

Lesson 3.5

Solving Two-Step Equations

3.5 Notes

Get out your spiral notebooks!

Essential Question

How do you solve a two-step equation?

Work backwards!



"Equations are like onions...



...they both have layers."

Example 1:Solve $-3x + 5 = 2$. Check your solution.

Need to first eliminate +5

The inverse of +5 is... -5

$$\begin{array}{r|l} -3x + 5 = 2 & \\ -5 & -5 \\ \hline -3x = -3 & \\ \frac{-3}{-3} & \frac{-3}{-3} \end{array}$$

$x = 1$

x is being multiplied by -3

The inverse of multiplying by -3 is dividing by -3

$$\begin{aligned} \text{Check: } -3(1) + 5 &= 2 \\ -3 + 5 &= 2 \\ 2 &= 2 \checkmark \end{aligned}$$

Solve the equation. Check your solution.

1. $-5c + 9 = -16$

$$\begin{array}{r|l} -5c + 9 = -16 & \\ -9 & -9 \\ \hline -5c = -25 & \\ \frac{-5}{-5} & \frac{-25}{-5} \end{array}$$

$c = 5$

$-5(5) + 9 = -16$

$-25 + 9 = -16 \checkmark$

2. $3(x - 4) = 9$

$$\begin{array}{r|l} 3x - 12 = 9 & \\ +12 & +12 \\ \hline 3x = 21 & \\ \frac{3}{3} & \frac{21}{3} \end{array}$$

$$x = 7$$

$3(7 - 4) = 9$

$3(3) = 9 \checkmark$

Example 2:Solve $\frac{x}{8} - \frac{1}{2} = -\frac{7}{2}$. Check your solution.

$$\begin{array}{r|l} \frac{x}{8} - \frac{1}{2} & = -\frac{7}{2} \\ +\frac{1}{2} & +\frac{1}{2} \\ \hline \frac{x}{8} & = -3 \\ \cdot 8 & \cdot 8 \\ \hline x & = -24 \end{array}$$

$$-\frac{7}{2} + \frac{1}{2} = -\frac{6}{2} = -3$$

$$\frac{-24}{8} - \frac{1}{2} = -\frac{7}{2}$$

$$-3 - \frac{1}{2} = -\frac{7}{2}$$

$$-\frac{6}{2} - \frac{1}{2} = -\frac{7}{2} \checkmark$$

Solve the equation. Check your solution.

3. $-\frac{z}{3} + 5 = 9$

$$\begin{array}{r|l} -\frac{z}{3} + 5 & = 9 \\ -5 & -5 \\ \hline -\frac{z}{3} & = 4 \\ \cdot -3 & \cdot -3 \\ \hline z & = -12 \end{array}$$

$$-\frac{-12}{3} + 5 = 9$$

$$-(-4) + 5 = 9$$

$$4 + 5 = 9 \checkmark$$

4. $\frac{2}{5} + 4a = -\frac{6}{5}$

$$\begin{array}{r|l} \frac{2}{5} + 4a & = -\frac{6}{5} \\ -\frac{2}{5} & -\frac{2}{5} \\ \hline 4a & = -\frac{8}{5} \\ \frac{4a}{4} & = \frac{-\frac{8}{5}}{4} \\ a & = -\frac{2}{5} \end{array}$$

$$-\frac{8}{5} \div 4$$

$$-\frac{8}{5} \cdot \frac{1}{4} = -\frac{2}{5}$$

$$\frac{2}{5} + 4\left(-\frac{2}{5}\right) = -\frac{6}{5}$$

$$\frac{2}{5} + \left(-\frac{8}{5}\right) = -\frac{6}{5}$$

Example 3: Here, we have to start by combining like terms.

Solve $3y - 8y = 25$. Check your solution.

$$\begin{array}{r|l} -5y & 25 \\ \hline -5 & -5 \\ \hline y & -5 \end{array}$$

$$\begin{aligned} 3(-5) - 8(-5) &= 25 \\ -15 + 40 &= 25 \checkmark \end{aligned}$$

Solve the equation. Check your solution.

5. $4 - 2y + 3 = -9$

Start by combining like terms!

6. $-8 = 1.3m - 2.1m$

$$\begin{array}{r|l} 7 - 2y & -9 \\ \hline -7 & -7 \\ \hline -2y & -16 \\ \hline -2 & -2 \\ \hline y & 8 \end{array}$$

$$\begin{array}{r|l} -8 & -0.8m \\ \hline -0.8 & -0.8 \\ \hline 10 & = m \end{array}$$

$$4 - 2(8) + 3 = -9$$

$$\begin{aligned} 4 - 16 + 3 &= -9 \\ -12 + 3 &= -9 \checkmark \end{aligned}$$

$$-8 = 1.3(10) - 2.1(10)$$

$$-8 = 13 - 21 \checkmark$$

Example 4:

A cell phone company charges a monthly fee plus \$0.25 for each text message. The monthly fee is \$30.00 and you owe \$59.50. How many text messages did you have?

$$\text{fee} + \text{texts} = 59.50$$

$$\begin{array}{r|l} 30 + 0.25t = 59.50 & \\ -30 & -30 \\ \hline 0.25t = 29.50 & \\ \hline 0.25 & 0.25 \end{array}$$

$$t = 118$$

$$\begin{aligned} 30 + 0.25(118) &= 59.50 \\ 30 + 29.50 &= 59.50 \checkmark \end{aligned}$$