TOPIC: SOLVING LINEAR EQUATIONS

- A **linear expression** with an ____ sign is a **linear equation**!

Linear Expression	Linear Equation
$2x + 3$	$2x + 3$ _____
When x is 4, $\underbrace{2(4) + 3}_{11}$	
● Simplify/evaluate for ***KNOWN*** x	● Solve for ***UNKNOWN*** x ▪ Find value(s) of x that make the statement _____

- You will need to use different operations $(+,\ -,\ \times,\ \div)$ to _____ x.
  - These operations should ***ALWAYS*** be done to _____ of the equation.

EXAMPLE: Identify and perform the operation needed to **isolate** x by applying it to both sides.

(A) $x + 2 = 0$

(B) $3x = 12$

_____
Operations
$+$
$\times$

- You'll often have to do *multiple* operations to solve a linear equation.

EXAMPLE: Solve the equation.

$$2(x - 3) = 0$$

Simplifying Algebraic Expressions

SOLVING LINEAR EQUATIONS

1) Distribute constants

2) Combine like terms

3) Group terms w/ __ & _____ on opposite sides

4) Isolate x (Solve for x)

5) _____ solution by replacing x in original equation

- ____ is the _____ or _____ of the equation

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PRACTICE: Solve the equation.

$$3(2-5x) = 4x + 25$$

SOLVING LINEAR EQUATIONS
1) Distribute constants
2) Combine like terms
3) Group terms w/ x & constants on opposite sides
4) Isolate x
5) Check solution by replacing x in original equation

Linear Equations with Fractions

- Linear equations may have **fractions** that need to be _____ using **L**east **C**ommon **D**enominator first.

EXAMPLE: Solve the equation.

$$\frac{1}{4}(x+2) - \frac{1}{3}x = \frac{1}{12}$$

SOLVING LINEAR EQUATIONS
0) Multiply by _____ to eliminate fractions
1) Distribute constants
2) Combine like terms
3) Group terms w/ x & constants on opposite sides
4) Isolate x
5) (Optional) Check by replacing x in original eqn

PRACTICE: Solve the equation.

$$\frac{9}{2} + \frac{1}{4}(x+2) = \frac{3}{4}x$$

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Categorizing Linear Equations

- **Linear equations** can be put in 3 possible **categories** based on _____ solutions they have.
  - These solutions may be written as a _____.

EXAMPLE: Solve, then categorize the linear equations.

_____	_____	_____
$2x + 4 = 10$	$x + 5 = x + 2 + 3$	$x = x + 4$
• _____ **solution** • Solution set is _____	• _____ statement • _____ **solutions** • Solution set is _____ (all real numbers)	• _____ statement • _____ solutions • Solution set is ___, _____ set

PRACTICE: Solve the equation. Then state whether it is an identity, conditional, or inconsistent equation.

$$5x + 17 = 8x + 12 - 3(x + 4)$$

SOLVING LINEAR EQUATIONS
0) Multiply by LCD to eliminate fractions
1) Distribute constants
2) Combine like terms
3) Group terms w/ x & constants on opposite sides
4) Isolate x (if any x terms remain)

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PRACTICE: Solve the equation. Then state whether it is an identity, conditional, or inconsistent equation.

$$\frac{x}{4}+\frac{1}{6}=\frac{x}{3}$$

SOLVING LINEAR EQUATIONS
0) Multiply by LCD to eliminate fractions
1) Distribute constants
2) Combine like terms
3) Group terms w/ x & constants on opposite sides
4) Isolate x (if any x terms remain)

PRACTICE: Solve the equation. Then state whether it is an identity, conditional, or inconsistent equation.

$$-2(5-3x)+x=7x-10$$