

1.4**Rewriting Equations and Formulas**

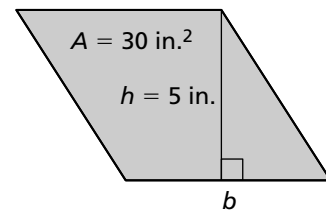
For use with Exploration 1.4

Essential Question How can you use a formula for one measurement to write a formula for a different measurement?

1 EXPLORATION: Using an Area Formula

Work with a partner.

- a. Write a formula for the area A of a parallelogram.

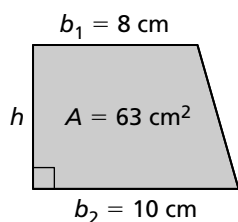


- b. Substitute the given values into the formula.
Then solve the equation for b . Justify each step.
- c. Solve the formula in part (a) for b without first substituting values into the formula. Justify each step.
- d. Compare how you solved the equations in parts (b) and (c). How are the processes similar? How are they different?

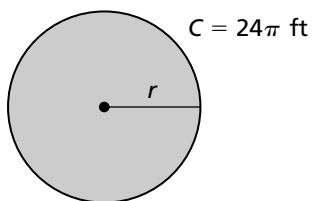
1.4 Rewriting Equations and Formulas (continued)**2 EXPLORATION:** Using Area, Circumference, and Volume Formulas

Work with a partner. Write the indicated formula for each figure. Then write a new formula by solving for the variable whose value is not given. Use the new formula to find the value of the variable.

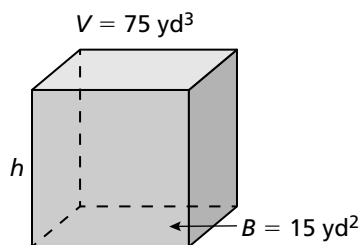
- a. Area A of a trapezoid



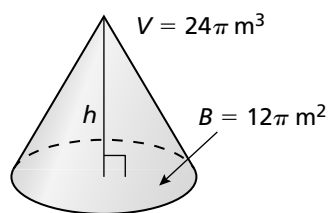
- b. Circumference C of a circle



- c. Volume V of a rectangular prism



- d. Volume V of a cone

**Communicate Your Answer**

3. How can you use a formula for one measurement to write a formula for a different measurement? Give an example that is different from those given in Explorations 1 and 2.

1.4**Practice**

For use after Lesson 1.4

Core Concepts**Common Formulas****Temperature** F = degrees Fahrenheit, C = degrees Celsius

$$C = \frac{5}{9}(F - 32)$$

Simple Interest I = interest, P = principal, r = annual interest rate (decimal form), t = time (years)

$$I = Prt$$

Distance d = distance traveled, r = rate, t = time

$$d = rt$$

Notes:**Worked-Out Examples****Example #1****Solve the literal equation for y .**

$$16x + 9 = 9y - 2x$$

$$16x + 2x + 9 = 9y - 2x + 2x$$

$$18x + 9 = 9y$$

$$\frac{18x + 9}{9} = \frac{9y}{9}$$

$$2x + 1 = y$$

The rewritten literal equation is $y = 2x + 1$.

1.4 Practice (continued)**Example #2**

REWRITING A FORMULA A common statistic used in professional football is the quarterback rating. This rating is made up of four major factors. One factor is the completion rating given by the formula

$$R = 5\left(\frac{C}{A} - 0.3\right)$$

where **C** is the number of completed passes and **A** is the number of attempted passes.
Solve the formula for **C**.

$$R = 5\left(\frac{C}{A} - 0.3\right)$$

$$\frac{R}{5} = \frac{5\left(\frac{C}{A} - 0.3\right)}{5}$$

$$\frac{R}{5} = \frac{C}{A} - 0.3$$

$$\frac{R}{5} + 0.3 = \frac{C}{A} - 0.3 + 0.3$$

$$\frac{R}{5} + 0.3 = \frac{C}{A}$$

$$A\left(\frac{R}{5} + 0.3\right) = A \cdot \frac{C}{A}$$

$$A\left(\frac{R}{5} + 0.3\right) = C$$

When you solve the formula for **C**, you obtain

$$C = A\left(\frac{R}{5} + 0.3\right).$$

Practice A

In Exercises 1–6, solve the literal equation for **y**.

1. $y - 2x = 15$

2. $4x + y = 2$

3. $5x - 2 = 8 + 5y$

4. $y + x = 11$

5. $3x - y = -4$

6. $3x + 1 = 7 - 4y$

In Exercises 7–12, solve the literal equation for **x**.

7. $y = 10x - 4x$

8. $q = 3x + 9xz$

9. $r = 4 + 7x - sx$

10. $y + 4x = 10x - 6$

11. $4g + r = 2r - 2x$

12. $3z + 8 = 12 + 3x - z$

1.4 Practice (continued)

In Exercises 13–16, solve the formula for the indicated variable.

13. Area of a triangle: $A = \frac{1}{2}bh$; Solve for b .

14. Volume of a cone: $V = \frac{1}{3}\pi r^2 h$; Solve for h .

15. Ohm's Law: $I = \frac{V}{R}$; Solve for R .

16. Ideal Gas Law: $PV = nRT$; Solve for R .

17. The amount A of money in an account after simple interest has been earned is given by the formula $A = P + Prt$ where P is the principal, r is the annual interest rate in decimal form, and t is the time in years.

a. Solve the formula for r .

b. The amount of money in an account after interest has been earned is \$1080, the principal is \$1000, and the time is 2 years. What is the annual interest rate?

c. Solve the formula for P .

Practice B

In Exercises 1–6, solve the literal equation for y .

1. $3y - 9x = 24$

2. $10 - 2y = 46$

3. $3x + 5 = 9 - 4y$

4. $-5x + 7y = 8x + 7$

5. $3 + \frac{1}{5}y = 2x + 4$

6. $10 - \frac{1}{3}y = 4 + 6x$

In Exercises 7–14, solve the literal equation for x .

7. $g = 4x + 5xy$

8. $w = 4ax - 9x$

9. $z = 6x + px + 2$

10. $t = 10 + 7x - qx$

11. $ax - bx = k$

12. $p = qx + rx + s$

13. $11 - 4x - 3jx = w$

14. $x - 8 + 3vx = y$

15. Describe and correct the error in solving the equation for x .

\times

$$\begin{aligned} k &= ax + bx + d \\ k &= x(a + b + d) \\ x &= \frac{k}{a + b + d} \end{aligned}$$

In Exercises 16–18, solve the equation for the indicated variable.

16. Simple interest: $I = prt$; Solve for r .

17. Volume of a box: $V = \ell wh$; Solve for w .

18. Heron's formula: $2S = a + b + c$; Solve for b .

19. Coulomb's Law is given by the formula

$$F = k \frac{q_1 q_2}{d^2}.$$

The force F between two charges q_1 and q_2 in a vacuum is proportional to the product of the charges, and is inversely proportional to the square of the distance d between the two charges. Solve the formula for k .

20. You deposit \$800 in an account that earns simple interest at an annual rate of 5%. How long must you leave the money in the account to earn \$100 in interest?