

1. Write an expression for the situation: The number of miles left in a 425-mile trip after  $m$  miles have been traveled.
  
2. Find the unit rate for the rate  $\frac{18 \text{ figurines}}{6 \text{ boxes}}$ .
  
3. A video store charges \$5 per game rental plus \$12 to rent the game system. Write an expression for renting the game system and a number of games. Then find the total cost if you rent 6 games.
  
4. Write an expression for the phrase: 4 times the difference of 6 and a number  $y$ .
  
5. A museum charges \$50 for an annual membership and then a reduced price of \$2 per ticket. Write an expression to represent the situation. Then find the total cost to join the museum and buy 9 tickets.

## 1.4 Notes

## Algebra 1

### LEARNING 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**.

Symbol	Meaning	Associated Words
$=$	Is equal to	The same as
$<$	Is less than	Fewer than
$\leq$	Is less than or equal to	At most, no more than
$>$	Is greater than	More than
$\geq$	Is greater than or equal to	At least, no less than

### EXAMPLE 1

#### Write equations and inequalities

Write an equation or an inequality.

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

### Exercises for Example 1

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.
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## 1.4 Notes

## Algebra 1

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.
5. The quotient of a number $p$ and 12 is at least 30.	6. The sum of twice a number $r$ and 3 is 11.
7. The quotient of a number $n$ and 2 is at most 16.	8. A number $q$ is at least 5 and less than 17.

### EXAMPLE 2

#### Check possible solutions

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

Equation/inequality	Substitute	Conclusion
a. $3x - 7 = 12$		
b. $9 + 2x \leq 23$		

#### Exercises for Example 2

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

9. $13 + a = 17$ ; 4	10. $7b - 3 = 10$ ; 2	11. $4c < 15$ ; 3
12. $21 - 3d \geq 11$ ; 2	13. $4g + 6 \leq 14$ ; 3	14. $7 < m + 8 < 15$ ; 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.

$$(\text{Price of pizza} - \text{Cost to make each pizza}) \times (\text{Number of pizzas sold}) = \text{Profit}$$

**STEP 2** Solve the equation.

**STEP 3** Find the number of pizzas each player sells:  $\frac{\text{pizzas}}{\text{players}} = \underline{\hspace{1cm}}$  pizzas per player  
Each player will sell  $\underline{\hspace{1cm}}$  pizzas.

**Exercise for Example 3**

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15. 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.

## 1.4 Practice B

## Algebra 1

**Write an equation or an inequality.**

1. The difference of a number $c$ and 17 is more than 33
2. The product of 3 and a number $x$ is at most 21
3. The sum of 14 and twice a number $y$ is equal to 78
4. The difference of 22 and the quotient of a number $m$ and 4 is 54
5. The sum of 7 and three times a number $b$ is at least 12

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

6. $6x + 7 = 25$ ; 3	7. $22 - 5c = 8$ ; 3	8. $\frac{b}{4} - 7 = 1$ ; 36
9. $7a + 4 \geq 20$ ; 2.7	10. $4y - 3 > 12$ ; 4	11. $\frac{m}{3} + 14 < 33$ ; 9

**Solve the equation.**

12. $x + 9 = 17$	13. $y - 5 = 12$	14. $8w = 48$
15. $\frac{m}{4} = 16$	16. $2x - 1 = 15$	17. $3x + 2 = 20$

## 1.4 Practice B

## Algebra 1

- 18. Computers** You are buying a new printer and a new scanner for your computer, and you cannot spend over \$150. The printer you want costs \$80. Write an inequality that describes the most that you can spend on the scanner and still stay within your budget. If you buy a scanner that costs \$75, will you remain within your budget?
- 19. Go-Carts** You and three of your friends are going to race go-carts. The last time you went, you had a coupon for \$3 off each admission and paid \$48 for the 4 admissions. What was the total price without the coupon? You pay the regular price this time and share it equally. How much does each person pay?
- 20. Bracelets** You are making beaded bracelets for your friends. You want to use 30 beads for each bracelet and want to use no more than 145 beads. Write an inequality that models this situation. Can you make 4 bracelets?
- 21. Staircase** When building a staircase, you need to be concerned with the height of the riser and the depth of the tread so that people can go up and down the stairs comfortably. One rule of thumb used to determine proper riser height and tread depth is that the sum of the tread depth (in inches) and twice the riser height (in inches) should equal 26 inches. Write an equation that models this situation. The riser height of a set of steps is 5 inches. What should the depth be?

