

One, No or Infinite Solutions Algebraic Solutions

Big Ideas: Solving a system algebraically can indicate how many solutions a system has.

One Solution: Will produce one answer that is true at one point, such as, $x = 7$.

No Solution: Will produce an untrue, or ridiculous answer, such as, $5 = 8$.

Infinite Solution: Will produce an answer that is always true, such as $4 = 4$.

Examples: Find how many solutions each equation has.

a. $7n + 10 = 3n$

$$\begin{array}{r} 4 \\ \cdot 4 \quad \cdot 4 \\ \hline 7n + 10 = 3n \\ -7n \quad -7n \\ \hline 10 = -4n \end{array}$$

$$\frac{10}{-4} = \frac{-4n}{-4}$$

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$$-2.5 = n$$

One Solution

b. (Put in slope intercept for first.)

$$\begin{cases} -24 = 20x + 4y \\ -15x = 3y - 18 \end{cases}$$

$$\begin{array}{r} -24 = 20x + 4y \\ -20x - 20x \\ \hline -24 = 4y \\ \frac{-24}{4} = \frac{4y}{4} \end{array}$$

$$-6 = y$$

$$y = -6$$

$$\begin{array}{r} -15x = 3y - 18 \\ -15x = 3(-6) - 18 \\ -15x = -18 - 18 \\ -15x = -36 \\ \frac{-15x}{-15} = \frac{-36}{-15} \end{array}$$

$$\begin{array}{r} -15x = 3y - 18 \\ +18 \\ \hline -15x = 3y \\ \frac{-15x}{-15} = \frac{3y}{-15} \end{array}$$

$$x = -\frac{y}{5}$$

$$x = -\frac{-6}{5}$$

Nonsense
No Solution

c. $3(2x + 4) = 6(x + 2)$

$$6x + 12 = 6x + 12$$

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$$0 = 0$$

$$x = -2$$

One Solution