2.6 Exercises

Concept Check

Fill-in-the-Blank. Complete each sentence using information found in this section.

1. Integers are _____ if each is 1 more than the previous integer.
2. Three consecutive integers can be represented as n, _____, and _____.
3. Three consecutive even integers can be represented as n, _____, and _____.
4. The whole numbers and their opposites form the set of _____.
5. Even integers are integers that are divisible by ___.
6. Odd integers are integers that are not _____.

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

7. If an odd integer is divided by 2, the remainder will be 1.
8. To find 3 consecutive odd integers, you could use n, $n + 1$, and $n + 3$.
9. Odd integers are integers that are divisible by 1.
10. Even integers are consecutive if each is 2 more than the previous even integer.

Practice

For each statement, define a variable to represent the unknown quantity. (Be sure that your variable definition includes what quantity is being measured and the units used to measure it.) Then, write an expression, equation, or inequality to represent it.

1. Three-fifths of the savings account balance
2. The radius of the circle increased by 6 centimeters
3. Four times the length of a side of the square is 20 feet.
4. Fifteen percent of your annual salary is 3000 dollars.

Read each problem carefully, translate the various phrases into algebraic expressions, set up an equation, and solve the equation. See Examples 1 through 5.

5. Five less than a number is equal to 13 decreased by the number. Find the number.
6. Three less than twice a number is equal to the number. What is the number?
7. Thirty-six is 4 more than twice a certain number. Find the number.
8. Fifteen decreased by twice a number is 27. Find the number.
9. Seven times a certain number is equal to the sum of twice the number and 35. What is the number?

10. The difference between twice a number and 3 is equal to 6 decreased by the number. Find the number.

11. Fourteen more than 3 times a number is equal to 6 decreased by the number. Find the number.

12. Two added to the quotient of a number and 7 is equal to –3. What is the number?

13. The quotient of twice a number and 5 is equal to the number increased by 6. What is the number?

14. Three times the sum of a number and 4 is equal to –9. Find the number.

15. Four times the difference between a number and 5 is equal to the number increased by 4. What is the number?

16. When 17 is added to 6 times a number, the result is equal to 1 plus twice the number. What is the number?

17. If the sum of twice a number and 5 is divided by 11, the result is equal to the difference between 4 and the number. Find the number.

18. If the difference between a number and 21 is divided by 2, the result is 4 times the number. What is the number?

19. Twice a number increased by 3 times the number is equal to 4 times the sum of the number and 3. Find the number.

20. Twice the difference between a number and 10 is equal to 6 times the number plus 16. What is the number?

21. The sum of two consecutive odd integers is 60. What are the integers?

22. The sum of two consecutive even integers is 78. What are the integers?

23. Find three consecutive integers whose sum is 69.

24. Find three consecutive integers whose sum is 93.

25. The sum of four consecutive integers is 74. What are the integers?

26. Find four consecutive integers whose sum is 90.

27. 171 minus the first of three consecutive integers is equal to the sum of the second and third. What are the integers?

28. If the first of three consecutive integers is subtracted from 120, the result is the sum of the second and third. What are the integers?

29. Four consecutive integers are such that if 3 times the first is subtracted from 208, the result is 50 less than the sum of the other three. What are the integers?

30. Find two consecutive integers such that twice the first plus three times the second equals 83.

31. Find three consecutive even integers such that the first plus twice the second is 54 less than four times the third.

32. Find three consecutive odd integers such that 4 times the first is 44 more than the sum of the second and third.

33. Find three consecutive even integers such that if the first is subtracted from the sum of the second and third, the result is 66.

34. Find three consecutive even integers such that their sum is 168 more than the second.

35. Find three consecutive odd integers such that the sum of twice the first and three times the second is 7 more than twice the third.

36. Find three consecutive even integers such that the sum of three times the first and twice the third is twenty less than six times the second.

Applications

Solve.

37. An art show charges $12.50 for admission and sells 4-inch by 6-inch postcards of works by the featured artists for $2.75 each. Brooke attends the art show and spends a total of $37.25 on admission and postcards. The situation can be modeled by $\$37.25 = \$12.50 + \$2.75p$.

a. The unknown value is represented by the variable p in the equation. What is the unknown value in this situation?

b. Solve the equation for the variable.

c. What does the answer to part b. mean? Write a complete sentence.

38. Robin is in charge of purchasing desserts for a dinner party that her nonprofit organization is throwing. She decides to buy a cake and several specialty cupcakes from Barbara's Bombtastic Bakery. She needs to buy one 8-inch round cake, which costs $19.50. She has $45 to spend and will spend the leftover amount on cupcakes, which are $8.50 for a box of 4. How many boxes of cupcakes can Robin purchase?

a. What is the unknown value in this problem? Let the variable c represent this unknown value.

b. Write an equation to represent this situation.

c. Solve the equation for the variable.

d. What does the answer to part c. mean? Write a complete sentence.

39. For his Superbowl party, John bought 3 large pizzas: a pepperoni, a sausage and mushroom, and a Hawaiian pizza with ham and pineapple. Each pizza was cut into the same number of slices. After the party was over, there was $\frac{1}{4}$ of the pepperoni pizza left, $\frac{1}{2}$ of the sausage and mushroom pizza left, and $\frac{3}{8}$ of the Hawaiian pizza left. There were a total of 9 pieces of pizza leftover. How many slices was each pizza cut into?

a. What is the unknown value in this problem? Let the variable p represent this unknown value.

b. Write an equation to represent this situation.

c. Solve the equation for the variable.

d. What does the answer to part c. mean? Write a complete sentence.

40. A mathematics student bought a calculator and a textbook for a course in statistics. If the textbook costs $67.51 more than the calculator, and the total cost for both was $329.49, what was the cost of each item?

41. The total cost of a computer flash drive and an all-in-one printer was $96.94, including tax. If the cost of the flash drive was $58.96 less than the printer, what was the cost of each item?

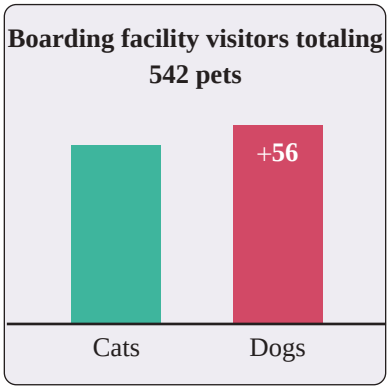
42. A real estate agent says that the current value of a 25-year old home is $90,000 more than twice its value when it was new. If the current value is $310,000, what was the value of the home when it was new?

43. On average, the number of electric guitars sold in Texas each year is 91,399, which is seven times the average number of guitars sold each year in Wyoming. How many electric guitars, on average, are sold each year in Wyoming?

44. A classic car is now selling for $1500 more than three times its original price. If the selling price is now $12,000, what was the car's original price?

45. On August 24, the Fernandez family received 19 pieces of mail, consisting of magazines, bills, letters, and ads. If they received the same number of magazines as letters, three more bills than letters, and five more ads than bills, how many magazines did they receive?

46. A pet boarding facility cared for a total of 542 dogs and cats in a given year. If the facility cared for 56 more dogs than cats, how many cats did the facility care for that year?



47. Lucinda bought two buckets of golf balls for the driving range. She gave the pro-shop clerk a 50-dollar bill and received $10.50 in change. What was the cost of one bucket of golf balls? (Tax was included.)

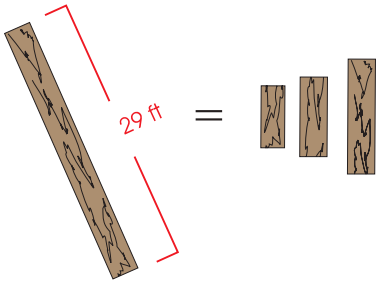
48. A guitar manufacturer spent $158 million on the production of acoustic and electric guitars last year. If the amount the company spent producing acoustic guitars was $68 million more than it spent on producing electric guitars, how much did the company spend producing electric guitars?

49. The cost to rent a ballroom at a convention center for one day is $800 for the first 2 hours. Every additional hour that the ballroom is in use costs an additional $50 per hour, which is used to cover security fees. If you owe $1450 for a one-day rental of the ballroom, how many hours did you use the ballroom?

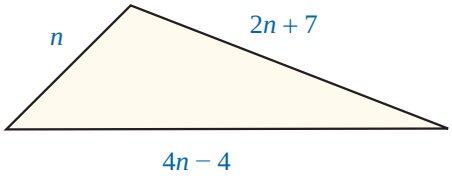
50. The cost to rent a party room at an arcade is a fixed price per hour plus $15 per child. If a 3-hour room rental with 20 children costs $330, what is the fixed price per hour for the room rental?

51. A-to-Z Truck Rentals charges $19.99 per day plus 65¢ per mile driven to rent a pick-up truck. For a one day trip, Louis paid a rental fee of $127.24. How many miles did he drive?

52. A 29-foot board is cut into three pieces at a sawmill. The second piece is 2 feet longer than the first and the third piece is 4 feet longer than the second. What are the lengths of the three pieces?

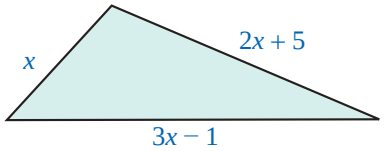


53. The three sides of a triangle are n, $4n-4$, $2n+7$ (as shown in the figure). If the perimeter of the triangle is 59 cm, what is the length of each side? (**Reminder:** The perimeter of a triangle is the sum of the lengths of the sides.)



54. Joe Johnson decided to buy a lot and build a house on the lot. He knew that the cost of constructing the house was going to be $50,000 less than the cost of the lot. He told a friend that the total cost was going to be $500,000. As a test to see if his friend remembered the algebra they had together in school, he challenged his friend to calculate what he paid for the lot and what he was going to pay for the house. What was the cost of the lot and the cost of the house?

55. The three sides of a triangle are x, $3x-1$, and $2x+5$ (as shown in the figure). If the perimeter of the triangle is 64 inches, what is the length of each side?



Write a word problem which leads to each equation. Be sure to include a description of the situation and a question which would be answered by solving the equation Make up your own word problem that might use the given equation in its solution. Be creative! Then solve the equation and check to see that the answer is reasonable.

56. $5x - x = 8$

57. $2x + 3 = 9$

58. $n + (n+1) = 33$

59. $n + (n+4) = 3(n+2)$

60. $3(n+1) = n + 53$

61. $2(n+2) - 6 = n + 4 - n$

Writing & Thinking

62. **a.** How would you represent four consecutive odd integers?

b. How would you represent four consecutive even integers?

c. Are these representations the same? Explain.