifestyle face more often than others is the task of finding the fourth proportional quantity. This type of task includes three dependent (proportional) quantities, for example: 1) price, cost and quantity; 2) speed, distance traveled and travel time; 3) work, time and quantity of prepared parts. In this case, two values are given for one quantity (for example, quantity: one notebook was purchased for the first time, 14 notebooks were purchased for the second time); one value is given for the second value, and the second must be found (example: the cost of the first purchase is 12 cents, how much was paid for the second?); the values of the third quantity are not given, but it is said that they are the same (in our example, the cost of the notebooks is not displayed, but it is the same). Thus, the task includes 3 quantities and 3 values of these quantities.

To solve the problem of finding the fourth proportional quantity, the following methods are used: 1) method of converting units of measurement; 2) unit inversion method; 3) coefficient method. Let's take a look at each of these methods.

The method of converting to a unit is that first the unit cost (price) of one of the proportional quantities (goods, work, etc.) is determined, and then the value of the quantity specified in the condition is determined. In this case, the two setpoint values are brought to one. For example, consider the following problem: "On the same workday, a worker received \$ 420 in 6 days from his payroll. How many dollars will this worker get in 25 days for the same salary?"

We write the task in tabular form:

In this case, both time values are known, one wage value is unknown, and the daily wage is the same. Solving the unit method, we first find the price or size of the first unit, that is, we find the worker's income in one day, and then we calculate how many dollars the worker will receive in 25 days.

The guys solve this problem by dividing and determine the daily wage of the worker: $420:6=70$ (dollars). Then, multiplying it, it finds the worker's 25-day wage: $70*25=1750$ (dollars). Answer: the worker gets \$ 175 in 25 days.

It is advisable to use thematic demos to explain the solution to the problem in this way. For example, "\$ 18 was paid for 6 pizzas. How much do you need to pay for 10 of these pizzas?" Solving the problem, the teacher invites the student, whom he calls to the blackboard, to put on the bar as many pizzas (6) as they took for the first time, and write down next to them how much they cost. Then, having determined that the question of the problem cannot be answered immediately (the price of the pizza is unknown), it is necessary to put 1 pizza on the second bar and put a question mark behind it. On the next bar, the student puts 10 pizzas and also puts a question mark behind them. Having analyzed the state and solution of the first such problem, it is recommended to write it down using a thematic demonstration:

6 p. Is worth \$ 18

Is the price the same

10 p.? dollars

Decision:

1) How much does 1 pizza cost? $18:6=3$ (dollars).

2) How much does 10 pizza cost? $3*10=30$ (dollars)

Answer: 10 pizzas cost \$ 30.

Note. It is useful to introduce students to various forms of problem writing.

Students repeat the solution to the problem, explaining each action - with the first action we find out how much 1 pizza costs, we divide \$ 18 by 6, because 1 pizza is 6 times cheaper than 6 pizzas; with the second action, we find how much 10 pizzas cost: 1 pizza costs \$ 3 and 10 pizzas cost 10 times as much, so you need to multiply \$ 3 by 10. This is the answer to the main question of the problem.

The method, called the inverse method of the unit, is such that the corresponding value of a given unit of quantity is found for a single value in the case condition. This is revealed when the condition of the problem is written in tabular form. For example, we compare the method of directing to oneness with the method of converting back to oneness.

A task: "The master prepares 60 parts in 6 hours. If a master works in the same rhythm, how long will it take him to make 80 pieces?"

Let's write the task in tabular form:

Productivity in 1 hour of work	Working time	Prepared parts
Equally	6 hours	60
	? hours	80

It can be seen from the table that one value is given for time and two values are given for the number of prepared parts. It is necessary to solve the unit by the reverse method and bring the first quantity (time) to unit, that is, to know how many parts can be prepared in 1 hour. Direct method to unit:

1) How long does it take for a master to make 1 part? $6 \text{ hours} = 360 \text{ (minutes)}$ $360:60=6 \text{ (minutes)}$.

2) How long does it take to manufacture 80 parts? $6*80=480 \text{ (minutes)}$ $480 \text{ minutes} = 8 \text{ hours}$. Direct method to one:

- 1) How long does it take for a master to make 1 part? $60:6=10$ (part)
- 2) How many hours will the master prepare 80 parts? $80:10=8$ (hours)

students do not always see the difference between the two problem solving methods under consideration. They regard both this method and that method as a method of unification, because in both cases they know the value of one quantity, corresponding to the unit of another quantity. Children do not need to try to show the difference between these methods of solving problems, it is more important for children to understand the content of mathematical relationships (proportionality) between the quantities involved in the problem, to pay attention to how one quantity depends on another.

When children become familiar with the method of solving problems, they begin to solve problems using the method of inversion of one and independently compose several problems with a short record in the form of a table or expression. Consideration of a new method for students can begin by creating a problem, the data of which is recorded in a table.

Capacity of 1 can	Number of cans	Number of liters
Bir xil	9	18
	?	30

Children with experience in creating such problems can easily solve this problem orally: "18 liters of the same milk were poured into 9 identical cans. How many cans do you need to pour 30 liters of the same milk"? When analyzing the conditions of the problem, it is necessary to draw the attention of children to the fact that all banks are the same, which means that their capacity is the same. On this basis, children should consider the following: To know how many cans you need for 30 liters of the same milk, you need to know how much milk goes into one can. This can be found because in this case it is stated that 18 liters of the same milk can be poured into 9 cans. From this we draw up a solution plan:

- 1) How much milk fits in 1 can?

2) How many cans do you need for 30 liters of the same milk? Decision: You will need 15 cans to pour 30 liters of the same milk. This problem can be solved by turning the same problem into inverse problems (there are 3 of them) and writing a solution to at least one of them. For example: "30 liters of the same milk were poured into 15 cans. How many cans of this kind are needed for 18 liters of the same milk"?

Decision: 1) $30:15=2$ (l.)

2) $18:2=9$ (cans). The solution of such tasks is usually carried out on questions. However, it is recommended to write the solution of several problems in the form of an expression and calculate the values of these expressions. The ratio method provides more possibilities for solving the problem of finding the fourth proportional quantity using integers than the method of combining (direct and inverse), For example, let's see how to solve a problem using the relationship method.

A task. A team of blacksmiths made 84 axes from 75 kg of steel. How much steel does it take to make 336 of these axes? Students can try to solve this problem using one of the methods they are familiar with. This should not be an obstacle to action; rather, it can be assumed that children are convinced that their knowledge is insufficient to solve the problem as a whole. Once they are convinced that it is impossible to divide 75 kg by 84, even expressing kilograms in grams, children will be more attentive to the relationship between the sizes involved. Analyzing the brief entry for the problem (84 axes - 75 kg, 336 axes {-?}), they are convinced that the more axes they prepare, the more steel they will need. To make 168 ($84 \cdot 2$) axes, you need 75 $\cdot 2$ (kg) steel, not 75 kg. To make ($84 \cdot 3$) axes, you will need ($75 \cdot 3$) kg of steel, and so on. To find out how much steel is needed for 336 axes, we need to find how many times 84 is included in 336, that is, if 336 is many times greater than 84, the required amount of steel is more than 75 kg.

The result makes it much easier to find a method for solving the problem.

- 1) How many times the number of crafted axes (336) exceeds the number of crafted axes?

$$336 : 84$$

2) How much steel will it take to make 336 axes? $75-(336: 84)$

Students perform calculations and find the numeric value of this expression:

$$75-(336: 84)=300.$$

Answer: To make 336 axes, you need 300 kg of steel.

In developing students' thinking and developing their problem-solving skills, it is important to understand the possibilities of different approaches to solving problems and choose the most rational of these approaches. The desire to solve problems in different ways also characterizes the practical orientation of the course, since the practical problems that children may encounter in everyday life have different solutions, using the problems given in the mathematics textbook to prepare them.

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