## TOPIC: FIRST-DEGREE MONOLITHIC EQUATIONS


**SUBJECT:** MATHEMATICS

**LEVEL/AGE:** 12-13-YEAR-OLD CHILDREN

**PREVIOUS KNOWLEDGE:** Operations with real numbers, Operations with fractions

**LENGTH:** 6 PAGES (DURATION: 50 MINUTES)

## RESOURCES

Workbook

Formula library

Repeating worksheet

Practice worksheet

PowerPoint presentation

## LEARNING OUTCOMES

At the end of the lesson, students will know how to solve problems related to first-degree-monolithic equations.

## TEACHING METHODS

Repetition

Lecture

Use an explorer worksheet

Projected worksheet

Game

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## ACTIVITIES

**INTRODUCTION** (3 minutes)

In 5th grade, we learned several different methods for solving text problems, among which we will approach the tasks that can be solved by the "false assumption method" from a different point of view, we will solve such tasks from a new perspective.

A classic task for this method of problem-solving: In a yard, there are hens and rabbits; they have a total of 25 heads and 68 legs. How many hens and how many rabbits are in the yard?


**REVISION** (7 minutes)

To revise, let's solve the presented task using the "false assumption method" learned in grade 5:

Task: In a yard, there are hens and rabbits; they have a total of 25 heads and 68 legs. How many hens and how many rabbits are in the yard?

The solution is algorithmized, broken down into steps:

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1. We assume: there are only hens in the yard, so a total of 25 × 2 = 50 would there be.

2. This means 68 – 50 = 18 fewer legs (as the assumption is considered to be wrong).

3. If we replace a 2-legged hen with a 4-legged rabbit, the number of legs would be 2 more.

4. Repeating the previous procedure, a number of 18 : 2 = 9 hens exchanged to rabbits; the difference is 0.

Consequently, there are 9 rabbits and 25 - 9 = 16 hens in the yard.

**THEORY PART** (7 minutes)

In addition to the arithmetic solution presented, an algebraic solution method is also presented.

First, let's revise the concept and method of solving the first-degree one-dimensional equation.

**Keep in mind!**

- **If an equality includes an unknown, then it is a univariate open statement.**
- **The set from which the unknown can take its value is called the interpretive set.**
- **To solve the equation is to find the values x in the set of interpretations for which there is equality.**
- **The set of these values is the solution set.**

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Having expanded our knowledge, let's move on to the description of systems of two-dimensional equations consisting of two linear equations.

A two-dimensional system of two linear equations

- Linear - the unknown are on the first power
- The solution of the system of equations - the pair of numbers (x,y) that is the solution of both equations.
- Assessment - by substitution

Two methods of solution are described:

1. Uniform coefficients method
2. Method of substitution

**HANDS-ON PART** (15 minutes)

Solve the following equation on the set of real numbers:

1) $4x = 12$

Solution: $x = 12 : 4$ meaning $x=3$

2) $\frac{5x}{2} = \frac{3x + 24}{6}$

Solutions with cross-multiplication of x :

$5 \cdot x \cdot 6 = 2 \cdot (3x + 24)$ ie. $30x - 6x = 48$, where $24 \cdot x = 48$,

meaning $x = 48 : 24$, consequently $x = 2$.

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3) $\frac{2}{3}x-\frac{x-2}{6}=-\frac{1}{2}(x-7)+\frac{1}{3}$

Solution: Let's bring it to a common denominator: $\frac{4}{6}x-\frac{x-2}{6}=\frac{3(x-7)}{6}+\frac{2}{6}$

Let's make the denominator disappear: $4x-x+2=-3x+21+2$

Let's organise the equaition: $4x-x+3x=21+2-2$

Let's merge members: $6x=21$

Solution: $x=\frac{21}{6}$

Proceeding, let's move on to the solution of the two-dimensional equation consisting of two equations, which gives the algebraic solution of the problem already solved by the arithmetic method presented at the beginning of the lesson.

Task: In a yard, there are hens and rabbits; they have a total of 25 heads and 68 legs. How many hens and how many rabbits are in the yard?

Denote ty the number of hens and ny the number of rabbits. The job data can be written as follows:

$$\begin{cases} ty + ny = 25 \\ 2\,ty + 4\,ny = 68 \end{cases}$$

Solving the system of equations, the result is 16 hens and 9 rabbits

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**EXERCISE PART** (10 MINUTES)

Solve it on the set of real numbers:

1) $\frac{x+1}{2}-\frac{x-1}{3}=\frac{1}{6}$

2) $\frac{x}{2}-\left\{\left\{\frac{x}{3}-\left[\frac{x}{4}-\left(\frac{x}{5}-\frac{1}{6}\right)\right]\right\}\right\}=0$

**CONCLUSION** (3 minutes)

Assessment of students' work.

Assign red and reward points.

**SYNTHESIS/SUMMARY** (5 minutes)

During your adventure, you will be helped by the knowledge you have learned and learned in today's class.

Enjoy the work!

## BIBLIOGRAPHY

Simon József - Matematika VI.osztály - Elmélet és feladatok - Alutus nyomda 2018, Miercurea Ciuc

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