

Solving One Step Equations – Guided Notes

I. Equations

A. Vocabulary

- An equation is a mathematical sentence with an equal sign.
 - The following are all considered to be equations:

Ex) $9 + 2 = 11$

Ex) $x + 7 = 37$

Ex) $a + (-3) = 2a + 5$

- A solution of an equation is a value for a variable that makes an equation true.

You substitute a number for a variable to determine whether the number is a solution of the equation.

Examples

Directions: Is the given number a solution for the equation? **Please show how you arrived at your answer.**

Ex) $170 + x = 200$, for $x=30$

$170 + 30 = 200$ True

YES

Ex) $3 = 12 - a$, for $a=6$

$3 = 12 - 6$ Not True

NO

Ex) $9 - m = 3$, for $m=6$

Ex) $8 + t = 2t$, for $t=3$

II. Solving One-Step Equations

A. Important Rules for Solving Equations

Rule #1) When you solve an equation, your goal is to get the variable alone by itself on one side of the equation. In other words, you are trying to isolate the variable.

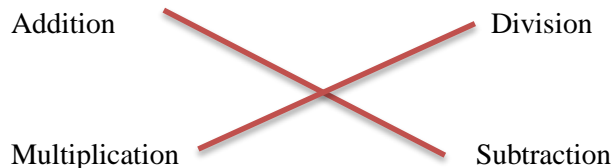
Rule #2) When you are solving for a variable, you **MUST** use inverse operations to isolate the variable on one side of the equation.

****Rule #3)** Whatever you do to one side of an equation, you must do to the other side of the equation. In other words, you must keep the equation equal/balanced.

- Think of solving an equation like lifting weights.
 - If you add or subtract weight from one side of the barbell, you must add or subtract the same amount of weight from the other side of the barbell to keep it balanced.



Please draw a line between the inverse operations.



B. Solving One-Step Equations by Adding or Subtracting

- When you are solving an equation, you **MUST** use the inverse operation to isolate the variable on one side of the equation.

- REMEMBER: If you **add** or **subtract** a number from one side of the equation, you must **add** or **subtract** the **same** number from the other side of the equation.

Examples

Directions: Solve each equation for the variable.

Ex) $x + 4 = 6$

- Questions you need to ask yourself: *How can I isolate this variable (or get it alone by itself)? Which operation do I need to use to solve the equation?*
- You can always check to see if your answer is correct by substituting it back into the original equation

$$x + 4 = 6$$

$$\begin{array}{r} -4 \quad -4 \end{array} \quad \text{(You must show your work on BOTH sides of the equations, otherwise it doesn't stay balanced)}$$

$$x = 2$$

Ex) $y - 5 = 12$

- Questions you need to ask yourself: *How can I isolate this variable (or get it alone by itself)? Which operation do I need to use to solve the equation?*
- You can always check to see if your answer is correct by substituting it back into the original equation

$$y - 5 = 12$$

$$\begin{array}{r} +5 \quad +5 \end{array}$$

$$y = 17$$

Directions: Solve each equation.

Ex) $d + 1 = 5$

Ex) $x + 11 = 3$

Ex) $c + 4 = 5$

Ex) $b - 12 = 49$

Ex) $z - 5 = 12$

Ex) $p - 30 = 42$

C. Solving Variations of One-Step Equations by Adding or Subtracting

- Notice that you can express one-step equations in different ways. It does not change how you go about solve the equation.

Directions: Solve each equation.

$$\text{Ex) } 11 = t + 2$$

$$\text{Ex) } 17 = y + 6$$

$$\text{Ex) } 8 = m + 8$$

$$\text{Ex) } 22 = c - 12$$

$$\text{Ex) } 21 = r - 5$$

$$\text{Ex) } 100 = y - 16$$

D. Number in Front of A Variable

- Whenever you see a variable, it is understood to have a **1 in front of it**.

Examples

Directions: Please rewrite each variable, expression, or equation so that the number in front of each variable is visible.

$$\text{Ex) } x$$

$$\text{Ex) } y - 4 = 4$$

$$\text{Ex) } x = -14$$

$$\text{Ex) } \frac{t}{4} = 4$$

E. Solving One-Step Equations by Multiplying or Dividing

- When you are solving an equation, your goal is to use the **inverse** operation to isolate the variable on one side
of the equation.
- REMEMBER: If you **add** or **subtract** a number from one side of the equation, you must **add** or **subtract** the **same** number from the other side of the equation to keep it balanced.

Examples

Directions: Solve each equation.

$$\text{Ex) } 2p = 18$$

$$\text{Ex) } 4x = 8$$

$$\text{Ex) } \frac{z}{14} = 2$$

F. Solving Variations of One-Step Equations by Multiplying or Dividing

Directions: Solve each equation.

Ex) $16 = 4b$

Ex) $20 = 5c$

Ex) $5 = \frac{d}{8}$

Ex) $11 = \frac{s}{2}$

G. Negative Sign in Front of A Number

- Whenever you see a negative sign in front of a number or variable, it is understood to have a **negative 1 in front of it.**

Examples

Directions: Please rewrite each variable, expression, or equation so that the number in front of each variable is visible.

Ex) $-x$

Ex) $-y + 1 = 5$

Ex) $-x = -12$

Ex) $\frac{-t}{4} = 4$

III. Solving One-Step Equations with Negative Integers

Directions: Solve each equation.

Ex) $d + 3 = -6$

Ex) $x + (-8) = 12$

Ex) $-t + 5 = 9$

Ex) $-p + 6 = -7$

Directions: Solve each equation.

Ex) $b - 11 = -9$

Ex) $-e - 3 = 7$

Ex) $-g - 4 = -3$

Directions: Solve each equation.

$$\text{Ex) } -x = 12$$

$$\text{Ex) } -g = -5$$

$$\text{Ex) } -x = 33$$

Directions: Solve each equation.

$$\text{Ex) } \frac{r}{-5} = 10$$

$$\text{Ex) } \frac{k}{2} = -6$$

$$\text{Ex) } \frac{t}{-4} = -20$$

Directions: Solve each equation.

$$\text{Ex) } \frac{-x}{8} = 8$$

$$\text{Ex) } \frac{-r}{2} = -13$$

$$\text{Ex) } \frac{-c}{-5} = -12$$