Linear Equations in One Variable

Objectives: To determine if a number is a solution of an equation and to solve equations.

Linear Equation in one Variable

- FORM: \( Ax + B = C \)
  
  \((A, B, and \ C \ are \ real \ numbers; \ A \ cannot \ equal \ 0)\)

- A linear equation is called a first degree equation since the greatest power of a variable is _______.

- GOAL: To find value(s) for \( x \) that make the equation true. (Solve for \( x \).)

VOCABULARY Review

- **Equation** -- math sentence with an _______ _______; equal sign divides the equation into two “sides”

- _______ -- math sentence with no equal sign

- _______ of the equation -- value(s) for the variable that makes the equation true

- **Inverse operations** -- operations that _______ one another; For example: Addition & subtraction are inverse operations.

Are the given numbers solutions of the given equations?

- A) \( 5k = 15; 3 \)  
  
  B) \( r + 6 = 4; -1 \)

- C) \( -8m = -12; 3/2 \)

Properties

- **Addition Property of Equality**
  
  What you add to one side of an equation must also be added to the _______ side of the equation.

  Example: \( A = B, \ so \ A + C = B + C \)

- **Multiplication Property of Equality**
  
  When you multiply by a factor on one side of an equation, you must also multiply by the _______ factor on the other side of the equation.

  Example: \( A = B, \ so \ AC = BC. \)

- These same properties hold true for subtraction and division as well.

GOLDEN RULE of SOLVING EQUATIONS

- **Do unto one side of an equation as you do unto the other side.**
EXAMPLES
1a) $5x - 4 = 21$  
1b) $9p + 1 = 7p - 9$

EXAMPLES
1c) $-4t + 5t - 8 + 4 = 6t - 4$

Steps
1. Clear the equation of fractions. (Multiply every term by the ______ to remove fractions.)
2. Use the ____________ Property to remove parentheses on each side.
3. Combine ______ _______ to get variable on one side. (Undo addition or subtraction.)
4. ______. (Undo multiplication or division.)
5. Check your solution by substituting what you get into the ___________ equation.

EXAMPLES
2a) $2(3 - 2x) = x - 4$

EXAMPLES
2b) $6x - 3(5x + 2) = 4(1 - x)$

EXAMPLES
2c) $4[2t - (3 - t) + 5] = -(2 + 7t)$
Fractions or Decimals?

**Solving with Fractions or Decimals**
- When an equation contains fractions, multiply EVERY PART by the $\text{_____}$. This will eliminate all fractions in the problem.
- With decimals, multiply EVERY PART by a power of $\text{_____}$ so that all coefficients are integers. (Don’t forget the “shortcut” for multiplying by a power of 10.)

See Example 3.

$3a) \ \frac{x}{5} - \frac{x}{4} = 1 \\
3b) \ \frac{3}{4}x - \frac{1}{3}x = \frac{5}{6}x - 5$

See Example 3.

$3c) \ \frac{2x+5}{5} = \frac{3x+1}{2} + \frac{-x+7}{2}$

See Example 4.

$4a) .09k + .13(k + 300) = 61 \\
b) .08x + .12(260 - x) = .48x$

Summary

- Simplify.
- Add or subtract.
- Multiply or divide.
- Check.

ASSIGNMENT

- MyMathLab assignment
- suggested odd exercises from textbook