

Day 6: Solving Equations with Variables on BOTH sides

#6

Solve each equation. Check your solution. For #1, explain each step in your process.

1) $5x - 2 = 3x + 4$

Work

$$\begin{array}{r} -3x \\ -3x \end{array}$$

$$\begin{array}{r} 2x - 2 = 4 \\ +2 \quad +2 \end{array}$$

$$\frac{2x}{2} = \frac{6}{2}$$

$$\boxed{x=3}$$

$$5(3) - 2 \stackrel{?}{=} 3(3) + 4$$

$$15 - 2 = 9 + 4$$

$$13 = 13$$

3) $12(6n - 8) = -4(1 + 5n)$

$$\begin{array}{r} 72n - 96 = -4 - 20n \\ +96 \quad +96 \end{array}$$

$$\begin{array}{r} 72n = 92 - 20n \\ +20n \quad +20n \end{array}$$

$$\frac{92n}{92} = \frac{92}{92}$$

$$\boxed{n=1}$$

$$12(6(1) - 8) \stackrel{?}{=} -4(1 + 5(1))$$

$$12(6 - 8) = -4(1 + 5)$$

$$12(-2) = -4(6)$$

$$-24 = -24$$

2) $5(m - 5) = 10(m - 6)$

$$\begin{array}{r} 5m - 25 = 10m - 60 \\ -5m \quad -5m \end{array}$$

$$\begin{array}{r} -25 = 5m - 60 \\ +60 \quad +60 \end{array}$$

$$\frac{35}{5} = \frac{5m}{5}$$

$$\boxed{7 = m}$$

$$5(7 - 5) \stackrel{?}{=} 10(7 - 6)$$

$$5 \cdot 2 = 10 = 1$$

4) Challenge:

$$-6(-2m - 8) = -3(-4m - 1) - 6$$

$$12m + 48 = 12m + 3 - 6$$

$$12m + 48 = 12m - 3$$

$$48 = -3$$

↑
Impossible, so no solution.

5) Define a variable and write an algebraic equation to model the problem. Then, solve the equation.

Antonio is choosing between two cell phone plans that offer the same amount of free minutes. T-Mobile's plan charges \$39.99 per month with additional data costing \$0.45 per MB (megabyte) used. Verizon's plan costs \$44.99 with additional MB of data at \$0.40. How many additional MB of data, d , will it take for the two plans to cost the same?

$$\begin{aligned}
 & \text{T-Mobile} = \text{Verizon} \\
 & 39.99 + 0.45d = 44.99 + 0.40d \\
 & \begin{array}{r} 39.99 \\ -39.99 \end{array} \qquad \begin{array}{r} 44.99 \\ -39.99 \end{array} \\
 & \qquad \qquad \qquad 0.45d = 5 + 0.40d \\
 & \qquad \qquad \qquad \begin{array}{r} 0.45d \\ -0.40d \end{array} \qquad \begin{array}{r} 5 \\ -0.40d \end{array} \\
 & \qquad \qquad \qquad \hline
 & \qquad \qquad \qquad 0.05d = 5 \\
 & \qquad \qquad \qquad \begin{array}{r} 0.05 \\ \hline .05 \end{array} \qquad \begin{array}{r} 5 \\ \hline .05 \end{array} \\
 & \qquad \qquad \qquad \hline
 & \qquad \qquad \qquad d = 100
 \end{aligned}$$

It would take 100 MB_d to cost the same.

SAVE SPACE FOR FOLDABLE!!!

ONE Solution	NO Solutions	INFINITE Solutions
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$$\begin{aligned} -3(x+1) &= -4x \\ -3x-3 &= -4x \\ +3x \quad +3x \end{aligned}$$

$$\begin{array}{r} -3 = -x \\ \frac{-3}{-1} = \frac{-x}{-1} \end{array}$$

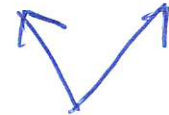
$$\boxed{3 = x}$$

$$\begin{aligned} -3(x+1) &= -3x \\ -3x-3 &= -3x \\ +3x \quad +3x \end{aligned}$$

$$-3 = 0$$

↑
Impossible
No solution.

$$\begin{aligned} -3(x+1) &= -3x-3 \\ -3x-3 &= -3x-3 \end{aligned}$$



Both sides are identical so there are infinite solutions.