2-5 Literal Equations and Formulas

Vocabulary

Review

Write the letter of each *formula* next to its description.

A. $C = 2\pi r$ B. $P = 2\ell + 2w$ C. $A = \frac{1}{2}bh$ D. $C = \frac{5}{9}(F - 32)$

_____ **1.** perimeter (P) of a rectangle with length (ℓ) and width (w)

_____ **2.** area (A) of a triangle with base (b) and height (h)

_____ **3.** circumference (C) of a circle with radius (r)

_____ **4.** temperature in degrees Celsius (C) given the same temperature in degrees Fahrenheit (F)

Vocabulary Builder

literal (adjective) LIT ur ul

Related Words: letter (noun), literature (noun), literary (adjective)

Definition: When something is **literal**, it uses the exact, or primary, meaning of a word or words. It is also something that uses or is expressed by letters.

Math Usage: A **literal** equation is an equation that involves two or more letters (variables).

Example: The formula in the box is a **literal** equation with three variables. You can solve for any of the three variables in terms of the other two.

Nonexample: $2x + 5 = 12$ is *not* a **literal** equation because it does *not* contain two or more variables.

These **literal** equations relate distance (d), rate (speed, r), and time (t).

$$d = r \cdot t$$

$$\frac{d}{r} = t$$

$$\frac{d}{t} = r$$

Use Your Vocabulary

Complete each statement with the appropriate word from the list.

letter literature literary literal equation

5. The word *Boston* begins with the ? *B*.

6. A novel is an example of a ? work.

7. The equation $2x + 5 = 12$ is *not* an example of a ? because it has only one variable.

8. You study classic ? in English class.

Problem 1 Rewriting a Literal Equation

Got It? **Solve the equation $4 = 2m - 5n$ for m. What are the values of m when $n = -2$, 0, and 2?**

Simplify.
Divide each side by 2.
Add $5n$ to both sides.

9. The equation is solved below. Choose a justification from the box for each step.

$4 = 2m - 5n$ Write the original equation.

$4 + 5n = 2m - 5n + 5n$

$4 + 5n = 2m$

$\frac{4 + 5n}{2} = \frac{2m}{2}$

$2 + \frac{5}{2}n = m$

10. Complete the table to find the value of m for each given value of n.

n	Substitute the value of n into the equation.	m
−2	$\square + \frac{5}{2} \cdot \square = m$ $\square = m$	$\square$
0	$\square + \frac{5}{2} \cdot \square = m$ $\square = m$	$\square$
2	$\square + \frac{5}{2} \cdot \square = m$ $\square = m$	$\square$

Problem 2 Rewriting a Literal Equation With Only Variables

Got It? **What equation do you get when you solve $-t = r + px$ for x?**

11. Use the justifications at the right to solve the equation.

$-t = r + px$	Write the original equation.
$-t - \square = r + px - \square$	Subtract the same amount from each side.
$-t - \square = px$	Simplify.
$\frac{-t - r}{\square} = \frac{px}{p}$	Divide each side by the same amount.
$-\frac{t}{p} - \frac{\square}{\square} = x$	Simplify.

Problem 3 Rewriting a Geometric Formula

Got It? **What is the height of a triangle that has an area of 24 in.^{2} and a base with a length of 8 in.?**

12. Circle the formula for the area of a triangle.

$A = \pi r^2$ $\quad A = \frac{1}{2}bh$ $\quad d = rt$ $\quad A = \ell w$

13. Circle the rewritten formula you will use to find the height of the triangle.

$\ell = \frac{P - 2w}{2}$ $\quad r = \sqrt{\frac{A}{\pi}}$ $\quad t = \frac{d}{r}$ $\quad h = \frac{2A}{b}$

14. Now find the height of a triangle with an area of 24 in.^{2} and a base of 8 in.

Problem 4 Rewriting a Formula

Got It? **Pacific gray whales migrate annually from the waters near Alaska to the waters near Baja California, Mexico, and back. The whales travel a distance of about 5000 mi each way at an average rate of 91 mi per day. About how many days does it take the whales to migrate one way?**

15. Write the formula that relates distance, rate, and time.

$\square = \square \cdot \square$

16. Circle what you are asked to find in the problem.

distance $\quad$ rate $\quad$ time

17. Complete the reasoning model below.

Think	Write
To isolate t, I divide each side of the formula by r.	$\frac{d}{\square} = \frac{rt}{\square}$
Then I simplify.	
Now I substitute 5000 for d and 91 for r.	

18. Simplify. The whales take about ____ days to migrate one way.

Lesson Check • Do you UNDERSTAND?

Compare and Contrast **How is the process of rewriting literal equations similar to the process of solving equations in one variable? How is it different?**

19. When you rewrite a literal equation, you are solving it for one of the variables. How is this process similar to solving an equation in one variable?

20. Describe one difference between rewriting a literal equation and solving an equation in one variable.

Math Success

Check off the vocabulary words that you understand.

☐ literal equation ☐ formula

Rate how well you can *rewrite literal equations.*

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