CHAPTER 6 Simultaneous Linear Equations

Solve the following simultaneous equations for x and y.

1. $5x - 4y = 40$
$x + 4y = -16$

2. $6x + 7y = 10$
$4x - 3y = -1$

3. $x - 6y = 17$
$5x + 3y = 2\frac{1}{2}$

4. $3x + 2y = 0$
$x - y = 2.5$

5. $x = 3y - 2$
$9y = 4x - 7$

6. $2y + 3x = 0$
$2x - 26 = 3y$

7. $3x - 4y = -6$
$2x - \frac{4}{3}y = 4$

8. $13 + 2y = 9x$
$3y = 7x$

9. $8x + 3y = -4$
$\frac{1}{2}x - y = -5$

10. $7(x - y) = 6x - 1$
$4(x + 1) = y + 3$

11. $4y = x + 1$
$2y = \frac{2x + 3}{2}$

12. $\frac{x}{3} + \frac{y}{2} = 4$
$\frac{2x}{3} - \frac{y}{6} = 1$

13. $1.2x - 0.8y = 0.4$
$y + 0.1x = 0.3$

14. $5x + 7y - 17 = 0$
$27 - 7y - 3x = 0$

15. $4(2x - y + 3) = 0$
$2(x + y) - 3(x - y) = 6$

16. $\frac{x}{3} + \frac{y}{4} = 3x - 7y - 37 = 0$

17. $\frac{1}{5}(x - 3) = \frac{1}{2}(y - 7)$
$11x = 13y$

18. $\frac{1}{3}x - \frac{5}{9}y = -1$
$0.4x + 0.5y = 2.3$

19. $2x - y + 1 = 3x - y = \frac{1}{2}$

20. $\frac{x+1}{y+2} = \frac{2}{3}$

$\frac{x-2}{y-1} = \frac{1}{3}$

Solve the following simultaneous equations.

21. $0.8x - 3y = -6$

$1.2x + 0.5y = 3$

22. $6(x + y) - 4(x + 1) = -1$

$\frac{1}{2}(4x - 9y) + \frac{1}{3}(x + 4) = 1$

23. $\frac{1}{3}(2x - y) - \frac{1}{2}(3x - 1) = -5$

$2(y - x) = 3(4x - y) + 3$

24. $\frac{x + 4y}{6} = y$

$\frac{3x + 6y}{2} = 4x - 1$

25. $\frac{x - y}{3} = \frac{2x + y}{2}$

$\frac{x + y + 5}{2} = \frac{3x}{5}$

26. $6x - 4y + 1 = 9x - 8y + 2 = 4y - 3x$

27. $3\frac{1}{3}x - 3y = 2\frac{5}{6}$

$2\frac{1}{4}y - 1\frac{1}{9}x = -1\frac{1}{12}$

28. $x = 3 + 4y$

$y = 2 + 3x$

29. $11x + 3y + 7 = 0$

$2x + 5y - 21 = 0$

30. $\frac{x+1}{3} + y = 8$

$x - \frac{y+1}{3} = -4$

31. $\frac{2x - 3y}{4} = \frac{3x - 2y}{5} = 7.5$

32. Using the substitution $u = \frac{1}{x}$ and $v = \frac{1}{y}$, solve the following simultaneous equations.

(a) $\frac{1}{x} + \frac{2}{y} = -1$

$\frac{3}{x} + \frac{5}{y} = 2$

(b) $\frac{1}{3x} + \frac{4}{5y} = 0$

$\frac{1}{2x} - \frac{2}{15y} = \frac{10}{3}$

33. Find the point of intersection of the following pairs of lines.

(a) $y = 3x - 4$

$2x + 3y + 1 = 0$

(b) $\frac{x}{5} + \frac{y}{3} = 1$

$2x - 5y = 20$

34. A concert was attended by x adults and y children. Each of the y children paid \$3 which was $\frac{3}{4}$ of what each of the adults paid. Given that the total sum collected for admission was \$1 200,

(a) calculate the amount each adult paid,

(b) find an equation connecting x and y.

Given further that the number of children attending the concert was $\frac{1}{3}$ of the number of adults, find the total number of people who attended the concert.

35. Two persons, A and B, each has a certain amount of money. If A gives B \$3, B will have twice as much as A. If B gives A \$7, the amount B has will be one-third that of A. How much does A and B each have?

36. The cost of 4 pencils and 1 ruler is \$1. The cost of 7 pencils and 3 rulers is \$2.25. Find the cost of 5 pencils and 12 rulers.

37. If the numerator of a fraction is subtracted from 22, the fraction becomes $\frac{1}{3}$. One-fifth of the sum of the numerator and denominator is 8. What is the fraction?

38. There were 200 students at a film show. Some paid \$2 each, the rest paid \$1 each and the total takings were \$320. How many students paid \$2 and how many paid \$1?

39. A wholesaler sold one type of biscuits at 80¢ per kg and another type at \$1.20 per kg. If he had sold them all at \$1.00 per kg, he would have received \$1.00 less. If he had sold all at \$1.20 per kg, he would have received \$4.00 more. How many kg of each type of biscuits did he sell?

40. An engineering firm has a machine X which turns out 30 finished products per hour and it has also set up a new machine Y which turns out 40 finished products of the same kind per hour. If 600 of these products were produced on a particular day when the machines were used for a total of 18 hours, how many hours were machines X and Y used?

41. In decimal numerals, a two-digit number is smaller by 54 than the number with the digits reversed. The units digit is three more than twice the tens digit. What is the number?

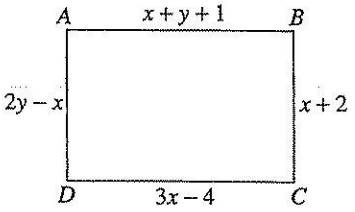
42. Mrs Chen paid \$24 for 2 kg of fresh prawns and 10 kg of tomatoes. Paying the same price for each item, Mrs Lin spent \$27 for 1 kg of fresh prawns and 20 kg of tomatoes. What was the price of each kg of fresh prawns and each kg of tomatoes?

43. The figure $ABCD$ shown is a rectangle. Its measurements are in cm. Calculate

(a) the length of AB and of BC,

(b) the perimeter of $ABCD$,

(c) the area of $ABCD$.



44. A father is three times as old as his son. In 12 years' time, he will be twice as old as his son. How old is the father now?

45. When Mrs Joseph bought five apples and three pears, she reckoned that she would have to pay 80 cents more if she had bought three apples and five pears. What was the difference between the price of one pear and the price of one apple?

46. When Mrs Marcos bought four oranges and a lemon, she paid a total of p cents, but when Mrs Fernando bought four lemons and an orange, she received p cents after giving the fruiterer a five-dollar note. What then was the cost of three oranges and three lemons?

47. The length of a rectangle is 2 cm longer than three times its breadth. If the perimeter of the rectangle is 44 cm, find the length and the breadth of the rectangle.

48. A mother's age is $2\frac{1}{2}$ times the combined ages of her twin daughters. The sum of the ages of the three is 56 years. Find the age of the mother and the age of each twin daughter.

49. \$80 is divided between two men such that one-quarter of one person's share is equal to $\frac{1}{6}$ of the other. How much will each man receive?

50. Motorist X and motorist Y start their journey at the same time travelling in the same direction. In 4 hours' time, X will travel 88 km less than Y. If X increases his speed by 12 km/h, his new speed will be $\frac{6}{7}$ of the original travelling speed of Y. Find the travelling speed of each motorist. (Assume that their travelling speeds are constant.)

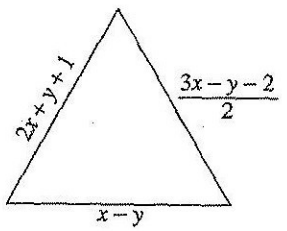
51. A fraction equals $\frac{1}{2}$ when 5 is added to both the numerator and the denominator. It is equal to 6 when 3 is subtracted from both the numerator and the denominator. Find the numerator and the denominator of the fraction. Hence give the value of the fraction in its simplest form.

52. A man bought a house and a car at a total cost of \$640 000. After one year, the value of the house increased by 40% but the value of the car decreased by 20%. Their total value is now \$800 000. Calculate the original price of the house and the original price of the car.

53. The figure shown is an equilateral triangle.

(a) Calculate the length of a side in cm.

(b) Find the area of the figure if the height is 7.5 cm.



54. The length of a rectangle is greater than its breadth by 2 cm. If the length is increased by 4 cm and the breadth decreased by 3 cm, the area remains the same. Find the length and the breadth of the rectangle.

55. In four years' time, a father will be three times as old as his son. Six years ago, he was seven times as old as his son. How old are they now?

56. Two cars leave town at the same time and travel in opposite directions. The speed of one car is 12 km/h more than the other. They are 444 km apart after three hours. Find the speed of the faster car.

57. Three times Joseph's present age is six years less than his father's present age. Five years ago, the father was seven times as old as his son. How old are they now?

Chapter 6

1. $x = 4, y = -5$ **2.** $x = \frac{1}{2}, y = 1$ **3.** $x = 2, y = -2\frac{1}{2}$

4. $x = 1, y = -1\frac{1}{2}$ **5.** $x = 13, y = 5$ **6.** $x = 4, y = -6$

7. $x = 6, y = 6$ **8.** $x = 3, y = 7$ **9.** $x = -2, y = 4$

10. $x = -\frac{2}{9}, y = \frac{1}{9}$ **11.** $x = -2, y = -\frac{1}{4}$ **12.** $x = 3, y = 6$

13. $x = 7, y = 4$ and $x = \frac{1}{2}, y = \frac{1}{4}$ **14.** $x = -5, y = 6$

15. $x = -1, y = 1$ **16.** $x = 3, y = -4$ **17.** $x = 13, y = 11$

18. $x = 2, y = 3$ **19.** $x = 1, y = \frac{5}{2}$ **20.** $x = 3, y = 4$

21. $x = 1.5, y = 2.4$ **22.** $x = \frac{1}{2}, y = \frac{1}{3}$ **23.** $x = 3, y = 9$

24. $x = 1, y = \frac{1}{2}$ **25.** $x = 5, y = -4$ **26.** $x = \frac{1}{3}, y = \frac{1}{2}$

27. $x = \frac{3}{4}, y = -\frac{1}{9}$ **28.** $x = -1, y = -1$ **29.** $x = -2, y = 5$

30. $x = -1, y = 8$ **31.** $x = 10.5, y = -3$

32. **(a)** $x = 9, y = -5$ **(b)** $x = \frac{1}{6}, y = -\frac{2}{5}$

33. **(a)** $x = 1, y = -1$ **(b)** $x = 7, y = -1\frac{1}{5}$

34. **(a)** \$4 **(b)** $4x + 3y = 1\,200$; 320

35. A has \$11, B has \$13 **36.** \$5.55 **37.** $\frac{13}{27}$

38. 120 paid \$2, 80 paid \$1

39. 10 kg of 80¢/kg biscuits and 15 kg of \$1.20/kg biscuits

40. 12 h, 6 h **41.** 39 **42.** \$7, \$1

43. **(a)** $AB = 14$ cm, $BC = 8$ cm **(b)** 44 cm **(c)** 112 cm^2

44. 36 years old **45.** 40 cents **46.** \$3

47. 17 cm, 5 cm **48.** 40 years old, 8 years old

49. \$32, \$48 **50.** $X = 48$ km/h, $Y = 70$ km/h

51. 5, 15, $\frac{1}{3}$ **52.** \$480 000, \$160 000

53. **(a)** 8 cm **(b)** 30 cm^2

54. 20 cm, 18 cm **55.** 41 years old, 11 years old

56. 80 km/h **57.** 9 years old and 33 years old