1-1 Variables and Expressions

Vocabulary

Review

What mathematical *operation* is shown in each equation? Write *addition, subtraction, multiplication,* or *division.*

1. $6 \cdot 2 = 12$ _____ **2.** $14 - 4 = 10$ _____ **3.** $27 \div 3 = 9$ _____ **4.** $13 + 7 = 20$ _____

Vocabulary Builder

variable (noun) VEHR ee uh bul

Related Words: vary (verb), varied (adjective), various (adjective)

Definition: A **variable** is a symbol, usually a letter, that represents one or more values of a quantity that changes.

Main Idea: The value given to a **variable** can change or vary. A quantity that changes, or varies, is called a *variable quantity.*

Example: The letter y is the **variable** in the algebraic expression $4 + y$. You can replace y with different numbers to find values for the expression.

a, x, and m are often used as **variables**. 100, $\frac{1}{a}$, and $3m$ are *not variables*.

Use Your Vocabulary

5. Circle the *variable*(*s*) in each algebraic expression.

$8 + 4x$ $\quad y + 12$ $\quad 9z + y$ $\quad \frac{8}{w} + 4w$

An **algebraic expression** is a mathematical phrase that includes one or more variables. A **numerical expression** is a mathematical phrase involving numbers and operation symbols, but no variables.

6. Write **N** next to each *numerical expression.* Write **A** next to each *algebraic expression.*

____ $6x$ ____ $\frac{5}{r} - 4$ ____ $11 + 5$ ____ $30 + 14k$

Problem 1 Writing Expressions With Addition and Subtraction

Got It? **What is an algebraic expression for 18 more than a number *n*?**

7. Complete the table with *add* or *subtract*.

Phrase	Math Operation
more than a number	_____
less a number	_____
sum of two numbers	_____
fewer than a number	_____

8. Circle the expression you could use to find 18 more than 6.

6×18 $6 + 18$ $18 - 6$ $18 + 18 + 18 + 18 + 18 + 18$

9. Now write an algebraic expression for 18 more than a number *n*.

n ☐ 18

Problem 2 Writing Expressions With Multiplication and Division

Got It? **What is an algebraic expression for the following word phrase?**

6 times a number *n*

10. Complete each sentence with *add, subtract, multiply,* or *divide*. One word is used more than once.

The phrase "8 less than a number" tells you to __?__ 8. _____

The phrase "the product of a number *x* and 4" tells you to __?__ *x* and 4. _____

The phrase "the quotient of 6 and a number" tells you to __?__ 6 by *x*. _____

The phrase "*n* times 12" tells you to __?__ *n* and 12. _____

The phrase "the sum of a number *n* and 59" tells you to __?__ *n* and 59. _____

11. Now write an algebraic expression for 6 times a number *n*.

6 ☐ *n*

Problem 3 Writing Expressions With Two Operations

Got It? **What is an algebraic expression for the following word phrase?**
8 less than the product of a number x and 4

12. Write an algebraic expression for the product of a number x and 4.

13. Underline the correct phrase to complete the sentence.

The phrase "8 less than a certain number" tells you to

subtract 8 from a number / subtract a number from 8 .

14. Cross out the expressions that do NOT represent the word phrase "8 less than the product of a number x and 4."

$4x - 8$ $4x + 8$ $x - 8$ $8x - 4$

Problem 4 Using Words for an Expression

Got It? **What word phrase can you use to represent each algebraic expression?**

$x + 8.1$ $10x + 9$ $\frac{n}{3}$ $5x - 1$

15. Complete the word phrase for each expression.

the ? of a number x and 8.1

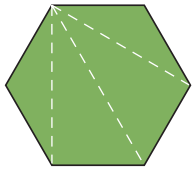
the ? of 10 ? a number x and 9

the quotient of ? and 3

1 ? the product of ?

Problem 5 Writing a Rule to Describe a Pattern

Got It? **Suppose you draw a segment from any one vertex of a regular polygon to the other vertices. A sample for a regular hexagon is shown at the right. Use the table to find a pattern. What is a rule for the number of nonoverlapping triangles formed? Give the rule in words and as an algebraic expression.**



Triangles in Polygons

Number of Sides of Polygon	Number of Triangles
4	4 − 2
5	5 − 2
6	6 − 2
n	■

16. Use the table. Find the number of nonoverlapping triangles in each figure.

a polygon with 4 sides a polygon with 5 sides

17. Underline the correct word or words to complete the sentence.

The value of the expression in the table for a 6-sided figure is / is not the same as the number of triangles in the drawing of the hexagon.

18. Give a rule in words to find the number of nonoverlapping triangles in a polygon.

_____

_____

19. Write an algebraic expression for the number of nonoverlapping triangles in a polygon that has n sides.

Lesson Check • Do you UNDERSTAND?

Reasoning **Use the table to decide whether $49n + 0.75$ or $49 + 0.75n$ represents the total cost to rent a truck that you drive n miles.**

Truck Rental Fees

Number of Miles	Cost
1	\$49 + (\$.75 × 1)
2	\$49 + (\$.75 × 2)
3	\$49 + (\$.75 × 3)
n	■

20. Write a rule in words for the pattern shown in the table.

_____

_____

21. Now write an algebraic expression to represent the total cost of renting a truck.

Math Success

Check off the vocabulary words that you understand.

☐ variable ☐ algebraic expression ☐ numerical expression

Rate how well you can *write algebraic expressions.*

Need to review 0 2 4 6 8 10 Now I get it!