The system of linear equations is as follows.

$$\begin{cases} 3x+2y=10.30 & \text{Three hot dogs and two orders of french fries cost \$10.30.} \\ 4x+4y=15.60 & \text{Four hot dogs and four orders of french fries cost \$15.60.} \end{cases}$$

Both equations are in standard form. Use the addition method to solve the system.

$$\begin{cases} [-2]\,(3x+2y=10.30) \longrightarrow -6x-4y=-20.60 \\ \quad (4x+4y=15.60) \longrightarrow \underline{\;\;4x+4y=\;\;15.60\;\;} \end{cases}$$

$$\begin{aligned} -2x &= -5.00 \\ x &= 2.50 \end{aligned}$$ Cost of one hot dog

Back substitute $x = 2.50$ into one of the original equations.

$$\begin{aligned} 3(2.50)+2y &= 10.30 \\ 7.50+2y &= 10.30 \\ 2y &= 2.80 \\ y &= 1.40 \end{aligned}$$ Cost of one order of fries

One hot dog costs \$2.50 and one order of french fries costs \$1.40.

Now work margin exercise 6.

Margin Exercise Answers

1. The wind speed was 0.5 miles per hour and Bob was running 4.5 miles per hour.
2. 12:00 p.m. **3.** 93 and 57 **4.** 12 dimes and 4 nickels **5.** Enrique is 13 and Maria is 4.
6. A soda costs \$1.25 and a water bottle costs \$0.80

6.4 Exercises

Practice

Solve each problem by setting up a system of two equations in two unknowns and solve. See Examples 1 through 6.

1. The sum of two numbers is 56. Their difference is 10. Find the numbers.

2. The sum of two numbers is 40. The sum of twice the larger and 4 times the smaller is 108. Find the numbers.

3. The sum of two numbers is 36. Three times the smaller plus twice the larger is 87. Find the two numbers.

4. The sum of two integers is 102, and the larger number is 10 more than three times the smaller. Find the two integers.

5. The difference between two integers is 13, and their sum is 87. What are the two integers?

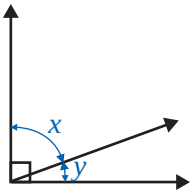
6. The difference between two numbers is 17. Four times the smaller is equal to 7 more than the larger. What are the numbers?

Applications

Solve

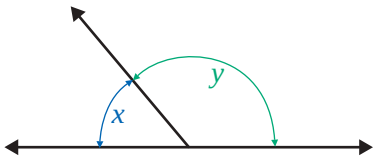
7. Two angles are supplementary if the sum of their measures is 180°. Find two supplementary angles such that the smaller is 30° more than one half of the larger.

8. Two angles are complementary if the sum of their measures is 90°. Find two complementary angles such that one is 15° less than six times the other.



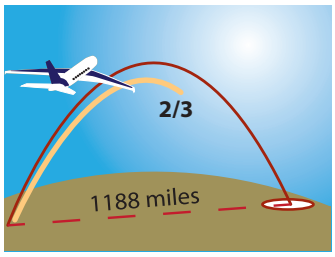
9. The sum of the measures of the three angles of a triangle is 180°. In an isosceles triangle, two of the angles have the same measure. What are the measures of the angles of an isosceles triangle in which one angle measures 15° more than each of the other two equal angles?

10. The sum of the measures of the three angles of a triangle is 180°. In an isosceles triangle, two of the angles have the same measure. What are the measures of the angles of an isosceles triangle in which each of the two equal angles measures 15° more than the third angle?



11. Liam makes a 4-mile motorboat trip downstream in 20 minutes $\left(\frac{1}{3}\text{ hr}\right)$. The return trip takes 30 minutes $\left(\frac{1}{2}\text{ hr}\right)$. Find the rate of the boat in still water and the rate of the current.

12. Mr. McKelvey finds that he can travel 1188 miles in 6 hours when flying with the wind. However, when flying against the wind, he travels only $\frac{2}{3}$ of the distance in the same amount of time. Find the speed of the plane in still air and the wind speed.



13. Usain Bolt, the world-record holder in the 100 meter dash, ran 100 meters in 9.69 seconds with no wind. He later ran the same distance in 9.58 seconds with the wind. What was his speed and what was the wind speed?

14. Jessica drove her speedboat upriver this morning. It took her 1 hour going upriver and 54 minutes going down river. If she traveled 36 miles each way, what would have been the rate of the boat in still water and what was the rate of the current (in miles per hour)?

15. Dominic went on a 190-mile business trip. He averaged 52 mph for the first part of the trip and 56 mph for the second part. If the total trip took $3\frac{1}{2}$ hours, how long did he travel at each rate?

16. Marian drove to a resort 335 miles from her home. She averaged 60 mph for the first part of her trip and 55 mph for the second part. If her total driving time was $5\frac{3}{4}$ hours, how long did she travel at each rate?

17. Marcos lives 364 miles away from his cousin Cana. They start driving at the same time and travel toward each other. Cana's speed is 11 mph faster than Marcos' speed. If they meet in 4 hrs, find their speeds.

18. Naomi and Linda live 324 miles apart. They start at the same time and travel toward each other. Naomi's speed is 8 mph greater than Linda's. If they meet in 3 hours, find their speeds.

19. Steve travels 4 times as fast as Tim. Starting at the same point, but traveling in opposite directions, they are 105 miles apart after 3 hours. Find their rates of travel.

20. Bella travels 5 mph less than twice as fast as June. Starting at the same point and traveling in the same direction, they are 80 miles apart after 4 hours. Find their speeds.

21. Two trains leave Dallas at the same time. One train travels east and the other travels west. The speed of the westbound train is 5 mph greater than the speed of the eastbound train. After 6 hours, they are 510 miles apart. Find the rate of each train. Assume the trains travel in a straight line in opposite directions.

22. A boat left Dana Point Marina at 11:00 a.m. traveling at 10 knots (nautical miles per hour). Two hours later, a Coast Guard boat left the same marina traveling at 14 knots trying to catch the first boat. If both boats traveled the same course, at what time did the Coast Guard captain anticipate overtaking the first boat?

23. A jogger runs into the countryside at a rate of 10 mph. He returns along the same route at 6 mph. If the total trip took 1 hour 36 minutes, how far did he jog?

24. A cyclist traveled to her destination at an average rate of 15 mph. By traveling 3 mph faster, she took 30 minutes less to return. What distance did she travel each way?

25. Sonja has some nickels and dimes. If she has 30 coins worth a total of $2.00, how many of each type of coin does she have?

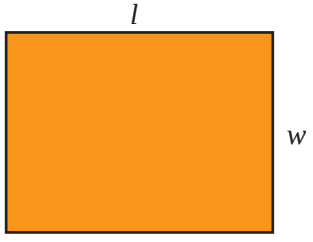
26. Conner has a total of 27 coins consisting of quarters and dimes. The total value of the coins is $5.40. How many of each type of coin does he have?

27. A bag contains pennies and nickels only. If there are 182 coins in all and their value is $3.90, how many pennies and how many nickels are in the bag?

28. Your friend challenges you to figure out how many dimes and quarters are in a cash register. He tells you that there are 65 coins and that their value is $11.90. How many dimes and how many quarters are in the register?

29. The entry fee for a county carnival was $3.50 for adults and $2.50 for children. If the income for one day was $9950 and the attendance was 3500 people, how many adults and how many children attended the carnival that day?

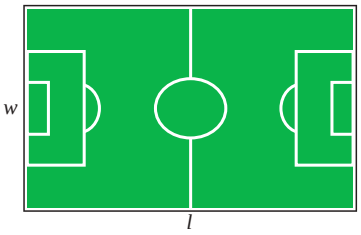
30. The width of a rectangle is $\frac{3}{4}$ of its length. If the perimeter of the rectangle is 140 feet, what are the dimensions of the rectangle?



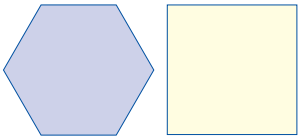
31. The length of a rectangle is 10 meters more than one half of the width. If the perimeter is 44 meters, what are the length and width?

32. A farmer has 260 meters of fencing to build a rectangular corral. He wants the length to be 3 times as long as the width. What dimensions should he make his corral?

33. At present, the length of a rectangular soccer field is 55 yards longer than the width. The city wants to rearrange the area containing the soccer field into two square playing fields. A math teacher on the council told them that if the width of the current field were to be increased by 5 yards and the length cut in half, the resulting field would be a square. What are the dimensions of the field currently?



34. Consider a square and a regular hexagon (a six-sided figure with sides of equal length). One side of the square is 5 feet longer than a side of the hexagon, and the two figures have the same perimeter. What are the lengths of the sides of each figure?



35. The length of a rectangle is 1 meter less than twice the width. If each side is increased by 4 meters, the perimeter will be 116 meters. Find the length and the width of the original rectangle.

36. Ava is 8 years older than her brother Curt. Four years from now, Ava will be twice as old as Curt. How old is each at the present time?

37. When they got married, Elvis Presley was 11 years older than his wife Priscilla. One year later, Priscilla was two-thirds of Elvis' age. How old was each of them when they got married?

38. A Christmas charity party sold tickets for $45.00 for adults and $25.00 for children. The total number of tickets sold was 320 and the total for the ticket sales was $13,000. How many adult and how many children's tickets were sold?

39. Joan went to a book sale on campus and bought paperback books for $0.25 each and hardback books for $1.75 each. If she bought a total of 15 books for $11.25, how many of each type of book did she buy?

40. Morton took some backup batteries and aluminum cans to the recycling center. Their total weight was 180 pounds. He received 1.5¢ per pound for the batteries and 30¢ per pound for the cans. The total received was $14.10. How many pounds of each did Morton have?

41. Admission to a high-school baseball game is $2.00 for general admission and $3.50 for reserved seats. The receipts for the season were $36,250 for 12,500 paid admissions. How many of each ticket, general and reserved, were sold?

42. Seventy children and 160 adults attended a play. The total receipts were $620. One adult ticket and 2 children's tickets cost $7. Find the price of each type of ticket.

43. Last summer, Ernie sold surfboards. One style sold for $625 and the other sold for $550. He sold a total of 47 surfboards. How many of each style did he sell if the sales from each style were equal?

44. The Candy Shack sells a particular candy in two different size packages. One size sells for $1.25 and the other sells for $1.75. If the store received $65.50 for 42 packages of candy, how many of each size were sold?

45. The pro shop at the Divots Country Club ordered two brands of golf balls. Titleless balls cost $1.80 each and the Done Lob balls cost $1.50 each. The total cost of Titleless balls exceeded the total cost of the Done Lob balls by $108. If equal numbers of each brand were ordered, how many dozen of each brand were ordered?

46. Sellit Realty Company gets a 6% fee for selling improved properties and 10% for selling unimproved land. Last week, the total sales were $220,000 and their total fees were $16,400. What were the sales from each of the two types of properties?

47. A men's clothing store sells two styles of sports jackets, one selling for $95 and one selling for $120. Last month, the store sold 40 jackets, with receipts totaling $4250. How many of each style did the store sell?

48. Frank bought 2 shirts and 1 pair of dress pants for a total of $55. If he had bought 1 shirt and 2 pairs of dress pants, he would have paid $68. What was the price of each shirt and each pair of dress pants?

49. At McDonalds, 3 Big Macs and 5 orders of medium French fries cost $21.53. Six Big Macs and 2 orders of medium French fries cost $28.34. What is the price of a Big Mac? What is the price of one order of medium French fries?

50. A bakery sells burnt and broken cookies for a discounted price. Burnt cookies are $0.49 and broken cookies are $0.70. If Spencer spends $49.70 to buy 80 cookies for a game night with his friends, how many of each type of cookie did Spencer buy?

51. A small manufacturer produces two kinds of radios, model *X* and model *Y*. Model *X* takes 4 hours to produce and costs $8 each to make. Model *Y* takes 3 hours to produce and costs $7 each to make. If the manufacturer decides to allot a total of 58 hours and $126 each week, how many of each model will be produced?

52. A furniture shop makes dining room chairs. Employees can build two styles of chairs. Style I takes 1 day and the materials cost $60. Style II takes $1\frac{1}{2}$ days but the materials only costs $30. If, during the last two months, they spent 36 days and $1200 building chairs, how many chairs of each style did they build?

53. A petting zoo charges \$5 for children and \$10 for adults. On Tuesday, the petting zoo made \$1400 from ticket sales and sold a total of 200 tickets. How many adults and how many children visited the petting zoo on Tuesday?

a. Write two equations to describe the situation. Use the variable c to represent the number of children and the variable a to represent the number of adults.

b. Solve the system of linear equations.

c. Use the solution from part b. to write a complete sentence to answer the question from the problem.

54. A boat tour travels 4 miles downstream in 20 minutes and the return trip upstream takes 30 minutes. Find the rate of the boat and the rate of the current.

a. Change each time from minutes to hours. Write each time value as a fraction.

b. Use a table to set up a system of linear equations. Use the variable b to represent the rate of the boat and the variable c to represent the rate of the current.

c. Solve the system of linear equations.

d. Use the solution from part c. to write a complete sentence to answer the question from the problem.

Writing & Thinking

55. A two digit number can be written as ab, where a and b are the digits. We do not mean that the digits are multiplied, but the value of the number is $10a + b$. For example, the two digit number 34 has a value of $10 \cdot 3 + 4$. Set up and solve a system of equations for the following problem.
The sum of the digits of a two digit number is 13. If the digits are reversed, then the value of the number is increased by 45. What is the number?