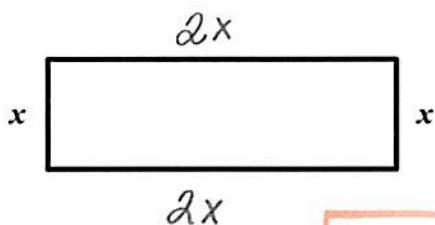


Essential Question: How can we model situations and solve problems using equations?

Do Now: Set up an equation to solve the following problem.

Nancy is stringing lights around her rectangular window. The length of the window is twice the width. Determine the dimensions, in cm, of the window if Nancy uses exactly 54 cm of string. Let x represent the width. $2x = \text{length}$

Think about: How can the length be represented algebraically? Is this a perimeter or area problem?



The width is 9 cm and the length is 18 cm.

Perimeter

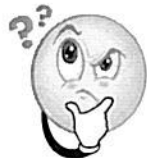
$$2(2x) + 2(x) = 54$$

$$4x + 2x = 54$$

$$\frac{6x}{6} = \frac{54}{6}$$

$$x = 9 \quad 2 \cdot 9 = 18$$

Solving Word Problems Algebraically



Remember to always...

- 1) **Read the problem** carefully and make sense of the situation. Be able to describe the situation in your own words.
- 2) **Define all unknowns** (always let x represent what you know the least about).
- 3) Use key words in the problem to **set up an equation** relating all the unknowns. The equation models the situation symbolically.
- 4) **Solve** the equation.
- 5) **Answer the question** and ask yourself..."does my answer make sense?"

1. One number is 4 more than another. If 4 times the smaller number is decreased by twice the larger, the result is 12. Find both numbers.

10	$x = \text{smaller number}$
14	$x + 4 = \text{larger number}$

$$4x - 2(x + 4) = 12$$

$$4x - 2x - 8 = 12$$

$$2x - 8 = 12$$

$$+8 \quad +8$$

$$\frac{2x}{2} = \frac{20}{2}$$

$$x = 10$$

The numbers are 10 and 14.

2. Frank saves half as much as Jordan. Jordan saves four times as much as Mia. Together, all three save \$280 dollars. How much did each person save?

$x =$ amount Mia saves \$40

$4x =$ amount Jordan saves \$160

$(4x \cdot \frac{1}{2}) 2x =$ amount Frank saves \$80

$$x + 4x + 2x = 280$$

$$\frac{7x}{7} = \frac{280}{7}$$

$$x = 40$$

$$4(40) = 160$$

$$2(40) = 80$$

3. Anthony keeps quarters, nickels, and dimes in a jar. He has a total of 28 coins. He has five more quarters than nickels and 10 fewer dimes than nickels. How many nickels does Anthony have?

$x =$ number of nickels 11

$x - 10 =$ number of dimes 1

$x + 5 =$ number of quarters 16

$$x + x - 10 + x + 5 = 28$$

$$3x - 5 = 28$$

$$\begin{array}{r} +5 \\ +5 \end{array}$$

$$\frac{3x}{3} = \frac{33}{3}$$

$$x = 11$$

4. Dylan's age is 2 years less than $\frac{3}{8}$'s of her father's age. If Dylan is 13 years old, how old is her father?

$x =$ father's age 40 years old

$$\frac{3}{8}x - 2 = 13$$

$$\begin{array}{r} +2 \\ +2 \end{array}$$

$$\frac{8}{3} \cdot \frac{3}{8}x = 15 \cdot \frac{8}{3}$$

$$x = 40$$