

1.2 - Solving One Step Equations

Addition/Subtraction and Multiplication/Division are inverse (opposite) operations. They undo each other.

Goal when solving equations: Get the variable by itself

Subtraction Property of Equality: If equal amounts are subtracted from the expressions on each side of an equation, the expressions remain equal.

Ex:

$$\begin{array}{r} 1) \quad x + 6 = 17 \\ \quad - 6 \quad - 6 \\ \hline \boxed{x = 11} \end{array}$$

$$\begin{array}{r} 2) \quad p + 17 = 34 \\ \quad - 17 \quad - 17 \\ \hline \boxed{p = 17} \end{array}$$

$$\begin{array}{r} 3) \quad 8 + x = 124 \\ \quad - 8 \quad - 8 \\ \hline \boxed{x = 116} \end{array}$$

$$\begin{array}{r} 4) \quad 4 + y = -6 \\ \quad - 4 \quad - 4 \\ \hline \boxed{y = -10} \end{array}$$

Addition Property of Equality: If equal amounts are added to both sides of an equation, then the expressions remain equal.

Ex:

$$\begin{array}{r} 1) \quad x - 5 = 2 \\ \quad \quad \quad \cancel{+5} \quad +5 \\ \hline \boxed{x = 7} \end{array}$$

$$\begin{array}{r} 2) \quad m - 14 = 1 \\ \quad \quad \quad \cancel{+14} \quad +14 \\ \hline \boxed{m = 15} \end{array}$$

$$\begin{array}{r} 3) \quad -6 + n = -4 \\ \quad \quad \quad \cancel{+6} \quad \quad \quad +6 \\ \hline \boxed{n = 2} \end{array}$$

$$\begin{array}{r} 4) \quad -181 + y = 256 \\ \quad \quad \quad \cancel{+181} \quad \quad \quad +181 \\ \hline \boxed{y = 437} \end{array}$$

Division Property of Equality: If the expressions on each side of an equation are divided by equal *nonzero* amounts, they remain equal.

Ex:

1) $\frac{3x}{3} = \frac{24}{3}$
 $x = 8$

2) $\frac{-4x}{-4} = \frac{60}{-4}$
 $x = -15$

3) $\frac{-7x}{-7} = \frac{-63}{-7}$
 $x = 9$

4) $\frac{-30}{6} = \frac{6m}{6}$
 $-5 = m$

Multiplication Property of Equality: If the expressions on each side of an equation are multiplied by equal amounts, the expressions remain equal.

Reciprocal Property: For any *nonzero* number, r , there is a number $\frac{1}{r}$, such that $r \cdot \frac{1}{r} = 1$.

(We will use this to solve multiplication problems)

Ex: 1) ~~$\frac{x}{5} = 2 \cdot 5$~~

$x = 10$

3) ~~$\frac{y}{-3} = 6 \cdot -3$~~

$y = -18$

2) ~~$\frac{m}{7} = 4 \cdot 7$~~

$m = 28$

4) ~~$\frac{n}{-4} = -16 \cdot -4$~~

$n = 64$

Ratio: Expressions that compare 2 quantities

Equal Ratios: Ratios that have the same value

Proportion: An equation containing 2 or more equal ratios

-Solve proportions by cross-multiplying

Ex: 1) $\frac{x}{5} = \frac{9}{15}$ $x=3$

~~$\frac{15}{5}x = \frac{45}{15}$~~

2) $\frac{1}{4} = \frac{m}{40}$ $m=10$

~~$\frac{40}{4} = \frac{4m}{40}$~~

3) $\frac{-4}{7} = \frac{n}{16}$ $n=-9.1$

~~$\frac{-64}{7} = \frac{7n}{7}$~~

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$$\begin{array}{r} x - 14 = 37 \\ + 14 \quad + 14 \\ \hline \end{array}$$

$$x = 51$$

$$51 - 14 = 37$$