

TOPIC: LINEAR EQUATIONS

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

Linear Expression

$$2x + 3$$

When x is 4,

$$\underbrace{2(4) + 3}_{11}$$

► Simplify/evaluate for **KNOWN** x

Linear Equation

$$2x + 3 \underline{\hspace{1cm}}$$

► Solve for **UNKNOWN** x

► Find values of x that make the statement _____

◆ You will need to use different operations (+, −, ×, ÷) 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

+

×

◆ 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.

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

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 (Solve for 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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Word Problem Solving Strategy

◆ Word problems could be tricky, but we can use these steps to break them down.

EXAMPLE

A rectangular field's length is four times its width. If the perimeter of the field is 500 yards, what are the field's dimensions?

1) Understand the problem:

- Read & *reread* the problem,
- Draw a picture if needed,
- Identify & name the _____.

2) Build equation(s) that models the problem.

4) State the answer in the context of the problem.

3) Solve the equation.

5) Check your solution (both to the *equation* and in the _____ of the problem).

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PRACTICE

Find each unknown number.

(A) One number is nine less than another. Their sum is negative twenty-seven.

(B) If half of a number is added to $\frac{2}{5}$, the result is the same as subtracting $\frac{1}{10}$ from the number.

HOW TO: Solve Word Problems

- 1) **Understand** the problem
 - Read & *reread* the problem
 - Draw a picture if needed
 - Identify & name the unknown
- 2) **Build** an equation that models the problem
- 3) **Solve** equation
- 4) Write the sentence as a **full sentence**
- 5) **Check** your solution (both to the equation and in the context of the problem)

PRACTICE

Patricia has 30 meters of fencing to make a rectangular garden in her backyard. She wants the length to be 5 meters more than the width. Complete steps 1 & 2 of the word problem solving process to set up an equation Patricia could use to find the width of her rectangular fence.

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PRACTICE

Jordan is designing a picture frame for a poster. The perimeter of the frame is 80 cm. The length is 12 cm longer than its width. Identify the dimensions of this poster.

EXAMPLE

A triangle-shaped garden is designed such that two sides of the triangle are 8 and 12 meters long, and the angle between these sides is 30° less than twice the measure of another angle in the triangle, x . The third angle is 20° more than x . Solve for the angles of the triangle.

Hint: The sum of all angles inside a triangle is equal to 180° .