

What Does a Solution Mean?

Name: _____

Date: _____

Read the final statement. $3(x + 2) = 3x + 6$ reduces to $6 = 6$: all real x . Changing the right constant to 7 gives $6 = 7$: no solution. Neither conclusion says $x = 0$.

Explore and explain

1. Solve and check $5x + 2 = 3x + 14$.

2. Classify and justify: (a) $4(x + 1) = 4x + 4$ (b) $4(x + 1) = 4x + 5$.

3. A student solves $2x + 7 = 2x + 9$ and writes $x = 0$ because the variable terms cancel. Explain the correct conclusion.

What Does a Solution Mean?

Apply and transfer

4. Solve and check $\frac{1}{2}x + 3 = \frac{1}{4}x + 5$.

5. Two plans cost $A(n) = 8 + 3n$ and $B(n) = 14 + 2n$ dollars for n whole-number items. Find when they cost the same and interpret the point.

6. Find a constant b that makes $2(x + 3) = 2x + b$ true for every real x . Explain what happens for any other value of b .

Think Like a Mathematician

Optional extension. Choose a strategy and justify why it works. Try a diagram, organized cases, a simpler example, or an equation.

7. For the equation $a(x - 2) = 3x - 6$, classify all real values of a according to whether there is one solution, no solution, or infinitely many. Explain why dividing by $a - 3$ immediately could lose a case.

8. Two pricing rules are $A(n) = an + 4$ and $B(n) = 2n + b$. They agree at $n = 3$ and $n = 7$. Find a and b , and prove that they agree at every n .