

Items for investigating the equation transformation capability

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Note. The items were translated from German into English.

1. Identify x (x stands for a real number).

Example: $2 + x = 5$

$$x = 3$$

$$\mathcal{L} = \{3\}$$

$3x = \frac{3}{4} + 2x$	$-3x = \frac{1}{7} - 4x$	$5x + 8 = 4x + 2$
$\mathcal{L} =$	$\mathcal{L} =$	$\mathcal{L} =$
$x = 5 - 2x$	$2x + 1 = 4x + 4$	$2 - x = 3 - 4x$
$\mathcal{L} =$	$\mathcal{L} =$	$\mathcal{L} =$

2. Put the following quadratic equations into the form $ax^2 + bx + c = 0$

(x represents one or multiple real numbers).

Example: $2x + x^2 = 5$

$$2x + x^2 - 5 = 0$$

$$x^2 + 2x - 5 = 0$$

$4x^2 = 6x^2 + \frac{1}{2}x - 1$	$x^2 + x + 4 = 3x$	$6x^2 + 5 = 2 - x$
$x^2 + 9x + 1 = 2x + 5$	$2x^2 + 2x + 3 = x^2 - x + 4$	$4x^2 + 3x + 2 = 7x^2 - x + 3$

3. Different relationships are described below. Solve for the named variable. All variables represent positive real numbers.

Example: The following equation describes the perimeter of a square.

Solve for a :

$$U = 4a$$

$$a = \frac{U}{4}$$

The following equation describes ...

... the *perimeter of an isosceles triangle*.

Solve for c :

$$U = 2a + c$$

... the *area of a rectangle*.

Solve for b :

$$A = a \times b$$

... the *surface area of a regular prism*.

Solve for G :

$$O = 2G + M$$

... the *perimeter of a rectangle*.

Solve for b :

$$U = 2a + 2b$$

... the *mean of three numbers a, b, c* .

Solve for a :

$$M = \frac{1}{3}a + \frac{1}{3}b + \frac{1}{3}c$$

... the *area of a trapezoid*.

Solve for a :

$$A = \frac{a + c}{2} \times h$$

4. Solve for the named variable. All variables represent real numbers.

Example: Solve for y :

$$\begin{aligned}x + y &= 2a \\ y &= 2a - x\end{aligned}$$

Solve for z :	Solve for b :	Solve for a :
$x = y \times z$	$a = b - 3c$	$x = 2a + 2z$
Solve for c :	Solve for m :	Solve for y :
$a = \frac{b}{c}$	$0 = 2p + 3m - 5a$	$x = \frac{u + y}{2} \times z$