

Vocabulary and Core Concept Check

- VOCABULARY** Is $9r + 16 = \frac{\pi}{5}$ a literal equation? Explain.
- DIFFERENT WORDS, SAME QUESTION** Which is different? Find “both” answers.

Solve $3x + 6y = 24$ for x .

Solve $24 - 3x = 6y$ for x .

Solve $6y = 24 - 3x$ for y in terms of x .

Solve $24 - 6y = 3x$ for x in terms of y .

Monitoring Progress and Modeling with Mathematics

In Exercises 3–12, solve the literal equation for y .
(See Example 1.)

- | | |
|---------------------------------|----------------------------------|
| 3. $y - 3x = 13$ | 4. $2x + y = 7$ |
| 5. $2y - 18x = -26$ | 6. $20x + 5y = 15$ |
| 7. $9x - y = 45$ | 8. $6x - 3y = -6$ |
| 9. $4x - 5 = 7 + 4y$ | 10. $16x + 9 = 9y - 2x$ |
| 11. $2 + \frac{1}{6}y = 3x + 4$ | 12. $11 - \frac{1}{2}y = 3 + 6x$ |

In Exercises 13–22, solve the literal equation for x .
(See Example 2.)

- | | |
|-------------------------|-----------------------|
| 13. $y = 4x + 8x$ | 14. $m = 10x - x$ |
| 15. $a = 2x + 6xz$ | 16. $y = 3bx - 7x$ |
| 17. $y = 4x + rx + 6$ | 18. $z = 8 + 6x - px$ |
| 19. $sx + tx = r$ | 20. $a = bx + cx + d$ |
| 21. $12 - 5x - 4kx = y$ | 22. $x - 9 + 2wx = y$ |

23. **MODELING WITH MATHEMATICS** The total cost C (in dollars) to participate in a ski club is given by the literal equation $C = 85x + 60$, where x is the number of ski trips you take.

- Solve the equation for x .
- How many ski trips do you take if you spend a total of \$315? \$485?



24. **MODELING WITH MATHEMATICS** The penny size of a nail indicates the length of the nail. The penny size d is given by the literal equation $d = 4n - 2$, where n is the length (in inches) of the nail.



- Solve the equation for n .
- Use the equation from part (a) to find the lengths of nails with the following penny sizes: 3, 6, and 10.

ERROR ANALYSIS In Exercises 25 and 26, describe and correct the error in solving the equation for x .

25.
$$\begin{aligned} 12 - 2x &= -2(y - x) \\ -2x &= -2(y - x) - 12 \\ x &= (y - x) + 6 \end{aligned}$$

26.
$$\begin{aligned} 10 &= ax - 3b \\ 10 &= x(a - 3b) \\ \frac{10}{a - 3b} &= x \end{aligned}$$

In Exercises 27–30, solve the formula for the indicated variable. (See Examples 3 and 5.)

- Profit: $P = R - C$; Solve for C .
- Surface area of a cylinder: $S = 2\pi r^2 + 2\pi rh$; Solve for h .
- Area of a trapezoid: $A = \frac{1}{2}h(b_1 + b_2)$; Solve for b_2 .
- Average acceleration of an object: $a = \frac{v_1 - v_0}{t}$; Solve for v_1 .

31. **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 .

32. **REWRITING A FORMULA** Newton's law of gravitation is given by the formula

$$F = G\left(\frac{m_1 m_2}{d^2}\right)$$

where F is the force between two objects of masses m_1 and m_2 , G is the gravitational constant, and d is the distance between the two objects. Solve the formula for m_1 .

33. **MODELING WITH MATHEMATICS** The sale price S (in dollars) of an item is given by the formula $S = L - rL$, where L is the list price (in dollars) and r is the discount rate (in decimal form). (See Examples 4 and 6.)

- Solve the formula for r .
- The list price of the shirt is \$30. What is the discount rate?



34. **MODELING WITH MATHEMATICS** The density d of a substance is given by the formula $d = \frac{m}{V}$, where m is its mass and V is its volume.

Pyrite

Density: 5.01g/cm^3 Volume: 1.2 cm^3



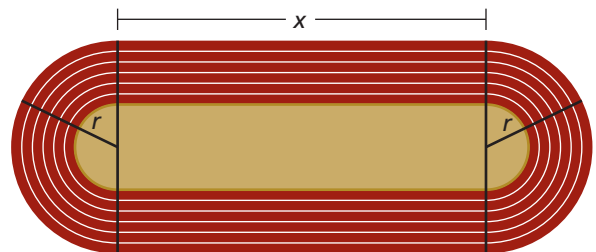
- Solve the formula for m .
- Find the mass of the pyrite sample.

35. **PROBLEM SOLVING** You deposit \$2000 in an account that earns simple interest at an annual rate of 4%. How long must you leave the money in the account to earn \$500 in interest? (See Example 7.)

36. **PROBLEM SOLVING** A flight averages 460 miles per hour. The return flight averages 500 miles per hour due to a tailwind. The total flying time is 4.8 hours. How long is each flight? Explain. (See Example 8.)

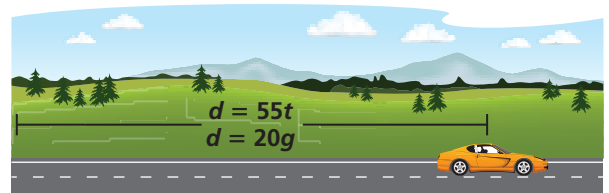


37. **USING STRUCTURE** An athletic facility is building an indoor track. The track is composed of a rectangle and two semicircles, as shown.



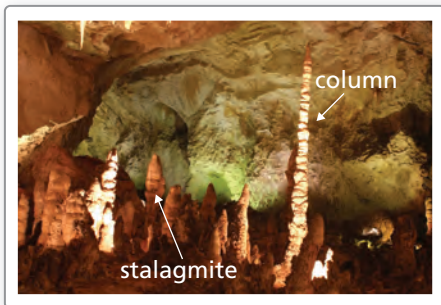
- Write a formula for the perimeter of the indoor track.
- Solve the formula for x .
- The perimeter of the track is 660 feet, and r is 50 feet. Find x . Round your answer to the nearest foot.

38. **MODELING WITH MATHEMATICS** The distance d (in miles) you travel in a car is given by the two equations shown, where t is the time (in hours) and g is the number of gallons of gasoline the car uses.



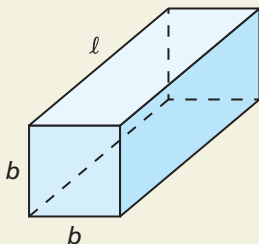
- Write an equation that relates g and t .
- Solve the equation for g .
- You travel for 6 hours. How many gallons of gasoline does the car use? How far do you travel? Explain.

39. **MODELING WITH MATHEMATICS** One type of stone formation found in Carlsbad Caverns in New Mexico is called a column. This cylindrical stone formation connects to the ceiling and the floor of a cave.



- Rewrite the formula for the circumference of a circle, so that you can easily calculate the radius of a column given its circumference.
- What is the radius (to the nearest tenth of a foot) of a column that has a circumference of 7 feet? 8 feet? 9 feet?
- Explain how you can find the area of a cross section of a column when you know its circumference.

40. **HOW DO YOU SEE IT?** The rectangular prism shown has bases with equal side lengths.

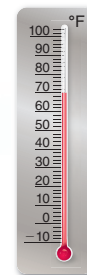


- Use the figure to write a formula for the surface area S of the rectangular prism.
- Your teacher asks you to rewrite the formula by solving for one of the side lengths, b or l . Which side length would you choose? Explain your reasoning.

41. **MAKING AN ARGUMENT** Your friend claims that Thermometer A displays a greater temperature than Thermometer B. Is your friend correct? Explain your reasoning.

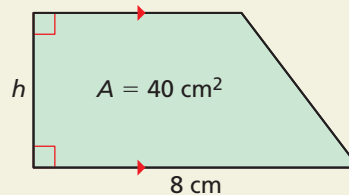


Thermometer A



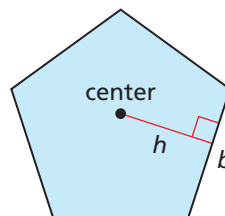
Thermometer B

42. **THOUGHT PROVOKING** Give a possible value for h . Justify your answer. Draw and label the figure using your chosen value of h .

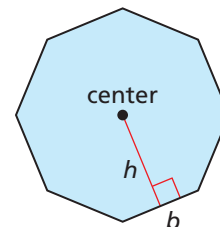


- MATHEMATICAL CONNECTIONS** In Exercises 43 and 44, write a formula for the area of the regular polygon. Solve the formula for the height h .

43.



44.



- REASONING** In Exercises 45 and 46, solve the literal equation for a .

45. $x = \frac{a + b + c}{ab}$

46. $y = x\left(\frac{ab}{a - b}\right)$

Maintaining Mathematical Proficiency

Reviewing what you learned in previous grades and lessons

Evaluate the expression. (*Skills Review Handbook*)

47. $15 - 5 + 5^2$

48. $18 \cdot 2 - 4^2 \div 8$

49. $3^3 + 12 \div 3 \cdot 5$

50. $2^5(5 - 6) + 9 \div 3$

Solve the equation. Graph the solutions, if possible. (*Section 1.4*)

51. $|x - 3| + 4 = 9$

52. $|3y - 12| - 7 = 2$

53. $2|2r + 4| = -16$

54. $-4|s + 9| = -24$