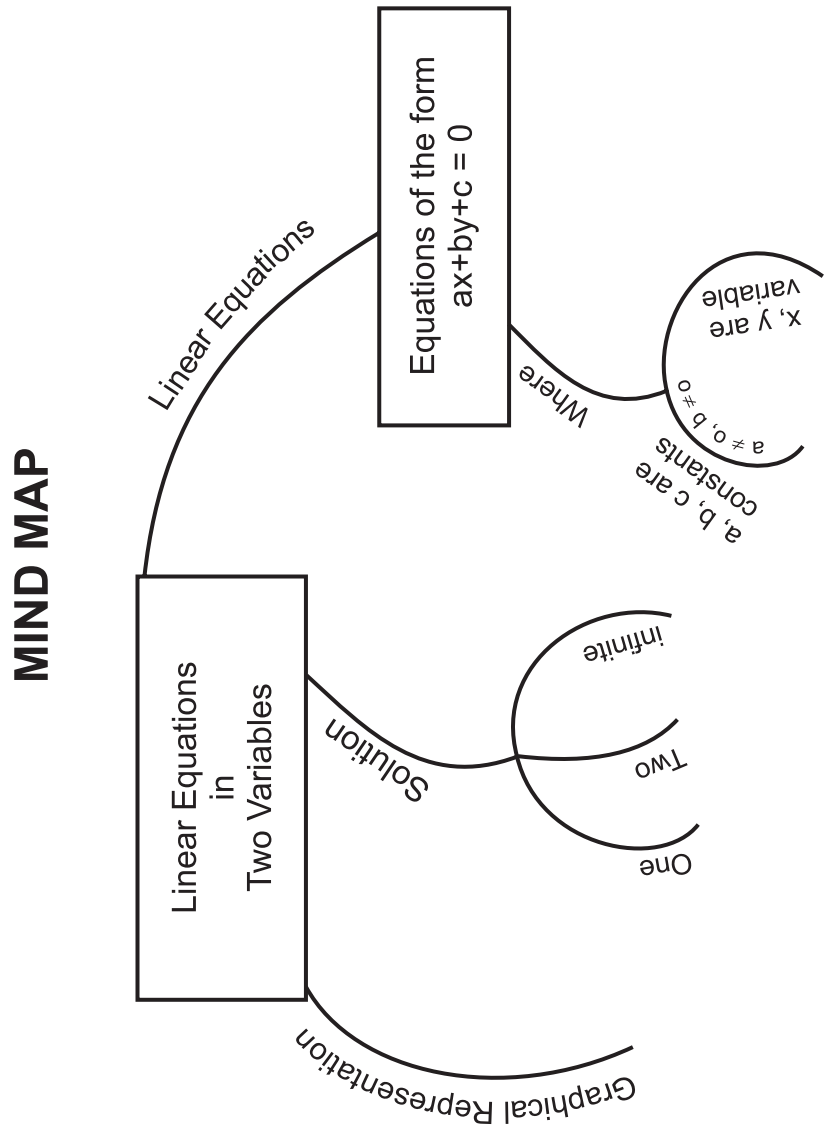
CHAPTER-4
Linear Equations In Two Variables



CHAPTER-4

LINEAR EQUATIONS IN TWO VARIABLES

KEY POINTS

- **Linear equation in one variable –** An equation which can be put in the form ax+b=0, $a \neq 0$ and a, b are real numbers is called a linear equation in one variable.
- **Linear equation in two variables –** Any equation which can be put in the form ax+by+c=0, where a, b, and c are real numbers and a, $b \neq 0$, is called a linear equation in two variables.

  Linear equation in one variable has a unique solution

  $ax + b = 0 \Rightarrow x = -\frac{b}{a}$
- Linear equation in two variables has infinitely many solutions.
- The graph of every linear equation in two variables is a straight line.
- Every point on the line satisfies the equation of the line.
- Every solution of the equation is a point on the line. Thus, a linear equation in two variables is represented geometrically by a line whose points make up the collection of solutions of the equation.

Graph :

* The pair of values of x and y which satisfies the given equation is called solution of the linear equation in two variables.

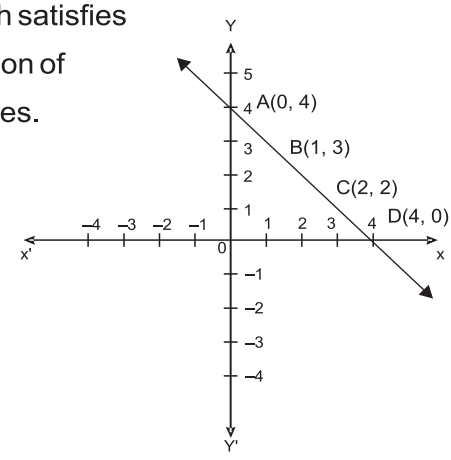
Example : x + y = 4

Solutions of equation

x+y = 4 are

(0,4) (1,3) (2,2) (4,0)

and many more



PART–A

1. Which of the following is not a linear equation ?

   a) $3x+3 = 5x + 2$ b) $x^2 + 5 = 3x - 5$

   c) $\frac{7}{3}x - 5 = 4x - 3$ c) $(x+2)^2 = x^2 - 8$

2. Which of the following is not a linear equation in two variables ?

   a) $2x+3y = 5$ b) $3x + 2y = 6$

   c) $ax^2 + by = c$ d) $ax + by = c$

3. A linear equation in two variables has maximum

   a) Only one solution b) Two solution

   c) Infinite solution d) None of these

4. The graph of $ax+by+c = 0$ is

   a) a straight line parallel to x-axis

   b) a straight line parallel to y-axis

   c) a general straight line

   d) Name of these

5. If $x = 1$, $y = 1$ is a solution of equation $9ax + 12ay = 63$, then the value of a is

   a) 3 b) 0 c) -3 d) 4

6. The equation of x-axis is

   a) $x = k$ b) $x = 0$ c) $y = k$ d) $y = 0$

7. Any point on the line $y=x$ is of the form

   a) (a, 0) b) (0, a) c) (a, a) d) (a, -a)

8. $x = 0$ represents the equation of

   a) x-axis b) y-axis

   c) a line parallel to x-axis

   d) a line parallel to y-axis

9. $x=2$, $y=3$ is a solution of the linear equation

a) $2x + y = 8$ b) $x + 2y = 8$

c) $x + y = 8$ d) $-x + y = 8$

10. The graph of $2x + 3y = 6$ is a line which meets the y-axis at the point ?

a) (2,0) b) (3,0) c) (0,2) d) (0,3)

11. How many linear equations in x and y can be formed by $x = 18$ and $y = 4$?

a) only one b) two

c) three d) infinitely many

12. The point of the form (-a, a) always lie on

a) $x = a$ b) $y = -a$

c) $y = x$ d) $x + y = 0$

13. The graph of $y = x$ passes through the point ?

a) $\left(\frac{5}{2}, -\frac{5}{2}\right)$ b) $\left(0, \frac{5}{2}\right)$

c) (1,1) d) $\left(-\frac{1}{2}, \frac{1}{2}\right)$

14. Graph of $x = 5$ is a line

a) Parallel to x - axis

b) Parallel to y - axis

c) Passes through origin

d) Lying on x- axis

15. Any solution of the linear equation $5x+0y+7=0$ in two variables is of the form

a) $\left(0, -\frac{7}{5}\right)$ b) $\left(-\frac{7}{5}, 0\right)$

c) $\left(-\frac{7}{5}, k\right)$ d) $\left(k, -\frac{7}{5}\right)$

16. Any point on the x-axis is of the form

a) (x, y) b) (o, y)

c) (o, x) d) (x, o)

17. Solution of the equation $3x - y = 3$ is

a) (0, -3) b) (2, 3)

c) (3, 6) d) All of these

18. The coefficient of the variable y in linear equation $5(2x-y) + 3x + 4y - 7 = 0$ is

a) -1 b) -9

c) 13 d) 9

19. If a linear equation has solutions (-1,1), (0, 0), (2, -2), then its equation is

a) $y - x = 0$ b) $x + y = 0$

c) $-2x + y = 0$ d) $-x + 2y = 0$

20. The point (a, -a) does not lie on the graph of

a) $x = a$ b) $y = -a$

c) $y = x$ d) $x + y = 0$

21. Which of the following equations represents a line parallel to x-axis ?

a) $2x + 3 = 0$ b) $2y + 2 = 0$

c) $2x + 3y = 0$ d) $2x - 3y = 0$

22. Which of the following equations represents a line parallel to y-axis ?

a) $2x = 3y$ b) $2y = 4$

c) $2x = 4$ d) $2x - 3y = 9$

23. If (a, -2) lies on the graph of $3x - y = 10$, then the value of a is

a) 4 b) $\frac{8}{3}$

c) 0 d) 1

24. The equation $2x + 9 = 0$ on number line is represented by :

a) a line b) a point

c) Infinitely many lines d) Infinitely many points

25. The distance between the graphs of the equations $x = -4$ and $x = 1$ is

a) 1 b) 5

c) 3 d) None of these

26. The distance between the graphs of the equations y = -2 and y = -5

a) 7 b) 3

c) –7 d) None

27. If (2k-1, k) is a solution of the equation 10x - 9y = 12, then k = _____

a) 1 b) 2

c) 3 d) 4

28. Which of the following equations passes through the origin ?

a) x + y = 2 b) x - y = 2

c) 2x - 3y = 0 d) None of these

29. If the equation 3y = 7 is expressed as ax + by + c = 0 then which of the following is correct ?

a) a = 0, b = 7, c = 3 b) a = 3, b = 0, c = -7

c) a = 0, b = 3, c = -7 d) a = 3, b = -7, c = 0

30. On expressing x in terms of y for the linear equation $\frac{2}{3}x + 4y = -7$ Which of the following is correct ?

a) $y = \frac{-21 - 12x}{2}$ b) $x = \frac{-21 - 12y}{2}$

c) $y = -7 + \frac{2}{3}x$ d) $x = -7 + 4y$

Fill in the blanks :

31. The equation of a line parallel to x-axis is _____=a where a is any non-zero real number.
32. The equation of a line parallel to y-axis is _____ =a, where a is any non-zero number.
33. The graph of every linear equation in two variables is a _____
34. An equation of the form ax + b = 0, where a, b are real numbers and a $\neq 0$, in the variable x geometrically represents _____
35. The coefficient of x in the linear equation 2 (x + y) - x = 7 is _____

State whether the following statements are true or false.

36. The linear equation 7x + 9y = 8 has a unique.
37. All the points (2,0), (-3,0), (4, 2) lie on the x-axis
38. The line parallel to y-axis at a distance of 5 units to the left of y-axis is given by the equation x = –5.
39. The graph of every linear equation in two variables need not be a line.
40. The graph of the linear equation x+2y = 5 passes through the point (0, 5)

41. Express the linear equation $\sqrt{2}x-4=5y$ in the form of $ax+by+c=0$ and thus indicate the values of a, b and c.

42. Express x in terms of y for the equation $3x+4y=7$

43. Express y in the terms of x.

    $3y+5x = 9$

44. Point (9,0) lie on which axis?

45. Find a solution of $x + y = 5$ which lies on y-axis

46. Express the equation $5y=9$ as linear equation in two variables.

47. Write the linear equation which is parallel to x-axis and is at a distance of 2 units from the origin in upward direction.

48. Check whether $(1, -2)$ is a solution of $2x - y = 6$.

49. Check whether $x = 2$ & $y = -2$ is a solution of $2x - y = 6$.

50. How many solutions are there for equation $y = 5x + 2$.

51. Find the value of K, if $x = -1$ & $y = 1$ is a solution of equation $Kx - 2y = 0$.

52. If the graph of equation $2x + Ky = 10$ K intersects x-axis at point (5,0) find the value of K.

53. The graph of the linear equation $4x=6$ is parallel to which axis?

54. At what point the graph of $2x - y = 6$, cuts x-axis?

55. On which side of y – axis, $x + 3 = 0$ lies

56. On which side of y-axis, $x + 3 = 0$ lies ?

PART-B

57. Find any two solutions of equation

    $2x+y = x+5$.

58. Find the value of P if $x=2$, $y=3$ is a solution of equation $5x+3Py = 4a$

59. If the points A (3,5) and B (1, 4) lies on the graph of line $ax+by=7$, find the value of a.

60. Write the coordinates of the point where the graph of the equation 5x+2y=10 intersect both the axes.

61. Write the equations of two lines passing through (3, 10).

62. The cost of coloured paper is r 7 more than 1/3 of the cost of white paper. Write this statement in linear equation in two variables.

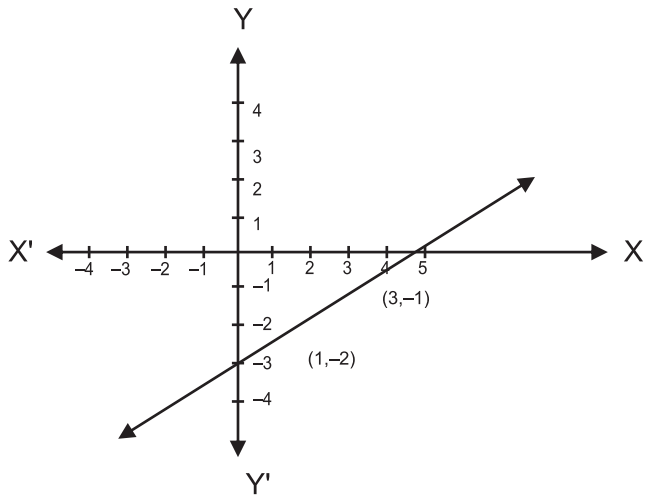
63. Draw the graph of equation x+y=5.

64. From the choices given below, choose the equation whose graph is given in figure –

(i) x+2y = 5

(ii) x – 2y = 5

(iii) y + 2x = 5



65. The graph of linear equation 2x - y = 6 will pass through which quadrant (s).

66. How many solution of the equation 3x - 2 = x - 3 are there on the

(i) Number line

(ii) Cartesian plane..

67. Find the points where the graph of x + y = 4 meets line which is

(i) parallel to x-axis at 3 units from origin in positive direction of y-axis.

(ii) parallel to y-axis at 2 units on left of origin.

PART–C

68. If the points A (4,6) and B (1,3) lie on the graph of ax+by=8 then find the value of a and b.

69. Find the value of 'a' if (1, –1) is the solution of the equation 2x + ay = 5. Find two more solutions of the equation.

70. Find two solutions of the equation $4x + 5y = 28$. Check whether (-2,10) is solution of the given equation.

71. Write the equation of line passing through (3, –3) & (6, -6).

72. If $x = 3k – 2$, $Y=2k$ is a solution of equation $4x – 7y + 12 =0$, then find the value of K.

73. If $(m – 2, 2m + 1)$ lies on equation $2x + 3y – 10 = 0$, find m.

74. $F = (9/5) C + 32$.

    (i) If the temperature is 35°C, what is the temperature in Fahrenheit?

    (ii) If the temperature is 30°C, what is the temperature in Fahrenheit?

75. Draw the graph of the linear equation $2x+3y=6$. Find out the coordinates of the points where the line intersects at x axis and y-axis.

76. Draw the graph for the linear equations

    $3x + 4y = 12$. If $x = 8$, find the value of y with the help of graph.

77. Draw the graph of $y = x$ & $2y = –5x$ on the same graph.

78. Give the geometrical representation of $5x + 7 = 0$ as equation.

    (i) in one variable

    (ii) in two variables

79. Draw the graph of the linear equations $2y – x = 7$. With the help of graph check whether $x = 3$ and $y = 2$ is the solution of the equation?

Part – D

80. Write $3y = 8x$ in the form of $ax+by+c=0$. Write x in terms of y. Find any two solutions of the equation. How many solutions you can find out?

81. Rohan and Ramita of Class IX decided to collect ₹ 25 for class cleanliness. Write it in linear equations in two variables. Also draw the graph.

82. Sarika distributes chocolates on the occasion of children's Day. She gives 5 chocolates to each child and 20 chocolates to adults. If number of children is represented by 'x' and total distributed chocolates as 'y'.

(i) Write it in the form of linear equation in two variables.

(ii) If she distributed 145 chocolates in total, find number of children?

83. Priyanka and Arti decided to donate ₹ 1600 for the Army widows. Let Priyanka's share as 'x' and Arti share as 'y'.

(a) Form a linear equation in two variables.

(b) If Priyanka donates thrice the amount donated by Arti, then find out the amount donated by both.

84. Riya participates in Diwali Mela with her friends for the charity to centre of handicapped children. They donate ₹ 3600 to the centre from the amount earned in Mela. If each girl donates ₹ 150 and each boy donates ₹ 200.

(a) Form the linear equation in two variables.

(b) If number of girls are 8, find number of boys.

85. Aftab is driving a car with uniform speed of 60 km/hr. Assuming total distance to be y km & time taken as x hours, form a linear equation. Draw the graph. From the graph read the following:

(i) distance travelled in 90 minutes.

(ii) Time taken to cover a distance of 150 km.

86. The parking charges of a car in a private parking is ₹ 20 for the first hour and ₹10 for subsequent hours. Taking total parking charges to be y & total parking time as x hours form a linear equation. Write it in standard form ₹ hence find, a, b & c. Draw the graph also.

87. We know that $C = 2\pi r$, taking $\pi = 22/7$, circumference as y units, radius as x units, form a linear equation. Draw the graph. Check whether the graph passes through (0, 0). From the graph read the circumference when radius is 2.8 units.

CHAPTER-4

LINEAR EQUATIONS IN TWO VARIABLES

ANSWER

1. b) $x^2 + 5 = 3x - 5$
2. c) $ax^2 + by = c$
3. c) Infinite solution
4. c) a general straight line
5. a) 3
6. d) y = 0
7. c) (a, a)
8. b) y-axis
9. b) x + 2y = 8
10. c) (0,2)
11. d) infinitely many
12. d) x + y = 0
13. c) (1,1)
14. b) Parallel to y - axis
15. c) $\left(-\frac{7}{5}, k\right)$
16. d) (x, o)
17. d) All of these
18. a) -1
19. b) x + y = 0
20. c) y = x
21. b) 2y + 2 = 0
22. c) 2x = 4
23. b) $\frac{8}{3}$
24. b) a point
25. b) 5
26. b) 3
27. b) 2
28. c) 2x - 3y = 0
29. c) a = 0, b = 3, c = -7
30. b) $x = \frac{-21 - 12y}{2}$
31. y
32. x
33. straight Line
34. a Point on number line
35. 1
36. False
37. False
38. True
39. False
40. False
41. $\sqrt{2}x - 5y - 4 = 0$,
    Where $a = \sqrt{2}, b = -5, c = -4$
42. $x = \frac{7 - 4y}{3}$
43. $y = \frac{9 - 5x}{3}$
44. x-axis
45. (0, 5)
46. $0.x + 5.y = 9$

47. $y = 2$

48. No

49. Yes

50. Infinitely many solutions

51. $k = -2$

52. $K = 1$

53. Parallel to y-axis.

54. (3, 0)

55. $y = mx$

56. On left side

57. (1, 4) (0, 5) (or any other two possible solutions)

58. $p = \frac{4a - 10}{9}$

59. $a = -1$

60. (0, 5) and (2, 0)

61. $3x - y + 1 = 0$ (or any other possible solution)

    $12x + 7y = 106$.

62. $3x - y = 21$ (Let the cost of coloured paper be ₹ x, cost of white paper by ₹ y).

63.

64. $x - 2y = 5$

65. I, II, III

66. (i) One Solution (ii) Infinitely many

67. (i) (3, 1) (ii) (6, -2)

68. $a = --4, b = 4$

69. $a = -3$ (any two solutions)

70. (2, 4), (7, 0), No

71. $x + y = 0$

72. $k = 2$

73. $m = 11/8$

74. 95° F, 86 °F

75. (3, 0), (0, 2)

76. $y = 3$

79. No

80. $8x - 3y + 0 = 0$

$a = 8, b = -3, c = 0$

Infinitely many solutions.

81. $x + y = 25$

82. (i) $5x + 20 = y$

(ii) 25

83. (i) $x + y = 1600$

(ii) Priyanka = ₹1200, Arti = ₹400

84. (i) $150x + 200y = 3600$, (ii) Number of boys = 12

85. $y = 60$, (i) 90 km (ii) 2½ hours

86. $y = 20 + 10x$

Standard from $10x - y + 20 = 0$

$a = 10, b = -1, c = 20$

PRACTICE TEST

LINEAR EQUATIONS IN TWO VARIABLES

Time : 50 Min. M.M. 20

1. The graph of linear equation $2y = 5$ is parallel to which axis? (1)
2. Write the linear equation the graph of which is parallel to y-axis and is at a distance 3 units on left from the origin. (1)
3. If the point (5, 2) lies on the graph of the linear equation $kx + 5y = 10k$, Find k. (2)
4. Write two linear equations the graph of which passes through (2, –3). (2)
5. Write the linear equation $x + \sqrt{3y} = 4$ in the form of $ax + by + c = 0$ & hence write the values of a, b & c.
   Write x in terms of y. (3)
6. Find the solutions of linear equation $2x + y = 4$ which represents a point on (3)
   (i) x-axis, (ii) y-axis.
   (iii) parallel to x-axis at a distance 3 units from origin.
7. Give the geometrical representation of $2x + 5 = 0$ as a linear-equation in (4)
   (a) one variable (b) two variables.
8. In a Residential Society, Rain water is stored in underground water tank. The water is stored at the rate of 30 cubic cm per second. If water stored is y cubic cm in x second, write a linear equation in two variables. Draw its graph. (4)
   From the graph read the following:
   (i) Total water stored in 3 seconds.
   (ii) In how many seconds water stored is 120 cm^3?