Lesson 11-3
Writing Expressions

Learning Targets:

- Use variables to represent quantities.
- Write expressions to represent quantities.

When writing mathematical expressions to find solutions to real-world problems, it is important to know words and phrases that represent the four mathematical operations.

Sum refers to addition, and *product* refers to multiplication. In the table below, add as many words as you can to define each operation.

Addition	Subtraction
sum	
Multiplication	**Division**
product	

Example D

When writing algebraic expressions for verbal expressions, first determine the operation being done.

a. Fifteen more than a number
(*More than* means "addition," so 15 is being added to a number.)
$15 + n$

b. One half of a number
(*Of* means "multiplication," so $\frac{1}{2}$ is being multiplied by a number.)
$\frac{1}{2}n$

c. A number decreased by 7
(*Decreased by* means "subtraction," so 7 is being subtracted from a number.)
$n - 7$

d. The quotient of 12 and a number
(*Quotient* means "division," so 12 is being divided by a number.)
$12 \div n$ or $\frac{12}{n}$

Try These D

Tell which operation is being used, and write an algebraic expression for each verbal expression.

a. 4 increased by a number

$4 + n$

b. A number divided by 3

$\frac{n}{3}$

c. 9 more than a number squared

$n^2 + 9$

d. 12 less than twice a number

$2n - 12$

1. The area of a rectangle is found by multiplying the base and the height.

a. Write an algebraic expression for the area of a rectangle.

bh

b. Use your expression to find the area of a rectangle with a length of 17 inches and a width of 13 inches.

bh

$17(13)$

221

2. The perimeter of a square is determined by finding the sum of the lengths of all four sides.

a. Write an algebraic expression to determine the perimeter of a square. $s+s+s+s$ or $4s$

b. Confirm that both expressions are equivalent using both expressions to find the perimeter of a square with side lengths of 2.6 inches.

$4s$

$4(2.6)$

10.4

3. Use concrete or pictorial models to determine if the expressions $3x$ and $x + x + x$ are equivalent.

$3x = x + x + x$

$3(4) = 4 + 4 + 4$

4. Use algebra tiles or other concrete or pictorial models to determine if the expressions $n \cdot n$ and n^2 are equivalent.

$n \cdot n = n^2$ $\qquad$ $5 \cdot 5 = 5^2$

5. The rental fee for a bicycle to ride on the beach is $10.00, plus $2.00 for each hour that you ride.

a. Model with mathematics. Write an algebraic expression for the total cost of renting the bike.

$10 + 2h$

b. Use your expression to determine the cost to rent the bike for three and a half hours.

$10 + 2h$

$10 + 2(3.5)$

$10 + 7$

17

6. Ayana and Zachary drove to the fair at an average speed of 40 mph. It took them 0.5 hours to get there. Write and simplify a numerical expression to determine how far away their home is from the fair. Show your work.

40 mph = rate (r)

0.5 hours = time (t)

distance = d

$rt = d$

$40(0.5) = d$

$20 = d$

The **unit rate** is the rate for one item. For example, if four apples cost $2.80, the unit cost, or cost per apple, is $2.80 divided by 4, or $0.70.

7. Zachary bought eight hot dogs at the fair. He paid a total of $12.00 for the food. Find the unit cost of one hot dog. Show your work.

$\frac{\text{total}}{\text{number}} \quad \frac{t}{n} \quad \frac{12.00}{8} = 1.5$

$1.50

8. Ayana is buying peanuts at the fair. She can buy a bag of 16 ounces of peanuts for $2.89 or a bag of 10 ounces for $1.75.

a. Find the unit cost of each bag of peanuts.

$\frac{2.89}{16}$ $\frac{1.75}{10}$

b. Which size bag is the better buy? Explain your reasoning.

$0.180 > 0.175$

Check Your Understanding

9. Write an algebraic expression for each verbal expression.

a. Six more than a number $n + 6$

b. Three times a number $3n$

c. The quotient of a number and 7 $\frac{n}{7}$

d. Four less than five times a number $5n - 4$

e. A number squared decreased by 2 $n^2 - 2$

f. Twice a number increased by 16 $2n + 16$

10. An electrician charges a $50 house call fee and $65 per hour for the work.

a. Write an algebraic expression to represent the situation.

$50 + 65h$

b. Is it less expensive to have the electrician work for 6 hours or have him come back for two 3-hour jobs? Explain.

$50 + 65(6) < 2(50 + 65(3))$

11. A store sells peanut butter in 28-ounce jars for $4.29 and in 16 ounce jars for $2.49. Find the price per ounce for each size jar and determine which jar is the better buy. Explain.

LESSON 11-3 PRACTICE

12. Write an algebraic expression for each verbal expression.

- **a.** Five fewer than twice a number
- **b.** A number of coins split into 4 equal groups
- **c.** A number to the third power
- **d.** The product of 1.5 and a number
- **e.** Four times a number increased by 11

HOMEWORK:

Pg. 142 (12 - 14)

Google Form

Pg. 142 (9 – 14)

Paper only

13. **Model with mathematics.** Three friends went to lunch. They all ordered the same meal. At the end of lunch, they gave the waiter a $12 tip.

- **a.** Write an algebraic expression to represent the situation.

- **b.** How much total money was spent if each meal cost $7.50?

14. Find the unit cost if a store sells a dozen eggs for $1.99.

LESSON 11-2 PRACTICE

16. Evaluate each expression for the given value of the variable.

a. $8a$ when $a = 2$

b. $\frac{x}{7}$ when $x = 21$

c. $c^3 - 1$ when $c = 4$

d. $2x + 9$ when $x = 5$

e. $4z - 2$ when $z = 3$

HOMEWORK:

Pg. 138 (16 - 19) – Google Form

Pg. 138 (12 – 19) – Paper only

17. Write an expression representing the product of 17 and c. Evaluate this expression for $c = 4$.

18. Write the expression $12a$ in words.

19. Reason abstractly. Write an expression to represent the sum of $5x$ and 9, and evaluate this expression for $x = 5$.