

Laboratory work №6

Theme: Term7. Solving equations

Section: Equivalent transformations of equations

Transformation: Transform equation to totality of equations

Text: Let's transform the equation to the totality of equations. We'll get:

How to do it: Select the equation. Choose operation. Press the button Execute.

Task 1.

Solve

$$(x-3) \cdot (2x+5) = 0$$

Solution

Begin solution

$$\Rightarrow (x-3) \cdot (2x+5) = 0$$

1. Right Click

2. Click

Move

Transform equation to totality of

$$F(x) \cdot G(x) = 0 \sim \begin{cases} F(x) = 0 \\ G(x) = 0 \end{cases}$$

Elementary equation with module

$$|x| = a \sim \begin{cases} x = a \\ x = -a \end{cases} a > 0$$
$$|x| = 0 \sim x = 0$$
$$|x| = a \sim \emptyset, a < 0$$

Task 1.

Solve

$$(x-3) \cdot (2x+5) = 0$$

Solution

Begin solution

$$(x-3) \cdot (2x+5) = 0$$

Let's transform the equation to the totality of equations. We'll get:

$$\Rightarrow \begin{cases} x-3 = 0 \\ 2x+5 = 0 \end{cases}$$

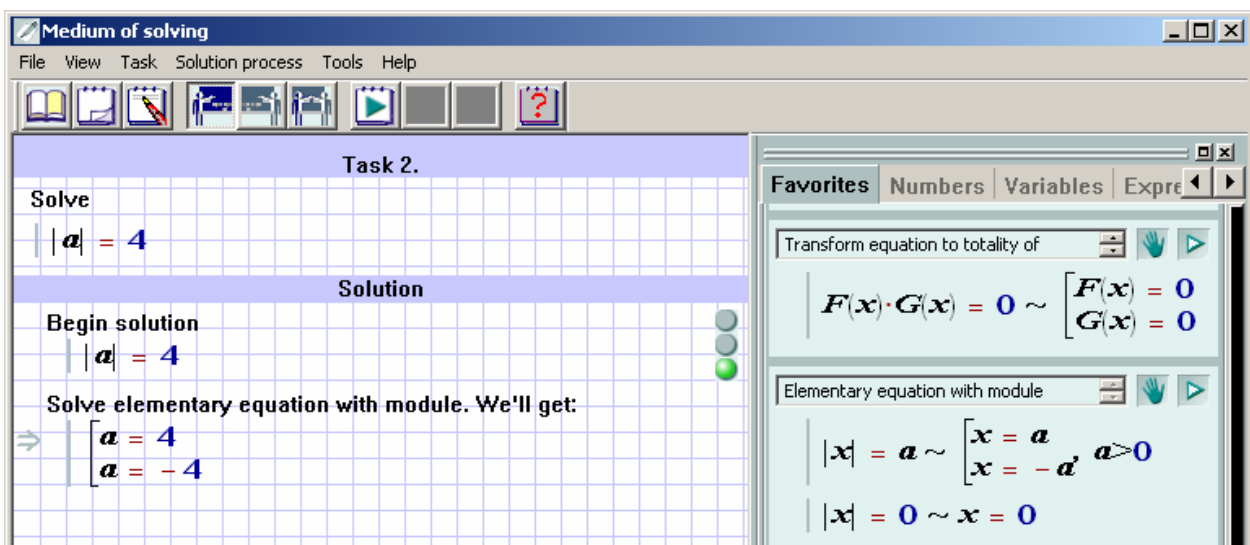
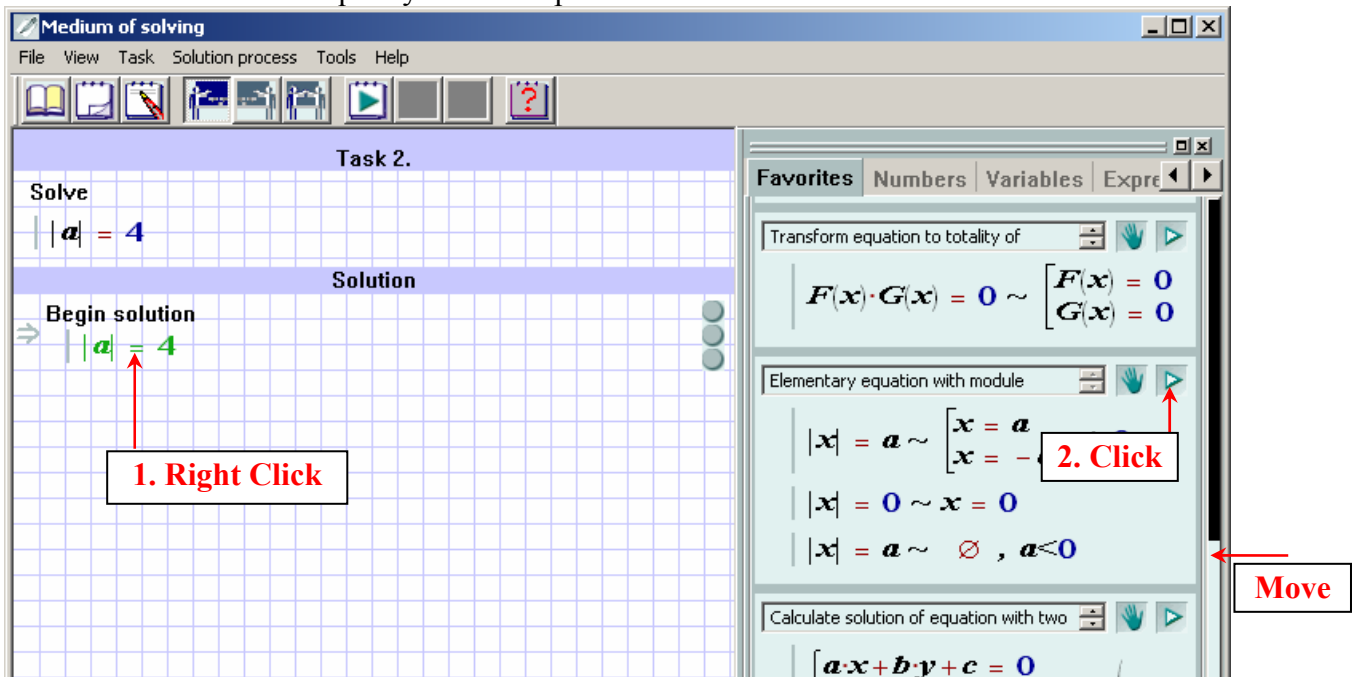
Mathematical explanation: If the left part of the equation is factored out, and the right part is equal to zero, such equation can be transformed to the totality of equations, and then solve consecutively each of these equations.

Section: Equations with modules

Transformation: Elementary equation with module

Text: Solve elementary equation with module. We'll get:

How to do it: Select an equality. Choose operation. Press the button Execute.



Mathematical explanation: The elementary equation with module has two solutions, if its right part - positive number. The elementary equation with module has one solution $x=0$ if its right part is zero. The elementary equation with module has no solutions, if its right part is negative number.

Transformation: Elementary equation with modules

Text: Solve elementary equation with modules. We'll get:

How to do it: Select an equality. Choose operation. Press the button Execute.

Medium of solving

File View Task Solution process Tools Help

Task 3.

Solve

$$|x-1| = |3x+1|$$

Solution

Begin solution

$$\Rightarrow |x-1| = |3x+1|$$

1. Right Click

Equations

Transform equation to totality of

$$F(x) \cdot G(x) = 0 \sim \begin{cases} F(x) = 0 \\ G(x) = 0 \end{cases}$$

Equations with modules

Elementary equation with module

$$|x| = a \sim \begin{cases} x = a \\ x = -a \end{cases} a > 0$$

$$|x| = 0 \sim x = 0$$

$$|x| = a \sim \emptyset, a < 0$$

Elementary equation with modules

$$|f(x)| = |g(x)| \sim \begin{cases} f(x) = g(x) \\ f(x) = -g(x) \end{cases}$$

2. Click

Medium of solving

File View Task Solution process Tools Help

Task 3.

Solve

$$|x-1| = |3x+1|$$

Solution

Begin solution

$$|x-1| = |3x+1|$$

Solve elementary equation with modules. We'll get:

$$\Rightarrow \begin{cases} x-1 = 3x+1 \\ x-1 = -(3x+1) \end{cases}$$

Equations

Transform equation to totality of

$$F(x) \cdot G(x) = 0 \sim \begin{cases} F(x) = 0 \\ G(x) = 0 \end{cases}$$

Equations with modules

Elementary equation with module

$$|x| = a \sim \begin{cases} x = a \\ x = -a \end{cases} a > 0$$

$$|x| = 0 \sim x = 0$$

$$|x| = a \sim \emptyset, a < 0$$

Mathematical explanation:

Section: Equations with two variables

Transformation: Calculate solution of equation with two variables

Text: Find one of solutions of the equation:

How to do it: Select the equation. Choose operation. Press the button Execute. Choose one of the variants of answer. Enter the value x. Calculate and enter the value y. Press the button Execute.

Medium of solving

File View Task Solution process Tools Help

Task 5.

Solve

$$3x + 4y - 10 = 0$$

Solution

Begin solution

$$\Rightarrow 3x + 4y - 10 = 0$$

1. Right Click

Favorites Numbers Variables Expressions Po

Elementary equation with module

$$|x| = a \sim \begin{cases} x = a \\ x = -a \end{cases} a > 0$$

$$|x| = 0 \sim x = 0$$

$$|x| = a \sim \emptyset, a < 0$$

Calculate solution of equation with two variables

$$\begin{cases} a \cdot x + b \cdot y + c = 0 \\ x = x_0 \end{cases} \Rightarrow \begin{cases} -c - a \cdot x_0 \\ x_0 \end{cases}$$

2. Click

Find solution of equation with two variables

$$a \cdot x + b \cdot y = c \Rightarrow \left(x_0; \frac{c - a \cdot x_0}{b} \right)$$

Move

Answers

Additional expression

Enter additional expression

$$3x + 4y - 10 = 0 \Rightarrow \left(-1; \frac{13}{4} \right)$$

3. Enter the value x

4. Calculate and enter the value y

5. Click

Undo Edit panel Execute

Medium of solving

File View Task Solution process Tools Help

Task 5.

Solve

$$3 \cdot x + 4 \cdot y - 10 = 0$$

Solution

Begin solution

$$\Rightarrow 3 \cdot x + 4 \cdot y - 10 = 0$$

Find one of solutions of the equation:

$$\left((-1); \frac{13}{4} \right)$$

Sign of correctness
Green – OK
Red - wrong

Favorites Numbers Variables Expressions

Elementary equation with module

$$|x| = a \sim \begin{cases} x = a \\ x = -a \end{cases} a > 0$$

$$|x| = 0 \sim x = 0$$

$$|x| = a \sim \emptyset, a < 0$$

Calculate solution of equation with two

$$\begin{cases} a \cdot x + b \cdot y + c = 0 \\ x = x_0 \end{cases} \Rightarrow \begin{pmatrix} x_0; \end{pmatrix}$$

Find solution of equation with two

$$a \cdot x + b \cdot y = c \Rightarrow \begin{pmatrix} x_0; \frac{c - a \cdot x}{b} \end{pmatrix}$$

Answers

Mathematical explanation: The equation with two variables has the infinite set of solutions. In order to find one of them, it's necessary to attach arbitrary value to one of variables, substitute this value to the equation and calculate the other variable's value, having solved the received equation with one variable.

Transformation: Find solution of equation with two variables

Text: Find one of the variants of answer:

How to do it: Select an equation. Choose operation. Press the button Execute. Choose one of the variants of answer. Enter the value x. (The value y will be calculated automatically) Press the button Execute.

Medium of solving

File View Task Solution process Tools Help

Task 5.

Solve

$$3x + 4y - 10 = 0$$

Solution

Begin solution

$$\Rightarrow 3x + 4y - 10 = 0$$

1. Right Click

Favorites Numbers Variables Expre

Elementary equation with module

$$|x| = a \sim \begin{cases} x = a \\ x = -a \end{cases} a > 0$$

$$|x| = 0 \sim x = 0$$

$$|x| = a \sim \emptyset, a < 0$$

Calculate solution of equation with two

$$\begin{cases} ax + by + c = 0 \\ x = x_0 \end{cases} \Rightarrow \begin{pmatrix} x_0 \\ y_0 \end{pmatrix}$$

Find solution of equation with two

$$ax + by = c \Rightarrow \begin{pmatrix} x_0 \\ y_0 \end{pmatrix}$$

2. Click

Move

Answers

Additional expression

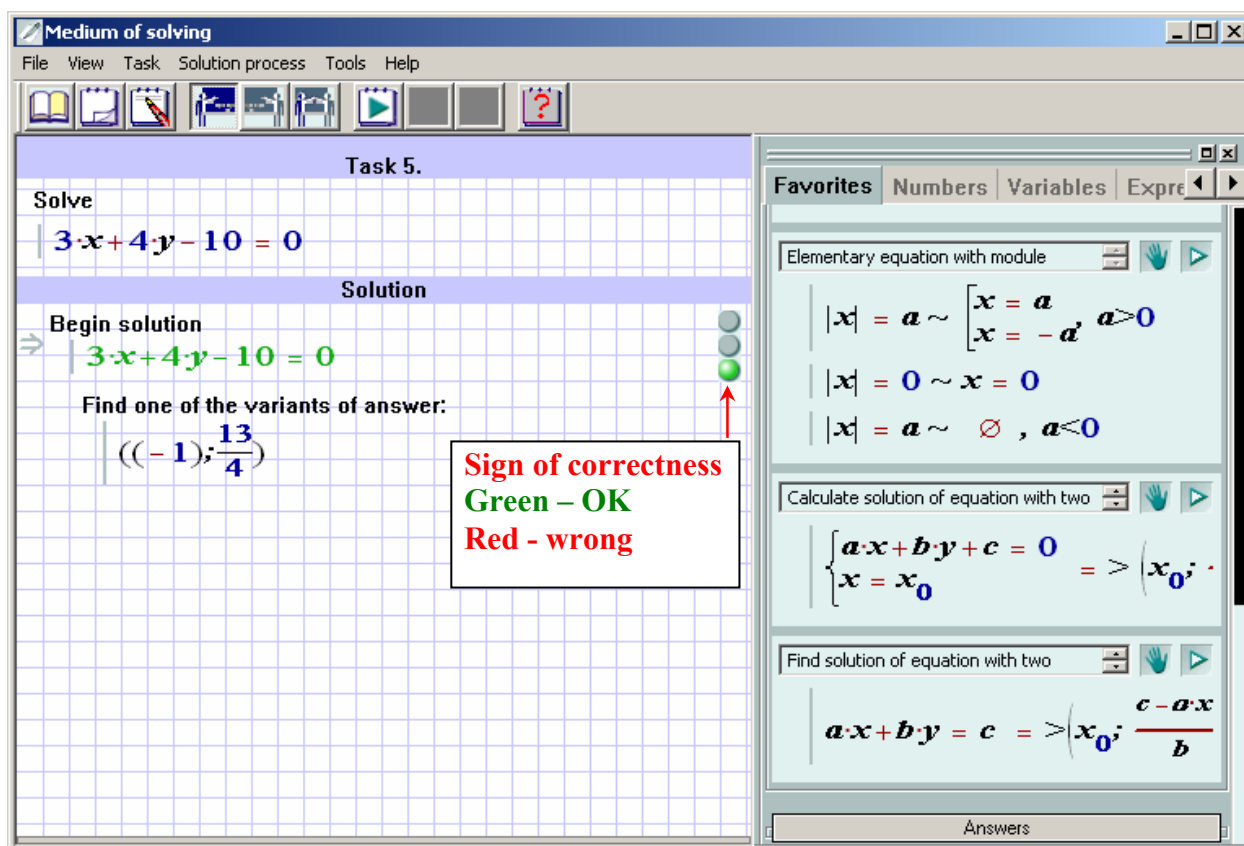
Enter additional expression

$$3x + 4y - 10 = 0 \Rightarrow -1$$

3. Enter the value x

4. Click

Undo Edit panel Execute



Mathematical explanation: The equation with two variables has the infinite set of solutions. In order to find one of them, it's necessary to attach arbitrary value to one of variables, substitute this value to the equation and calculate the other variable's value, having solved the received equation with one variable.

Tasks:

1. Download the program Term7;
2. Choose «Personification»;
3. Choose TextBook and CHAPTER 1. EQUATIONS; Read theoretical materials of §§1-4 and Check your attainments up in §§2-4.
4. Choose TaskBook in the program Term7, choose Thematical attestations/6.1 Thematical attestation №1 on subject: Equations.

Thematical attestation №1 on subject: Equations

I variant

Task 1.1.1

Solve the equation:

- 1) $\frac{2}{9}x = 1,8$
- 2) $-4 \cdot x = 2$
- 3) $9 \cdot x - 8 = 4 \cdot x + 12$
- 4) $9 - 7 \cdot (x + 3) = 5 - 6 \cdot x$

Task 1.1.2

Solve the task by making an equation: In three boxes there were 122 kg of apples. In the first box there were 14 kg less, than in the second one, and 2 times less, than in the third one. How many kilograms of apples were there in each box?

Task 1.1.3

Solve the equation:

- 1) $7 \cdot x - (4 \cdot x + 3) = 3 \cdot x + 2$

Task 1.1.4

At what value of a the equation $(a+3)x=12$ has the root, which is equal to 3?

II variant

Task 1.2.1

Solve the equation:

1) $\frac{3}{7}x = 2,1$

2) $-9 \cdot x = 3$

3) $6 \cdot x - 15 = 4 \cdot x + 11$

4) $6 - 8 \cdot (x + 2) = 3 - 7 \cdot x$

Task 1.2.2

Solve the task by making an equation: In three sections of the sporting school 147 pupils study. In the football section there are engaged 23 pupils more, than in the basketball one and twice more than in the volleyball one. How many pupils go in for sports in each section?

Task 1.2.3

Solve the equation:

1) $9 \cdot x - (5 \cdot x - 4) = 4 \cdot x + 4$

Task 1.2.4

At what value of a the equation $(a-2) \cdot x = 35$ has the root, which is equal to 7?

III variant

Task 1.3.1

Solve the equation:

1) $\frac{5}{6}x = 3,5$

2) $-15 \cdot x = 5$

3) $8 \cdot x - 11 = 3 \cdot x + 14$

4) $17 - 12 \cdot (x + 1) = 9 - 11 \cdot x$

Task 1.3.2

Solve the task by making an equation: Sasha, Serezha and Alyona gathered 123 mushrooms in the forest together. Sasha gathered twice less mushrooms, than Alyona, but 21 mushrooms more than Serezha. How many mushrooms gathered each child?

Task 1.3.3

Solve the equation:

1) $11 \cdot x - (3 \cdot x + 8) = 8 \cdot x + 5$

Task 1.3.4

At what value of a the equation $(a+6) \cdot x = 28$ has the root, which is equal to 7?

IV variant

Task 1.4.1

Solve the equation:

1) $\frac{7}{8}x = 2,1$

2) $-6 \cdot x = 2$

3) $13 \cdot x - 10 = 7 \cdot x + 2$

4) $7 - 15 \cdot (x - 2) = 23 - 14 \cdot x$

Task 1.4.2

Solve the task by making an equation: The sum of three natural numbers is equal to 103. It is known, that the first number is three time less than the second one and 17 more than the third one. Find these three numbers.

Task 1.4.3

Solve the equation:

1) $12 \cdot x - (5 \cdot x - 8) = 8 + 7 \cdot x$

Task 1.4.4

At what value of a the equation $(a-5)x=27$ has the root, which equals to 9?

V variant

Task 1.5.1

Solve the equation:

1) $\frac{3}{4}x = 2,4$

2) $-4 \cdot x = 2$

3) $3 \cdot x - 12 = x + 7$

4) $3 - 4 \cdot (x - 1) = 3 + 5 \cdot x$

Task 1.5.2

Solve the task by making an equation: The perimeter of a rectangle is equal to 28 sm. Its length is bigger than its width on 4 sm. Find the width(x) of the rectangle.

Task 1.5.3

Solve the equation:

1) $15 - (3 \cdot x - 3) = 5 - 4 \cdot x$

Task 1.5.4

Find the value of m , at which the equations $2 \cdot x - 3 = 7$ and $m - 3 \cdot x = 1$ have common root.

VI variant

Task 1.6.1

Solve the equation:

1) $\frac{1}{2}x = 1,8$

2) $-5 \cdot x = 1$

3) $4 \cdot x - 10 = 2 \cdot x + 12$

4) $4 - 5 \cdot (x + 2) = 2 + 6 \cdot x$

Task 1.6.2

Solve the task by making the equation: The perimeter of a rectangle is 24 sm. Its width is 3 times less than its length. Find the length(x) of the rectangle.

Task 1.6.3

Solve the equation:

1) $18 - (6 \cdot x + 5) = 4 - 7 \cdot x$

Task 1.6.4

Find the value of m , at which the equations $5 - 3 \cdot x = -1$ and $5 \cdot x - m = 3$ have common root.