

# Warm-Up

## Solving Real-World Multistep Equations



### Lesson Question



### Lesson Goals

**Write** multistep equations for real-world scenarios.



**Solve** multistep equations to  real-world problems.

**Verify**  to real-world linear equations.



### Words to Know

Fill in this table as you work through the lesson. You may also use the glossary to help you.

verify	to <input type="text"/> what is known to confirm an expected result
equation	a mathematical statement that uses an equals sign to <input type="text"/> two algebraic expressions
perimeter	<input type="text"/> around a two-dimensional shape
variable	a letter or symbol used to represent an <input type="text"/> quantity

## Instruction

## Solving Real-World Multistep Equations

Slide

2

**Solving Real-World Problems Using Multistep Equations****PROCEDURE**

1. Determine the .
2. Identify key words and translate the meaning.
3. Write the multistep .
4. Solve for the variable.
5. Use the  of the variable to solve the problem.

**Writing a Multistep Equation for a Real-World Scenario**

In the 2012 Summer Olympics, Great Britain won 21 more medals than Germany. Russia won 6 fewer than two times the number of medals Germany won. The three countries won a total of 191 medals.

1. Determine the variable.  $g$  = Number of medals/Germany
2. Identify key words and translate the meaning  
Let,  $GB$  represent the medal count for Great Britain. Use  $R$  to represent Russia.

$$GB = g + \boxed{\phantom{00}}$$

$$R = 2g - \boxed{\phantom{00}}$$

3. Write the multistep equation.

$$\boxed{\phantom{00}} + (g + 21) + (2g - 6) = \boxed{\phantom{00}}$$

## Instruction

## Solving Real-World Multistep Equations

Slide

4

## Writing a Multistep Equation for a Real-World Scenario

The medal count for Germany, Great Britain, and Russia in the 2012 Summer Olympics is represented by the equation  $g + (g + 21) + (2g - 6) = 191$ , where  $g$  represents Germany's total medal count. How many medals did Russia win if its athletes won 6 less than two times as many medals as Germany?

4. Solve for the variable.

$$g + g + 21 + 2g - 6 = 191$$

$$4g + \boxed{\phantom{000}} = 191$$

- 15    - 15

$$\frac{4g}{4} = \frac{176}{4}$$

$$g = \boxed{\phantom{000}}$$

5. Use the value of the variable to solve the problem.

$$R = 2g - 6$$

$$R = 2(44) - 6$$

$$= \boxed{\phantom{000}} - 6$$

$$= 82$$

Russia won 82  $\boxed{\phantom{000}}$ .

## Solving Problems Using the Variable

How many medals did Great Britain win if its athletes won 21 more medals than Germany?

$$GB = g + 21$$

$$= 44 + \boxed{\phantom{000}}$$

$$GB = \boxed{\phantom{000}}$$

- **Verify** that the medal counts for the three countries are correct. The total number of medals should be 191.

$$44 + 65 + 82 = 191$$

$$191 = 191$$

## Instruction

## Solving Real-World Multistep Equations

Slide

8

**Writing a Multistep Equation for a Real-World Scenario**

Ride-n-Fly Shuttle charges \$16.00 for pickup and an additional \$0.20 for each mile traveled. Speedy Shuttle charges \$4.00 for pickup and an additional \$0.50 for each mile traveled. At what number of miles is the cost of both shuttle services the same?

Use  $m$  as the number of miles, which is the unknown.

$$m = \text{\#miles}$$

$$RF = 0.20m + \boxed{\phantom{00}}$$

$$SS = \boxed{\phantom{00}} + 4$$

$$RF = SS$$

$$0.20m + 16 = 0.50m + 4$$

$$\begin{array}{r} -0.20m \quad -0.20m \\ \hline \end{array}$$

$$16 = \boxed{\phantom{00}} + 4$$

$$\frac{12}{0.30} = \frac{0.30m}{0.30}$$

$$\boxed{\phantom{00}} = m$$

40 is the number of miles at which we would have to travel for the  $\boxed{\phantom{00}}$  of each shuttle to be the same.

## Instruction

## Solving Real-World Multistep Equations

Slide

8

## Verifying the Solution of a Real-World Scenario

$$\text{Equation: } 0.20m + 16 = 0.50m + 4$$

$$m = 40$$

$$0.20(40) + 16 = 0.50(40) + 4$$

$$\boxed{\phantom{00}} + 16 = \boxed{\phantom{00}} + 4$$

$$24 = 24$$

We have a true statement, and thus our solution is correct.

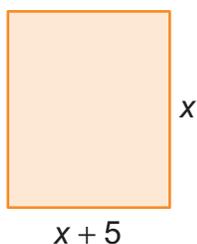
10

## Using a Model of a Mathematical Problem

A regular pentagon and a rectangle have the same **perimeter**. The side of the pentagon is 2 units less than the length of the rectangle. The width of the rectangle is 5 units more than the length of the rectangle. What is the perimeter of each figure?

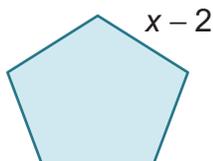
$$p = 2l + 2w$$

$$= 2x + 2(x + 5)$$



$$p = \boxed{\phantom{00}}$$

$$= 5(x - 2)$$



## Instruction

## Solving Real-World Multistep Equations

Slide

10

## Using a Model of a Mathematical Problem

$$\text{Rectangle}_p = \text{Pentagon}_p$$

$$2x + 2(x + 5) = 5(x - 2)$$

$$2x + 2x + \boxed{\phantom{00}} = 5x - 10$$

$$\begin{array}{r} 4x + 10 = \boxed{\phantom{00}} - 10 \\ -4x \qquad -4x \end{array}$$

$$\begin{array}{r} 10 = x - 10 \\ +10 \quad +10 \end{array}$$

$$\begin{array}{r} \boxed{\phantom{00}} = x \\ x = 20 \end{array}$$

Perimeter of rectangle:

$$\begin{aligned} &= 2(\boxed{\phantom{00}}) + 2(20 + 5) \\ &= 40 + 2(25) \\ &= 40 + 50 \\ &= \boxed{\phantom{00}} \end{aligned}$$

Perimeter of pentagon:

$$\begin{aligned} &= 5 \cdot \boxed{\phantom{00}} \\ &= 90 \end{aligned}$$

Since the perimeters came out the same, and our equation stated that the perimeters must be the same, we know that we have the correct answer.

## Summary

## Solving Real-World Multistep Equations

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**Lesson  
Question**

How can you solve multistep equations that represent real world scenarios?

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**Answer**

2

**Review: Key Concepts**

Solving real-world problems using multistep equations:

1. Determine the variable.
2. Identify  and translate the meaning.
3. Write the multistep equation.
4. Solve for the .
5. Use the value of the variable to solve the problem.



# Summary

## Solving Real-World Multistep Equations

*Use this space to write any questions or thoughts about this lesson.*