

Name: _____

Date: _____

Learning Goal 6.1

I can solve linear equations.

Recall to solve an **equation**

$$3x - 4 = 5$$

$$\quad \quad -4 \quad -4$$

Solving Equations with Variables on Both Sides

- Combine the constants to one side of the equation
↳ #s with no variables
- Combine the variable terms to the other side of the equation.
- Multiply or divide to find the variable.

Example Solve the following by simplifying, then applying the opposite operations. Check your answer.

a. $5x = 4x - 4$

$$\begin{array}{r} 5x = 4x - 4 \\ -4x \quad -4x \quad \quad \quad \\ \hline x = -4 \end{array}$$

b. $2y = 2 + 4y$

$$\begin{array}{r} 2y = 2 + 4y \\ -4y \quad \quad -4y \\ \hline -2y = 2 \\ \frac{-2y}{-2} = \frac{2}{-2} \\ y = -1 \end{array}$$

c. $7m + 8m = -10m + 5$

$$\begin{array}{r} 7m + 8m = -10m + 5 \\ 15m = -10m + 5 \\ +10m \quad +10m \\ \hline 25m = 5 \\ \frac{25m}{25} = \frac{5}{25} \\ m = \frac{5 \div 5}{25 \div 5} = \frac{1}{5} \end{array}$$

d. $2x - 5x = x + 8$

$$\begin{array}{r} 2x - 5x = x + 8 \\ -3x = x + 8 \\ -x \quad -x \\ \hline -4x = 8 \\ \frac{-4x}{-4} = \frac{8}{-4} \\ x = -2 \end{array}$$

$$\begin{aligned}
 \text{e. } 3x + x &= 5x - 6 \\
 4x &= 5x - 6 \\
 -5x & \quad -5x \\
 -1x - x &= -6x - 1 \\
 x &= 6
 \end{aligned}$$

$$\begin{aligned}
 \text{g. } 12 + 2(k+3) &= 3k - 6 \\
 12 + 2k + 6 &= 3k - 6 \\
 -2k & \quad -2k \\
 12 - k + 6 &= -6 \\
 18 - k &= -6 \\
 -18 & \quad -18 \\
 -1x - k &= -24x - 1 \\
 k &= 24
 \end{aligned}$$

$$\begin{aligned}
 \text{i. } 5(c+4) &= 4(2c-3) - 7 \\
 5c + 20 &= 8c - 12 - 7 \\
 -5c & \quad -5c \\
 20 &= 3c - 12 - 7 \\
 20 &= 3c - 19 \\
 +19 & \quad +19 \\
 39 &= 3c \\
 \frac{39}{3} &= \frac{3c}{3} \\
 13 &= c \\
 c &= 13
 \end{aligned}$$

$$\begin{aligned}
 \text{k. } 3(2x-5) - (x+3) &= 2(x+1) + 4 \\
 6x - 15 - x - 3 &= 2x + 2 + 4 \\
 5x - 18 &= 2x + 6 \\
 -2x & \quad -2x \\
 3x - 18 &= 6 \\
 +18 & \quad +18 \\
 3x &= 24 \\
 \frac{3x}{3} &= \frac{24}{3} \\
 x &= 8
 \end{aligned}$$

$$\begin{aligned}
 \text{f. } -3a + 8 &= 4a + 22 \\
 -4a & \quad -4a \\
 -7a + 8 &= 22 \\
 -8 & \quad -8 \\
 -7a &= 14 \\
 \frac{-7a}{-7} &= \frac{14}{-7} \\
 a &= -2
 \end{aligned}$$

$$\begin{aligned}
 \text{h. } 3(n-2) - 19 &= 5 + 2(n+5) \\
 3n - 6 - 19 &= 5 + 2n + 10 \\
 3n - 25 &= 2n + 15 \\
 -2n & \quad -2n \\
 n - 25 &= 15 \\
 +25 & \quad +25 \\
 n &= 40
 \end{aligned}$$

$$\begin{aligned}
 \text{j. } 4(x+2) - 3(x+1) &= 2(x+2) \\
 4x + 8 - 3x - 3 &= 2x + 4 \\
 x + 5 &= 2x + 4 \\
 -x & \quad -x \\
 5 &= x + 4 \\
 -4 & \quad -4 \\
 1 &= x \\
 x &= 1
 \end{aligned}$$

$$\begin{aligned}
 \text{l. } 12(2x-1) - 4(-2x-1) &= 2(x+11) \\
 24x - 12 + 8x + 4 &= 2x + 22 \\
 32x - 8 &= 2x + 22 \\
 -2x & \quad -2x \\
 30x - 8 &= 22 \\
 +8 & \quad +8 \\
 30x &= 30 \\
 \frac{30x}{30} &= \frac{30}{30} \\
 x &= 1
 \end{aligned}$$