

## LESSON 1.4

### GOAL

Translate verbal sentences into equations or inequalities.

#### Vocabulary

An **open sentence** is a mathematical statement that contains two expressions and a symbol that compares them.

An **equation** is an open sentence that contains the symbol  $=$ .

An **inequality** is an open sentence that contains one of the symbols  $<$ ,  $\leq$ ,  $>$ , or  $\geq$

When you substitute a number for the variable in an open sentence, the resulting statement is either true or false. If the statement is true, the number is a **solution of the equation**, or a **solution of the inequality**.

#### EXAMPLE 1

##### Write equations and inequalities

Write an equation or an inequality.

- 8 times the quantity of 11 plus a number  $x$  is 112.
- The product of 7 and a number  $y$  is no more than 31.
- A number  $z$  is more than 8 and at most 15.

#### Solution

	Verbal phrase	Equation or inequality
a.	8 times the quantity of 11 plus a number $x$ is 112.	$8(11 + x) = 112$
b.	The product of 7 and a number $y$ is no more than 31.	$7y = 31$
c.	A number $z$ is more than 8 and at most 15.	$8 < z \leq 15$

## Exercises for Example 1

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**Write an equation or an inequality.**

1. The difference of 73 and a number  $x$  is 17.
2. The product of 8 and the quantity of a number  $y$  plus 6 is less than 21
3. The quotient of a number  $w$  and 5 is at most 4.
4. The sum of a number  $z$  and 2 is greater than 15 and less than 23.

## EXAMPLE 2

**Check possible solutions**

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**Check whether 5 is a solution of the equation or inequality.**

Equation/inequality	Substitute	Conclusion
a. $3x - 7 = 12$	$3(5) - 7 \neq 12$	$8 \neq 12$ ✗ 5 is not a solution
b. $9 + 2x \leq 23$	$9 + 2(5) \leq 23$	$19 \leq 23$ ✓ 5 is a solution

## Exercises for Example 2

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**Check whether the given number is a solution of the equation or inequality.**

5 $3 + a = 17$ ; 4	8 $21 - 3d \geq 11$ ; 2	10 $7 < m + 8 <$
6 $7b - 3 = 10$ ; 2	9 $4g + 6 \leq 14$ ; 3	15; 6
7 $4c < 15$ ; 3		

### EXAMPLE 3

#### Solve a multi-step problem

A soccer team is selling pizzas for \$6 each. Each pizza costs \$4 to make. The team has 10 players and wants to raise \$900 for equipment and uniforms. How many pizzas does the team need to sell? How many pizzas will each player sell if every player sells the same number of pizzas?

#### Solution

**STEP 1 Write** a verbal model. Let  $p$  be the number of pizzas sold. Write an equation.

$$\begin{array}{ccccccc} \text{(Price of pizza} & - & \text{Cost to make each pizza)} & \times & \text{(Number of pizzas sold)} & & \\ \text{)} = \text{Profit} & & & & & & \\ (6 & - & 4) & \times & p & = & 900 \end{array}$$

**STEP 2 Use** mental math to solve the equation  $(6 - 4)p = 900$ , or  $2p = 900$ .

Think: 2 times what number is 900? Because  $2(450) = 900$ , the solution is 450.

The team needs to sell 450 pizzas.

**STEP 3 Find** the number of pizzas each player sells.  $\frac{450 \text{ pizzas}}{10 \text{ players}} = 45$  pizzas per player

Each player will sell 45 pizzas.

#### Exercise for Example 3

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11. Your family is driving 188 miles to visit a relative. Your father drives 63 miles then stops for a break. How many more miles are left in the trip? Your father drives 50 miles per hour. How long will the remainder of the trip take? Write a verbal model for the situation, then solve.

## *Answer Key*

### *Lesson 1.4*

#### **Study Guide**

1.  $73 - x = 17$
2.  $8(y + 6) < 21$
3.  $\frac{w}{5} \leq 4$
4.  $15 < z + 2 < 23$
5. yes
6. no
7. yes
8. yes
9. no
10. yes
11. 125 miles; Miles traveled + Miles left = Total miles; 2.5 hours

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