



Algebra1Coach.com

Solving Two-Step Equations

Unit 2 Lesson 2

SOLVING TWO-STEP EQUATIONS

Students will be able to:

Solve two-step equations by undoing mathematical operations

Key Vocabulary:

- Two-Step equation
- Order of Operations

SOLVING TWO-STEP EQUATIONS

A **Two-Step Equation** is an equation that can be solved in two steps using the properties of equality and undoing the mathematical operations.

If x is the variable in the equation, then the two-step equation can be of the forms:

$$ax + b = c$$

$$\frac{x}{a} + b = c$$

$$a(x + b) = c$$

$$\frac{x + a}{b} = c$$

$$ax - b = c$$

$$\frac{x}{a} - b = c$$

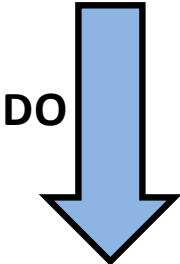
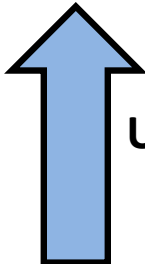
$$a(x - b) = c$$

$$\frac{x - a}{b} = c$$

SOLVING TWO-STEP EQUATIONS

Undoing the Order of Operations

While simplifying the mathematical expressions, the order of operations followed is PEDMAS.

When Simplifying	 DO	Name	Operation	When Solving Equation	 UNDO
		()	Parenthesis		
		x^2	Exponents		
		$\div \times$	Divide, Multiply		
		$+ -$	Add, Subtract		

When solving an equation, we undo the operations in equation in the opposite sequence i.e. from bottom to top.

SOLVING TWO-STEP EQUATIONS

Solving Two-Step Equations without Parenthesis

In solving these types of equations, we first add or subtract and then multiply or divide according to the equation.

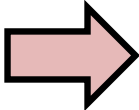
$$ax + b = c$$

$$ax - b = c$$

$$\frac{x}{a} + b = c$$

$$\frac{x}{a} - b = c$$

Example 1: Solve $2x - 4 = 8$.

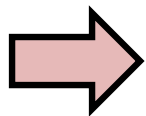
Step 1 

$$2x - 4 + 4 = 8 + 4$$

Addition Property of Equality

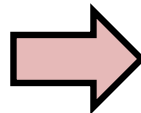
$$2x = 12$$

Step 2



$$\frac{2x}{2} = \frac{12}{2}$$

Division Property of Equality

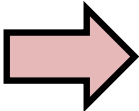


$$x = 6$$

SOLVING TWO-STEP EQUATIONS

Solving Two-Step Equations without Parenthesis

Example 2: Solve $\frac{x}{4} + 3 = 5$.

Step 1 

$$\frac{x}{4} + 3 - 3 = 5 - 3$$

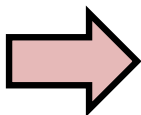
Subtraction Property of Equality

$$\frac{x}{4} = 2$$

Step 2 

$$4 \times \frac{x}{4} = 2 \times 4$$

Multiplication Property of Equality



$$x = 8$$

SOLVING TWO-STEP EQUATIONS

Solving Two-Step Equations with Parenthesis

In solving these types of equations, we first multiply or divide and then solve the expression in parenthesis using addition or subtraction, according to the equation.

$$a(x + b) = c$$

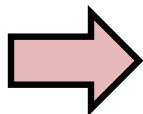
$$\frac{x + a}{b} = c$$

$$a(x - b) = c$$

$$\frac{x - a}{b} = c$$

Example 3: Solve $5(x - 1) = 15$.

Step 1

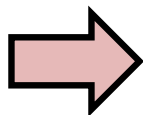


$$\frac{5(x - 1)}{5} = \frac{15}{5}$$

Division Property of Equality

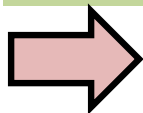
$$x - 1 = 3$$

Step 2



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

Addition Property of Equality

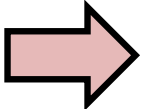


$$x = 4$$

SOLVING TWO-STEP EQUATIONS

Solving Two-Step Equations without Parenthesis

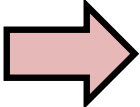
Example 4: Solve $\frac{x+10}{6} = 5$.

Step 1 

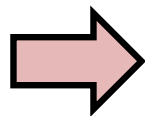
$$6 \times \frac{x+10}{6} = 5 \times 6$$

Multiplication Property of Equality

$$x + 10 = 30$$

Step 2 

$$x + 10 - 10 = 30 - 10$$



$$x = 20$$

Subtraction Property of Equality