

Problem Solving

Example 1
(page 103)

- The length of a rectangle is 3 in. more than its width. The perimeter of the rectangle is 30 in.
 - Define a variable for the width.
 - Write an expression for the length in terms of the width.
 - Write an equation to find the width of the rectangle. Solve your equation.
 - What is the length of the rectangle?
- The length of a rectangle is 8 in. more than its width. The perimeter of the rectangle is 24 in. What are the width and length of the rectangle?
- The width of a rectangle is one half its length. The perimeter of the rectangle is 54 cm. What are the width and length of the rectangle?
- The length of a rectangular garden is 3 yd more than twice its width. The perimeter of the garden is 36 yd. What are the width and length of the garden?

Example 2
(page 104)

- The sum of the two consecutive integers is -35 . If n = the first integer, which equation best models the situation?

A. $n(n + 1) = -35$	B. $n + 2n = -35$
C. $n + (n + 1) = -35$	D. $n + (2n + 1) = -35$
- The sum of two consecutive *even* integers is 118.
 - Define a variable for the smaller integer.
 - What must you add to an even integer to get the next greater even integer?
 - Write an expression for the second integer.
 - Write and solve an equation to find the two even integers.
- The sum of two consecutive *odd* integers is 56.
 - Define a variable for the smaller integer.
 - What must you add to an odd integer to get the next greater odd integer?
 - Write an expression for the second integer.
 - Write and solve an equation to find the two odd integers.
- The sum of three consecutive integers is 915. What are the integers?
- The sum of two consecutive *even* integers is -298 . What are the integers?

up with the moving van.

11. Air Travel A jet leaves the Charlotte, North Carolina, airport traveling at an average rate of 564 km/h. Another jet leaves the airport one half hour later traveling at 744 km/h in the same direction. How long will the second jet take to overtake the first?

4 **12.** Juan drives to work. Because of traffic conditions, he averages 22 miles per hour. He returns home averaging 32 miles per hour. The total travel time is $2\frac{1}{4}$ hours.

- a.** Define a variable for the time Juan takes to travel to work. Write an expression for the time Juan takes to return home.
b. Write and solve an equation to find the time Juan spends driving to work.

13. Air Travel An airplane flies from New Orleans, Louisiana, to Atlanta, Georgia, at an average rate of 320 miles per hour. The airplane then returns at an average rate of 280 miles per hour. The total travel time is 3 hours.

- a.** Define a variable for the flying time from New Orleans to Atlanta. Write an expression for the travel time from Atlanta to New Orleans.
b. Write and solve an equation to find the flying time from New Orleans to Atlanta.

5 **14.** John and William leave their home traveling in opposite directions on a straight road. John drives 20 miles per hour faster than William. After 4 hours they are 250 miles apart.

- a.** Define a variable for John's rate. Write an expression for William's rate.
b. Write and solve an equation to find John's rate. Then find William's rate.

15. Two bicyclists ride in opposite directions. The speed of the first bicyclist is 5 miles per hour faster than the second. After 2 hours they are 70 miles apart. Find their rates.

16 a. Which of the following numbers is not the sum of three consecutive integers?

I. 51

II. 61

III. 72

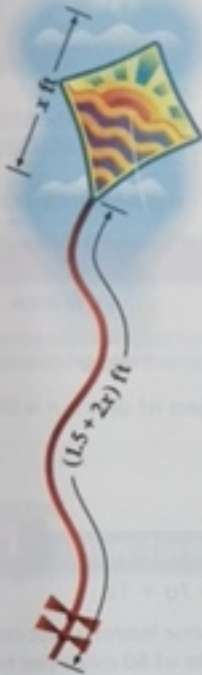
IV. 81

b. Critical Thinking What common trait do the other numbers share?

17. Geometry The length of a rectangle is 8 cm more than twice the width. The perimeter of the rectangle is 34 cm. What is the length of the rectangle?

18. The sum of four consecutive *even* integers is 308. Write and solve an equation to find the four integers.

19. The sum of three consecutive *odd* integers is -87 . What are the integers?

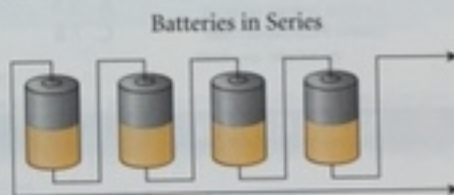


20. The tail of a kite is 1.5 ft plus twice the length of the kite. Together, the kite and tail are 15 ft 6 in. long.
- Write an expression for the length of the kite and tail together.
 - Write 15 ft 6 in. in terms of feet.
 - Write and solve an equation to find the length of the tail.

21. **Travel** A bus traveling at an average rate of 30 miles per hour left the city at 11:45 A.M. A car following the bus at 45 miles per hour left the city at noon. At what time did the car catch up with the bus?
22. Ellen and Kate raced on their bicycles to the library after school. They both left school at 3:00 P.M. and bicycled along the same path. Ellen rode at a speed of 12 miles per hour and Kate rode at 9 miles per hour. Ellen got to the library 15 minutes before Kate.
- How long did it take Ellen to get to the library?
 - At what time did Ellen get to the library?
23. At 1:30 P.M., Tom leaves in his boat from a dock and heads south. He travels at a rate of 25 miles per hour. Ten minutes later, Mary leaves the same dock in her speedboat and heads after Tom. If she travels at a rate of 30 miles per hour, when will she catch up with Tom?

24. **Air Travel** Two airplanes depart from an airport traveling in opposite directions. The second airplane is 200 miles per hour faster than the first. After 2 hours they are 1100 miles apart. Find the speeds of the airplanes.
25. Three friends were born in consecutive years. The sum of their birth years is 5961. Find the year in which each person was born.
26. Two boats leave a ramp traveling in opposite directions. The second boat is 10 miles per hour faster than the first. After 3 hours they are 150 miles apart. Find the speeds of the boats.
27. **Travel** A truck traveling 45 miles per hour and a train traveling 60 miles per hour cover the same distance. The truck travels 2 hours longer than the train. How many hours does each travel?

28. **Electricity** A group of ten 6- and 12-volt batteries are wired in series as shown at the right. The sum of their voltages is 84 volts. How many of each type of battery are used?



29. **Writing** Describe the steps you would use to solve consecutive integer problems.
30. **Open-Ended** Write a word problem that could be solved using the equation $35(t - 1) = 20t$.
31. **a.** Write and solve an equation to find three consecutive integers with a sum of 126. Let n = the first integer.
- b. Critical Thinking** In part (a), could you solve the problem by letting n = the middle integer, $n - 1$ = the smallest integer, and $n + 1$ = the largest integer?
- C Challenge** 32. **Geometry** A triangle has a perimeter of 165 cm. The first side is 65 cm less than twice the second side. The third side is 10 cm less than the second side. Write and solve an equation to find the length of each side of the triangle.