

LESSON
1.4**Study Guide***For use with the lesson "Write Equations and Inequalities"***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.	$7y \leq 31$
c. A number z is more than 8 and at most 15.	$8 < z \leq 15$

Exercises for Example 1**Write an equation or an inequality.**

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

LESSON
1.4**Study Guide** *continued*
For use with the lesson "Write Equations and Inequalities"**EXAMPLE 2** Check possible solutions**Check whether 5 is a solution of the equation or inequality.**

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

Exercises for Example 2**Check whether the given number is a solution of the equation or inequality.**

5. $13 + a = 17$; 4 6. $7b - 3 = 10$; 2 7. $4c < 15$; 3
8. $21 - 3d \geq 11$; 2 9. $4g + 6 \leq 14$; 3 10. $7 < m + 8 < 15$; 6

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.

$$\left(\begin{array}{c} \text{Price of} \\ \text{pizza} \end{array} - \begin{array}{c} \text{Cost to make} \\ \text{each pizza} \end{array} \right) \times \left(\begin{array}{c} \text{Number of} \\ \text{pizzas sold} \end{array} \right) = \text{Profit}$$

$$(6 - 4) \times p = 900$$

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

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.