

3.2 Introduction to Problem Solving

Solving a Formula for a Variable Steps for Solving a Problem Percentages
--

Solving a Formula for a Variable*Exercises 1-4: Solve the problem.*

1. A rectangle has a perimeter of 54 inches and a width of 8 inches.

(a) Write a formula to find the length L of a rectangle with known perimeter and width W . **1. (a)** _____

(b) Use the formula to find L . **(b)** _____

2. The perimeter P of a triangle with sides a , b , and c is
 $P = a + b + c$.

(a) Solve this formula for c . **2. (a)** _____

(b) Find c if $a = 6$, $b = 9$, and $P = 20$. **(b)** _____

3. The formula $C = \frac{5}{9}(F - 32)$ is used to convert degrees Fahrenheit to degrees Celsius. Use this formula to convert $32^\circ F$ to an equivalent Celsius temperature. 3. _____

4. The formula $F = \frac{9}{5}C + 32$ is used to convert degrees Celsius to degrees Fahrenheit. Use this formula to convert $30^\circ C$ to an equivalent Fahrenheit temperature. 4. _____

Exercises 5-7: Solve the equation for the given variable.

5. $2(x - 3y) = 5x$; x 5. _____

6. $S = 2\pi rh$; h 6. _____

7. $A = \frac{1}{2}(a + b)h$; a 7. _____

Exercises 8-10: Solve the equation for y and write a formula for a function f defined by $y = f(x)$.

8. $3(2x - y) = 5x + 1$

8. _____

9. $\frac{x - y}{3} - 2 = 4$

9. _____

10. $\frac{x}{3} = \frac{y - 4}{2}$

10. _____

Steps for Solving a Problem

Exercises 11-16: Do the following.

(a) Translate the sentence into an equation, using the variable x .

(b) Solve the resulting equation.

11. The difference between a number and 5 is 14.

11. (a) _____

(b) _____

12. Three times a number, minus 1, equals the number plus 11.

12. (a) _____

(b) _____

13. If a number is decreased by 3 and then divided by 5, the result equals -2 . 13. (a) _____
(b) _____

14. The sum of three consecutive integers is 57. Find the three integers. 14. (a) _____
(b) _____

15. The sum of three consecutive even integers is 96. Find the three integers. 15. (a) _____
(b) _____

16. Three times the sum of three consecutive integers is 63. Find the three integers. 16. (a) _____
(b) _____

Exercises 17-20: Solve the problem.

17. The width of a rectangular pen is 20 feet less than its length. If the perimeter of the pen is 168 feet, find the width and length of the pen. 17. _____

- 18.** For air travel, passengers may check boxes that are no larger than 62 linear inches (total length + width + height). Emma finds that her box fits the specifications exactly. The length of the box is three times the height. The width is 4 inches less than twice the height. Find the dimensions of the box.

18. _____

- 19.** A runner completes a half-marathon of 13.1 miles in 1.7 hours. She runs 7.5 miles per hour for the first part and then increases her speed to 8 miles per hour. How long did she run at each speed?

19. _____

- 20.** Two cars begin from a common location and travel in opposite directions. One and a half hours later, they are 204 miles apart. If one car is traveling 8 miles per hour faster than the other car, find the speed of each car.

20. _____

- 21.** In still water, a certain boat has a speed of 20 mph. The boat travels downstream, with the current, completing the trip in 1 hour. The boat then returns upstream, against the current, in 1.5 hours. Find the speed of the current.

21. _____

22. Sara mixes three kinds of nuts to make a Super Bowl snack. Cashews cost \$8.85 per pound, almonds cost \$7.95 per pound, and peanuts cost \$3.95 per pound. Sara uses equal amounts of cashews and almonds and three times as many peanuts as cashews. Find the amount of each type of nut if Sara makes a 10-pound mixture costing \$5.73 per pound. **22.** _____

23. The sum of the degree measures of the angles in a triangle equals 180° . The measure of the largest angle is 50° more than the measure of the smallest angle. The measure of the third angle is 10° less than the measure of the largest angle. Find the measure of each angle. **23.** _____

24. A student drives a 1991 Chevy Blazer and has annual fuel costs of \$1750. If it is assumed that gasoline costs \$2.80 per gallon and that the student drives 10,000 miles per year, estimate the average mileage for this vehicle. **24.** _____
25. To receive an A in a Spanish course, Rebecca Whitney must average 90 percent correct on five exams worth 100 points each. She scores 87, 92, 85, and 90 on the first four exams. What is the minimum score Rebecca must receive on the final exam to receive an A? **25.** _____

Percentages

26. A lab assistant mixes 2 liters of 20% hydrochloric acid with a sample of 75% hydrochloric acid to obtain a sample of 50% hydrochloric acid. How much of the 75% sample was used? 26. _____
27. A college student takes out two unsubsidized loans totaling \$3000. One loan has an annual interest rate of 6% and the other has an annual interest rate of 7.5%. Interest after one year is \$187.50. Determine the amount of each loan. 27. _____

28. Ron Cartier invested a total of \$8000 in two accounts. One account earned 8% interest and the other earned 12% interest. The investments yielded \$832 in interest. How much was invested in each account? 28. _____

29. In 2006, housing sales in a small community were \$2.4 million. This was an increase of 60% over housing sales in 1995. Determine housing sales in 1995. 29. _____
30. In 2007, an average 5-day Caribbean cruise cost \$499, a 33.4% decrease from 2002. Find the average cost of a Caribbean cruise in 2002. Round to the nearest dollar. 30. _____