

Name Key
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Date _____
8R Period _____

Solving Equations with Like Terms on Opposite Sides of the Equal Sign

I. Goal: To get the like terms on the same side of the equal sign and then to isolate the variable.

II Steps:

C 1) Combine the like terms on the same side of the equal sign
(use the operation in front of the 2nd term)

M 2) Move the smaller variable to the larger variable across the equal sign
(using the inverse operation)

S 3) Solve the 2-step equation

4) Checks 😊

Combine like terms (same side, same operation)

Move the smaller variable to the larger (opposite side/opposite operation)

Solve the remaining equation

III. Examples: Solve for the missing variable.

1) $7y + 2 = 3y + 10$

$$\begin{array}{r} -3y \quad -3y \\ \hline 4y + 2 = 10 \end{array}$$
 Subtraction Property of Equality

$$\begin{array}{r} -2 \quad -2 \\ \hline 4y = 8 \end{array}$$
 Sub. Prop. of Equality

$$\frac{4y}{4} = \frac{8}{4}$$
 Div. Prop. of Equality

$$\boxed{y=2}$$

2) $12 + 4x = 10x - 18$

$$\begin{array}{r} -4x \quad -4x \\ \hline 12 = 6x - 18 \end{array}$$

$$\begin{array}{r} +18 \quad +18 \\ \hline 30 = 6x \end{array}$$

$$\frac{30}{6} = \frac{6x}{6}$$

$$\boxed{x=5}$$

Check
 $12 + 4x = 10x - 18$
 $12 + 4(5) = 10(5) - 18$
 $12 + 20 = 50 - 18$
 $32 = 32$

3) $10x + 3x - 2 = x + 10$

$$\begin{array}{r} 13x - 2 = x + 10 \\ -x \quad -x \\ \hline 12x - 2 = 10 \end{array}$$
 Combine like terms
 Sub. Prop. of Equal

$$\begin{array}{r} +2 \quad +2 \\ \hline 12x = 12 \end{array}$$
 Add Prop. of Equal

$$\frac{12x}{12} = \frac{12}{12}$$
 Div. Prop. of Equal

$$\boxed{x=1}$$

4) $2x + 6 + x = 9x - 6$

$$\begin{array}{r} 3x + 6 = 9x - 6 \\ -3x \quad -3x \\ \hline 6 = 6x - 6 \end{array}$$

$$\begin{array}{r} +6 \quad +6 \\ \hline 12 = 6x \end{array}$$

$$\frac{12}{6} = \frac{6x}{6}$$

$$\boxed{x=2}$$

Check
 $2x + 6 + x = 9x - 6$
 $2(2) + 6 + 2 = 9(2) - 6$
 $4 + 6 + 2 = 18 - 6$
 $12 = 12$

5) $1 + n = 10 - 2n$

$$\begin{array}{r} +n \quad +2n \\ \hline 1 + 3n = 10 \end{array}$$
 Addition Property of Equality

$$\begin{array}{r} -1 \quad -1 \\ \hline 3n = 9 \end{array}$$
 Subtraction Property of Equality

$$\frac{3n}{3} = \frac{9}{3}$$
 Div. Prop. of Equality

$$\boxed{n=3}$$

6) $-3x = x + 16$

$$\begin{array}{r} -x \quad -x \\ \hline -4x = 16 \end{array}$$

$$\begin{array}{r} -4 \quad -4 \\ \hline x = -4 \end{array}$$

$$\boxed{x=-4}$$

✱ Break Rules ✱
Check
 $-3x = x + 16$
 $-3(-4) = -4 + 16$
 $12 = 12$

7) $2x + 2 + 3x + 1 = 2x - 3x + 9$

$$\begin{array}{r} 5x + 3 = -x + 9 \\ +x \quad +x \\ \hline 6x + 3 = 9 \end{array}$$
 Combine like terms
 Addition Prop. of Equal

$$\begin{array}{r} -3 \quad -3 \\ \hline 6x = 6 \end{array}$$
 Subtraction Prop. of Equality

$$\frac{6x}{6} = \frac{6}{6}$$
 Div. Prop. of Equality

$$\boxed{x=1}$$

*8) $2 + x + 3 + 1 + 2x = 2x + 10 + 3x - 7 + x$

$$\begin{array}{r} 3x + 6 = 6x + 3 \\ -3x \quad -3x \\ \hline 6 = 3x + 3 \end{array}$$

$$\begin{array}{r} -3 \quad -3 \\ \hline 3 = 3x \end{array}$$

$$\frac{3}{3} = \frac{3x}{3}$$

$$\boxed{x=1}$$