

1-3

Variables and Expressions (Pages 17–21)

Aside from the operation symbols you already know, algebra uses placeholders, usually letters, called **variables**. The letter x is used very often as a variable in algebra, but variables can be any letter. An expression such as $a \div 2 + 110$ is an **algebraic expression** because it is a combination of variables, numbers, and at least one operation. You can evaluate algebraic expressions by replacing the variables with numbers and then finding the numerical value of the expression.

Substitution Property of Equality	For all numbers a and b , if $a = b$, then a may be replaced by b .	
Special Notation	$3d$ means $3 \times d$ xy means $x \times y$	$7st$ means $7 \times s \times t$ $\frac{q}{4}$ means $q \div 4$

Examples Find the value of each expression.

a. Evaluate $a + 47$ if $a = 12$.

$$\begin{aligned} a + 47 &= 12 + 47 && \text{Replace } a \text{ with } 12. \\ &= 59 \end{aligned}$$

b. Evaluate $\frac{7r}{2}$ if $r = 4$.

$$\begin{aligned} \frac{7r}{2} &= \frac{7(4)}{2} && \text{Replace } r \text{ with } 4. \\ &= \frac{28}{2} \text{ or } 14 \end{aligned}$$

Practice

Evaluate each expression if $x = 2$, $y = 7$, and $z = 4$.

- | | | |
|------------------------|----------------------|------------------------|
| 1. $x + y + z$ | 2. $(z - x) + y$ | 3. $2x - z$ |
| 4. $4y - 3z$ | 5. $4(x + y) \div z$ | 6. $4x + 2y$ |
| 7. $8 + 10 \div x + z$ | 8. $y + 2z \div 3$ | 9. $\frac{2x + 2y}{6}$ |

Translate each phrase into an algebraic expression.

- | | |
|----------------------------------|---------------------------------------|
| 10. 4 more than 2 times a number | 11. the product of x and y |
| 12. the quotient of 16 and a | 13. the sum of m and 8 divided by 2 |

14. Standardized Test Practice The carrying capacity of an environment is the number of individuals the natural ecosystem of an area is able to support. If one mouse requires 1.6 acres of land for survival, what is the carrying capacity of a 528-acre park for mice?

- A** 845 mice **B** 528 mice **C** 330 mice **D** 33 mice

Answers: 1. 13 2. 9 3. 0 4. 16 5. 9 6. 22 7. 17 8. $9\frac{3}{2}$ 9. 3 10. $4 + 2x$ 11. xy 12. $\frac{a}{16}$ 13. $\frac{m+8}{2}$ 14. C