Applied Academy

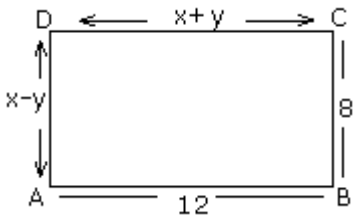
H-76 Sec 22

MATHS

Class 10 - Mathematics

Section A

1. What type of lines are represented by the equations x = 2y and 4x + 3y = 20? **[2]**
2. Show that x = 3, y = 2 is not a solution of the system of linear equations 3x - 2y = 5, 2x + y = 7 **[2]**
3. Solve graphically: 2x - 3y + 13 = 0; 3x - 2y + 12 = 0. **[2]**
4. The coach of cricket team buys 7 bats and 6 balls for ₹ 3,800. Later, she buys 3 bats and 5 balls for ₹ 1750. Find the cost of each bat and each ball. **[2]**
5. Do the equations 4x + 3y – 1 = 5 and 12x + 9y = 15 represent a pair of coincident lines? Justify your answer. **[2]**
6. ABCD is a rectangle if the value of AB = 12 is given, find the values of x and y. **[2]**



7. Determine, algebraically, the vertices of the triangle formed by the lines **[2]**

   $3x - y = 3$

   $2x - 3y = 2$

   $x + 2y = 8$
8. The larger of two supplementary angles exceeds the smaller by 18 degree. Find the angles. **[2]**
9. Find the value of k for which the roots of $9x^2 + 8kx + 16 = 0$ are real and equal. **[2]**
10. For what value of k, the roots of the quadratic equation $kx(x - 2\sqrt{5}) + 10 = 0$ real and equal? **[2]**
11. One fourth of a herd of camels was seen in forest. Twice of square root of the herd had gone to mountains and remaining 15 camels were seen on the bank of a river, find the total number of camels. **[2]**
12. If the quadratic equation $(1 + a^2)x^2 + 2abx + (b^2 - c^2) = 0$ has equal roots, then prove that: $b^2 = c^2 (1 + a^2)$. **[2]**
13. Solve quadratic equation by factorization method: **[2]**

    $4x^2 - 4ax + (a^2 - b^2) = 0$
14. Find the value(s) of k for which the quadratic equation $x^2 + 5kx + 16 = 0$ has real and equal roots. **[2]**
15. Find the value of k for which the roots are real and equal of equation: **[2]**

    $kx^2 - 2\sqrt{5}x + 4 = 0$
16. Using quadratic formula, find the real roots of the equation $2x^2 + 2x + 9 = 0$, if they exist. **[2]**
17. Find the number of terms in AP: 7, 13, 19, …., 205 **[2]**
18. The sum of the first terms of an A.P. is given by $S_n = 2n^2 + 8n$. Find the sixteenth term of the A.P. **[2]**
19. Write the expression $a_n - a_k$ for the AP: a, a + d, a + 2d, ... and find the common difference of the AP for which 20^{th} term is 10 more than the 18^{th} term. **[2]**

20. If five times the fifth term of an A.P. is equal to 8 times its eighth term, show that its 13^{th} term is zero. **[2]**

21. Find the 12^{th} term from the end of the arithmetic progression 1,4,7,10,..., 88. **[2]**

22. Write the first five terms of the sequence whose nth term is: $A_n = 3^n$ **[2]**

23. Are the given numbers form an AP? If they form an AP, write the next two terms: 1, -1, -3, -5, ... **[2]**

24. An AP consists of 31 terms. If 16^{th} term is 10, then find the sum of all the terms of this AP. **[2]**

Section B

25. A plane left 30 minutes late than its scheduled time and in order to reach the destination 1500 km away in time, it had to increase its speed by 100 km/h from the usual speed. Find its usual speed. **[3]**

26. The area of a rectangle remains the same if the length is increased by 7 metres and the breadth is decreased by 3 metres. The area remains unaffected if the length is decreased by 7 metres and breadth is increased by 5 metres. Find the dimensions of the rectangle. **[3]**

27. The sum of digits of a two digit number is 15. The number obtained by reversing the order of digits of the given number exceeds the given number by 9. Find the given number. **[3]**

28. Half of the difference between two numbers is 2. The sum of the greater number and twice the smaller number is 13. Find the numbers. **[3]**

29. On selling a tea-set at 5% loss and a lemon-set at 15% gain, a crockery seller gains, a crockery seller gains ₹7. If he sells the tea-set at 5% gain and the lemon-set at 10% gain, he gain ₹13. Find the actual price of the tea-set and the lemon-set. **[3]**

30. Solve the system of equations: **[3]**

    3x - 7y +10 = 0

    y - 2x -3 = 0

31. Solve: **[3]**

    x + 2y + z =7

    x + 3z =11

    2x - 3y =1

32. Solve the following system of linear equations: 35x + 23y = 209; 23x + 35y = 197. **[3]**

33. For what value of k, the following system of equations will represent the coincident lines? **[3]**

    x + 2y + 7 = 0

    2x + ky + 14 = 0

34. A and B have certain number of oranges A says to B " If you give me 10 of yours oranges I will have twice the number of oranges left with you". B replies, " If you give me 10 of your oranges I will have the same number of oranges as left with you". Find the number of oranges that A and B have separately. **[3]**

35. Seven years ago Varun's age was five times the square of Swati's age. Three years hence Swati's age will be two fifth of Varun's age. Find present ages of Varun and Swati. **[3]**

36. Solve the quadratic equation by factorization: **[3]**

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

37. If the roots of the equation $x^2 + 2cx + ab = 0$ are real unequal, then prove that the equation $x^2 - 2(a + b)x + a^2 + b^2 + 2c^2 = 0$ has no real roots. **[3]**

38. A rectangular field is 16 m long and 10 m wide. There is a path of uniform width all around it, having an area of 120 m^2. Find the width of the path. **[3]**

39. Some students planned a picnic. The budget for food was ₹ 480. But eight of these failed to go and thus the cost **[3]**

of food for each member increased by ₹ 10. How many students went to picnic?

40. If a, b, c are real numbers such that $ac \neq 0$, then show that at least one of the equations $ax^2 + bx + c = 0$ and $-ax^2 + bx + c = 0$ has real roots. **[3]**

41. Two numbers differ by 3 and their product is 504. Find the numbers. **[3]**

42. Rohan's mother is 26 years older than him. The product of their ages 3 years from now will be 360. We would like to find Rohan's present age. Represent the situation in the form of a quadratic equation. **[3]**

43. Determine, if 3 is a root of the equation given below: **[3]**
$\sqrt{x^2 - 4x + 3} + \sqrt{x^2 - 9} = \sqrt{4x^2 - 14x + 16}$

44. If the roots of the equation $(b - c)x^2 + (c - a)x + (a - b) = 0$ are equal, then prove that $2b = a + c$. **[3]**

45. If $a_n = 3 - 4n$, show that a_1, a_2, a_3... form an A.P. Also find S_{20}. **[3]**

46. The amount of air present in a cylinder when a vacuum pump removes $\frac{1}{4}$ of the air remaining in the cylinder at a time. Is this situation make an arithmetic progression and why? **[3]**

47. Find the sum of all two-digit natural numbers which are divisible by 4. **[3]**

48. Find the sum of first n odd natural numbers. **[3]**

49. If $(m + 1)^{th}$ term of an A.P. is twice the $(n + 1)^{th}$ term, prove that $(3m + 1)^{th}$ term is twice the $(m + n + 1)^{th}$ term. **[3]**

50. Sum of the first n terms of an AP is $5n^2 - 3n$. Find the AP and also find its 16th term. **[3]**

51. The first and the last terms of an A.P are 17 and 350 respectively. If the common difference is 9, how many terms are there and what is their sum? **[3]**

52. How many terms of the A.P. $-6, -\frac{11}{2}, -5$..... are needed to give the sum - 25? Explain the double answer. **[3]**

53. How many terms are there in the A.P. $-1, -\frac{5}{6}, -\frac{2}{3}, -\frac{1}{2}, \ldots, \frac{10}{3}$ **[3]**

54. Given that in an A.P., the sum of first n terms is $\frac{3n^2}{2} + \frac{5n}{2}$. Find its 25th term. **[3]**

Section C

55. I am three times as old as my son. Five years later, I shall be two and a half times as old as my son. How old am I and how old is my son? **[5]**

56. A leading library has a fixed charge for the first three days and an additional charge for each day thereafter Sarika paid ₹ 27 for a book kept for seven days, while Sury paid ₹ 21 for the book she kept for five days, find the fixed charge and the charge for each extra day. **[5]**

57. A lending library has a fixed charge for the first three days and an additional charge for each day thereafter. Saritha paid ₹ 27 for a book kept for seven days, while Susy paid ₹ 21 for the book she kept for five days. Find the fixed charge and the charge for each extra day. Solve the pair of the linear equation obtained by the elimination method. **[5]**

58. The area of a rectangle gets reduced by 9 square units, if its length is reduced by 5 units and the breadth is increased by 3 units. The area is increased by 67 square units if length is increased by 3 units and breadth is increased by 2 units. Find the perimeter of the rectangle. **[5]**

59. A fraction becomes $\frac{3}{4}$, if 2 is added to the numerator and 1 is added to the denominator. If 2 is subtracted from the numerator and 1 is subtracted from the denominator, it becomes $\frac{1}{2}$. Find the fraction. **[5]**

60. A man travels 370 km, partly by train and partly by car. If he covers 250 km by train and the rest by car, it takes him 4 hours. But, if he travels 130 km by train and the rest by car, he takes 18 minutes longer. Find the speed of the train and that of the car. **[5]**

61. If a bag containing red and white balls, half the number of white balls is equal to one-third the number of red balls. Thrice the total number of balls exceeds seven times the number of white balls by 6. How many balls of each colour does the bag contain? **[5]**

62. If the price of a book is reduced by ₹5, a person can buy 5 more books for ₹ 300. Find the original list price of the book. **[5]**

63. Find the value of m for which the quadratic equation $(m+1)y^2 - 6(m+1)y + 3(m+9) = 0$, $m \neq -1$ has equal roots. Hence find the roots of the equation. **[5]**

64. Find the value of **k** for which the quadratic equation $(k + 1)x^2 - 2(3k + 1)x + (8k + 1) = 0$ has real and equal roots. **[5]**

65. A rectangular park is to be designed whose breadth is 3 m less than its length. Its area is to be 4 square metres more than the area of a park that has already been made in the shape of an isosceles triangle with its base as the breadth of the rectangular park and of altitude 12 m. Find the length and breadth of the park. **[5]**

66. The length of the hypotenuse of a right triangle exceeds the length of its base by 2 cm and exceeds twice the length of altitude by 1 cm. Find the length of each side of the triangle. **[5]**

67. A train travels at a certain average speed for a distance 63 km and then travels a distance of 72 km at an average speed of 6 km/hr more than the original speed. If it takes 3 hours to complete total journey, what is its original average speed? **[5]**

68. In a flight of 600 km, the speed of the aircraft was slowed down due to bad weather. The average speed of the trip was decreased by 200 km/hr and thus the time of flight increased by 30 minutes. Find the average speed of the aircraft originally. **[5]**

69. The sum of 5^{th} and 9^{th} terms of an A.P. is 30. If its 25^{th} term is three times its 8^{th} term, find the AP. **[5]**

70. The sum of the first 8 terms of an A.P. is 100 and the sum of its first 19 terms is 551. Find the sum of its first **n** terms. **[5]**

71. In an A.P. of 40 terms, the sum of first 9 terms is 153 and the sum of last 6 terms is 687. Determine the first term and common difference of A.P. Also, find the sum of all the terms of the A.P. **[5]**

72. In an A.P., the n^{th} term is $\frac{1}{m}$ and the m^{th} term is $\frac{1}{n}$. Find (i) $(mn)^{th}$ term, (ii) sum of first (mn) terms. **[5]**

73. The sum of first n terms of an A.P. is $5n^2 + 3n$. If its m^{th} term is 168, find the value of m. Also, find the 20^{th} term of this A.P. **[5]**

74. The sum of the third and the seventh terms of an AP is 6 and their product is 8. Find the sum of the first sixteen terms of the AP. **[5]**

75. The sum of 5th and 9th terms of an AP is 72 and the sum of 7th and 12th terms is 97. Find the AP. **[5]**