Applied Academy

H-76 Sec 22

MATHS CH 3&4

Class 10 - Mathematics

Section A

1. The pair of linear equations $4x + 6y = 9$ and $2x + 3y = 6$ has **[1]**

   a) no solution
   b) two solutions

   c) one solution
   d) many solutions

2. If $\angle A$ and $\angle B$ are complementary angles and $\angle A$ is x, then which equation can be used to find $\angle B$ which is denoted by y? **[1]**

   a) $y = (180° - x)$
   b) $y = (90° - x)$

   c) $y = (90° + x)$
   d) $y = (x + 180°)$

3. The pair of linear equations $\frac{3x}{2} + \frac{5y}{3} = 7$ and $9x + 10y = 14$ is: **[1]**

   a) consistent
   b) inconsistent

   c) consistent with many solutions
   d) consistent with one solution

4. A and B are friends. A is elder to B by 5 years. B's sister C is half the age of B while A's father D is 8 years older than twice the age of B. If the present age of D is 48 years, then find the present ages of A, B and C respectively. **[1]**

   a) 40 years, 20 years, 15 years
   b) 20 years, 15 years, 10 years

   c) 50 years, 25 years, 20 years
   d) 25 years, 20 years, 10 years

5. The sum of the digits of a two-digit number is 15. The number obtained by interchanging the digits exceeds the given number by 9. The number is **[1]**

   a) 69
   b) 87

   c) 78
   d) 96

6. The discriminant of $4x^2 + 3x - 2 = 0$ is **[1]**

   a) -23
   b) 41

   c) 39
   d) -31

7. A two digit number is such that the product of the digits is 12. When 36 is added to the number then the digits interchange their places. The number is **[1]**

   a) 26
   b) 34

   c) 43
   d) 62

8. **Assertion (A):** For k = 6, the system of linear equations $x + 2y + 3 = 0$ and $3x + ky + 6 = 0$ is inconsistent. **[1]**

   Reason (R): The system of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ is inconsistent if

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

   a) Both A and R are true and R is the correct explanation of A.

   b) Both A and R are true but R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false but R is true.

9. **Assertion (A):** A pair of linear equations has no solution (s) if it is represented by intersecting lines graphically. **[1]**

   Reason (R): If the pair of lines are intersecting, then the pair has a unique solution and is called consistent pair of equations.

   a) Both A and R are true and R is the correct explanation of A.

   b) Both A and R are true but R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false but R is true.

10. **Assertion (A):** Sum and product of roots of $2x^2 - 3x + 5 = 0$ are $\frac{3}{2}$ and $\frac{5}{2}$ respectively. **[1]**

   Reason (R): If α and β are the roots of $ax^2 + bx + c = 0$, $a \neq 0$, then sum of roots $= \alpha + \beta = -\frac{b}{a}$ and product of roots $= \alpha\beta = \frac{c}{a}$

   a) Both A and R are true and R is the correct explanation of A.

   b) Both A and R are true but R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false but R is true.

11. **Assertion (A):** The equation $8x^2 + 3kx + 2 = 0$ has equal roots then the value of k is $\pm\frac{8}{3}$ **[1]**

   Reason (R): The equation $ax^2 + bx + c = 0$ has equal roots if $D = b^2 - 4ac = 0$

   a) Both A and R are true and R is the correct explanation of A.

   b) Both A and R are true but R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false but R is true.

12. Find whether the lines representing the following pair of linear equations intersect at a point, are parallel or coincident: **[1]**

   2x - 3y + 6 = 0; 4x - 5y + 2 = 0

13. Check whether the pair of equations x + 3y = 6, 2x - 3y = 12 is consistent. **[1]**

14. Solve the following system of linear equations algebraically: **[1]**

   2x + 5y = -4; 4x - 3y = 5

15. Graphically, find whether the following pair of equations has no solution, unique solution or infinitely many solutions: **[1]**

   5x - 8y + 1 = 0; ...(i)

   $3x - \frac{24}{5}y + \frac{3}{5} = 0$ ...(ii)

16. If 12x + 17y = 53 and 17x + 12y = 63 then find the value of (x + y). **[1]**

17. The product of two consecutive positive integers is 306. Form the quadratic equation to find the integers, if x denotes the smaller integer. **[1]**

18. If $2x^2 - (2 + k)x + k = 0$ where k is a real number, find the roots of the equation. **[1]**

19. Determine the nature of the roots of the quadratic equation: **[1]**

   $4x^2 - 4x + 1 = 0$.

20. Is it quadratic equation ? **[1]**

$3x^2 - 2\sqrt{x} + 8 = 0$

21. Check whether $(x + 2)^3 = 2x(x^2 - 1)$ is a quadratic equation. **[1]**

Section B

22. Solve the following pair of linear equations: $152x - 378y = -74$, $-378x + 152y = -604$. **[2]**

23. Two people are 16 km apart on a straight road. They start walking at the same time. If they walk towards each other with different speeds, they will meet in 2 hours. Had they walked in the same direction with same speeds as before, they would have met in 8 hours. Find their walking speeds. **[2]**

24. Does the pair of the linear equation have no solution? Justify your answer. **[2]**
    $x = 2y$, $y = 2x$

25. Do the equations $-2x - 3y = 1$ and $6y + 4x = -2$ represent a pair of coincident lines? Justify your answer. **[2]**

26. Solve: $4x + \frac{6}{y} = 15$ **[2]**
    $6x - \frac{8}{y} = 14$
    and hence find 'p' if y= px -2

27. A part of monthly hostel charges in a school is fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 22 days, he has to pay ₹4250 as hostel charges, whereas a student B, who takes food for 28 days, pays ₹5150 as hostel charges. Find the fixed charges and the cost of food per day. **[2]**

28. On comparing the ratios $\frac{a_1}{a_2}$, $\frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the pair of linear equations are consistent, or inconsistent: $2x - 3y = 8$, $4x - 6y = 9$. **[2]**

29. Show that $x = 2$, $y = 1$ is a solution of the system of simultaneous linear equations **[2]**
    $3x - 2y = 4$
    $2x + y = 5$

30. Solve algebraically the following pair of linear equations for x and y **[2]**
    $148x + 231y = 610$, $231x + 148y = 527$.

31. Solve the pair of the equations: $\frac{2xy}{x+y} = \frac{3}{2}$, $\frac{xy}{2x-y} = \frac{-3}{10}$, $\quad x + y \neq 0, 2x - y \neq 0$ **[2]**

32. Solve: $\sqrt{3}x^2 + 11x + 6\sqrt{3} = 0$ **[2]**

33. Find the values of k for which the given equation has real and equal roots: **[2]**
    $2x^2 - 10x + k = 0$

34. Two water taps together can fill a tank in $3\frac{1}{3}$ hours. The tap of larger diameter takes 5 hours less than the smaller one to fill the tank separately. Find the time in which each tap can fill the tank separately. **[2]**

35. Solve: $\frac{x+3}{x+2} = \frac{3x-7}{2x-3}$ **[2]**

36. Find the ratio of the sum and product of the roots of $7x^2 - 12x + 18 = 0$. **[2]**

Section C

37. If we buy 2 tickets from station A to station B, and 3 from station A to station C, we have to pay Rs. 795. But 3 tickets from station A to B and 5 tickets from A to C cost a total of Rs. 1300. what is the fare from station A to B and that from station A to C ? **[3]**

38. Solve for x and y using elimination method: $10x + 3y = 75$, $6x - 5y = 11$. **[3]**

39. Solve the pair of linear equations $x + y = 5$ and $2x - 3y = 4$ by elimination and substitution method. **[3]**

40. A father is three times as old as his son. After twelve years, his age will be twice as that of his son then. Find their present ages. **[3]**

41. Form the pair of linear equations for the following problems and find their solution by substitution method. The taxi charges in a city consists of a fixed charge together with the charge for the distance covered. For a distance **[3]**

of 10 km, the charge paid is Rs. 105 and for a journey of 15 km, the charge paid is Rs. 155. What are the fixed charges and the charge per kilometer? How much does a person have to pay for traveling a distance of 25 km?

42. Given the linear equation $2x + 3y - 8 = 0$, write another linear equation in two variables such that the geometrical representation of the pair so formed is: **[3]**

   i. intersecting lines

  ii. parallel lines

 iii. coincident lines

43. The angles of a cyclic quadrilateral ABCD are $\angle A = (6x + 10)°$, $\angle B = (5x)°$, $\angle C = (x + y)°$, $\angle D = (3y - 10)°$ Find x and y, and hence the values of the four angles. **[3]**

44. The cost of two kg of apples and 1 kg of grapes on a day was found to be Rs.160. After a month the cost of 4 kg apples and 2 kg grapes is Rs.300. Represent the situation algebraically and graphically. **[3]**

45. The ratio of incomes of two persons is 9 : 7 and the ratio of their expenditures is 4 : 3. If each of them manages to save ₹ 2000 per month, then find their monthly incomes. **[3]**

46. Solve: **[3]**

$37x + 41y = 70$

$41x + 37y = 86$

47. The product of two successive integral multiples of 5 is 300. Determine the multiples. **[3]**

48. Is the following situation possible? If so, determine their present ages. The sum of the ages of two friends is 20 years. Four years ago, the product of their ages in years was 48. **[3]**

49. A two-digit number is seven times the sum of its digits and is also equal to 12 less than three times the Product of its digits. Find the number. **[3]**

50. The speed of a boat in still water is 8 km/hr. It can go 15 km upstream and 22 km downstream in 5 hours. Find the speed of the stream. **[3]**

51. Solve the quadratic equation by factorization: **[3]**
$\frac{1}{2a+b+2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$

52. Sum of the areas of two squares is 157 m^2. If the sum of their perimeters is 68 m, find the sides of the two squares. **[3]**

53. Nine times the side of one square exceeds a perimeter of a second square by one metre and six times the area of the second square exceeds twenty-nine times the area of the first by one square metre, Find the side of each square. **[3]**

54. An aeroplane left 50 minutes later than its scheduled time, and in order to reach the destination, 1250 km away, in time, it had to increase its speed by 250 km/hr from its usual speed. Find its usual speed. **[3]**

55. Solve: $\frac{3x-4}{7} + \frac{7}{3x-4} = \frac{5}{2}, x \neq \frac{4}{3}$ **[3]**

56. The hypotenuse of a grassy land in the shape of a right triangle is 1 metre more than twice the shortest side. If the third side is 7 metres more than the shortest side, find the sides of the grassy land. **[3]**

Section D

57. Solve the pair of linear equations $3x - 5y - 4 = 0$ and $9x = 2y + 7$ by elimination and substitution method. **[5]**

58. Solve graphically the system of linear equation: **[5]**

$4x - 3y + 4 = 0$

$4x + 3y - 20 = 0$

Find the area bounded by these lines and x-axis.

59. A railway half ticket costs half the full fare and the reservation charge is the same on half ticket as on full ticket. **[5]**

One reserved first class ticket from Mumbai to Ahmedabad costs ₹ 216 and one full and one half reserved first class tickets cost ₹ 327. What is the basic first class full fare and what is the reservation charge?

60. Solve the system of equation **[5]**

    x + y = 4,

    2x - 3y = 3 graphically.

61. A two-digit number is such that the product of its digits is 20. If 9 is added to the number, the digits interchange their places. Find the number. **[5]**

62. For Uttarakhand flood victims two sections A and B of class X contributed Rs 1,500. If the contribution of X-A was Rs 100 less than that of X-B, find graphically the amounts contributed by both the sections. **[5]**

63. Use a single graph paper and draw the graph of the following equations: **[5]**

    2y - x = 8; 5y - x = 14, y - 2x = 1

    Obtain the vertices of the triangle so obtained.

64. Determine whether the following system of linear equations is inconsistent or not: $3x - 5y = 20$; $6x - 10y = -40$. **[5]**

65. Sangeeta went to a book-seller's shop and purchased 2 textbook of IX Mathematics and 3 textbook of X mathematics for Rs.250. Her friend Meenu also bought 4 textbooks of IX Mathematics and 6 textbooks of X maths of same kind for Rs.500. Represents this situation algebraically and graphically. **[5]**

66. Draw the graphs of the pair of linear equations: **[5]**

    x + 2y = 5 and 2x - 3y = - 4

    Also find the points where the lines meet the x-axis.

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

68. A dealer sells a toy for ₹ 24 and gains as much per cent as the cost price of the toy. Then find the cost price of the toy.38319 **[5]**

69. Two pipes running together can fill a tank in $11\frac{1}{9}$ minutes. If one pipe takes 5 minutes more than the other to fill the tank, find the time in which each pipe would fill the tank separately. **[5]**

70. If x = - 4 is a root of the equation $x^2 + 2x + 4p = 0$, find the values of k for which the equation $x^2 + px(1 + 3k) + 7(3 + 2k) = 0$ has equal roots. **[5]**

71. The diagonal of a rectangular field is 60 m more than the shorter side. If the longer side is 80 m more than the shorter side, find the length of the sides of the field. **[5]**

72. The sum of the ages of a boy and his sister (in years) is 25 and product of their ages is 150. Find their present ages. **[5]**

73. The difference of squares of two numbers is 204. The square of the smaller number is 4 less than 10 times the larger number. Find the two numbers. **[5]**

74. A train travels at a certain average speed for a distance of 360 km. It would have taken 48 minutes less to travel the same distance if its speed was 5 km/hour more. Find the original speed of the train. **[5]**