

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.

3. Linear equation in one variable has a unique solution

$$ax + b = 0 \Rightarrow x = -\frac{b}{a}$$

4. Linear equation in two variables has infinitely many solutions.

5. The graph of every linear equation in two variables is a straight line.

6. Every point on the line satisfies the equation of the line.

7. 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 equation in two variables.

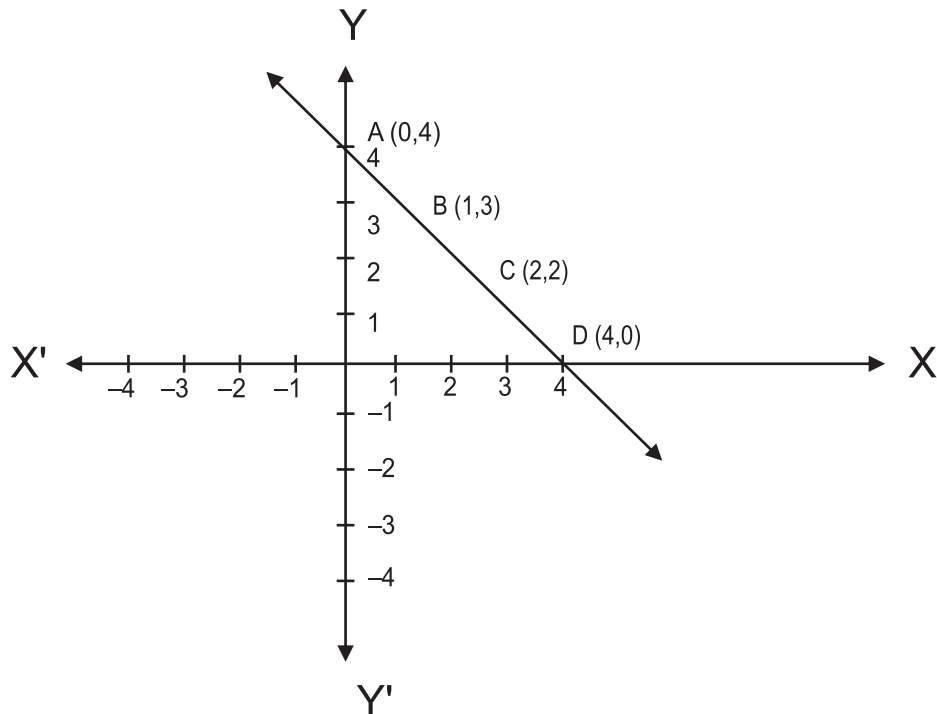
Example : $x + y = 4$

Solution of equation

$x+y = 4$ are

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

and many more



Part – A

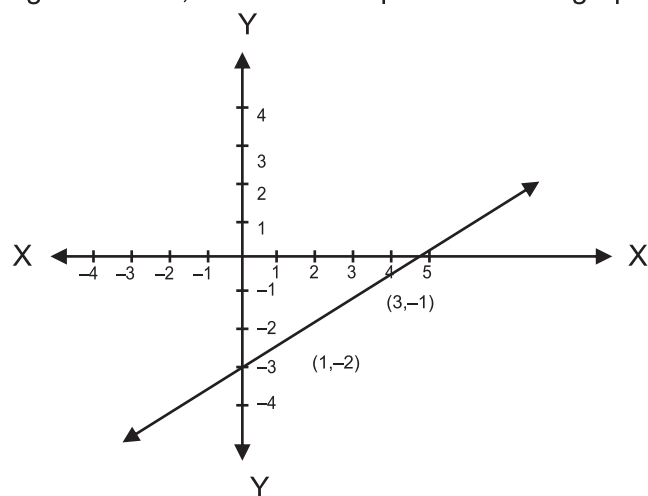
1. The graph of the linear equation $4x=6$ is parallel to which axis?
2. Point $(a,0)$ lie on which axis?
3. Write the equation of x axis.
4. Write a linear equation of two variables for $x=5, y=-2$.
5. Find the value of K, if $x=-1$ is a solution of equation $Kx-2y=0$.
6. Write the linear equation which is parallel to x-axis and is at a distance of 2 units from the origin in upward direction.
7. How many solutions are there for equation $y=5x+2$.
8. Express the equation $5y=9$ as linear equation in two variables.
9. If the graph of equation $2x+Ky=10$ K intersects x axis at point $(5,0)$ find the value of K.

10. 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 .
11. Express x in terms of y for the equation $3x+4y=7$
12. Express y in the terms of x .
 $3y+5x=9$

Part – B

13. Examine whether the point $(5,2)$ lie on the graph of equation $2x+3y = 16$?
14. Find any two solutions of equation
 $2x+y = x+5$.
15. Find the value of P if $x=2, y=3$ is a solution of equations. $5x+3py=4a$
16. Write the equations of two lines passing through $(3, 10)$.
17. Write the coordinates of the point where the graph of the equation $5x+2y=10$ intersect both the axes.
18. If the points $A(3,5)$ and $B(1, 4)$ lies on the graph of line $ax+by=7$. Find the value of a .
19. The cost of coloured paper is 7 more than $\frac{1}{3}$ of the cost of white paper. Write this statement in linear equation in two variables.
20. Draw the graph of equation $x+y=5$.
21. From the choices given below, choose the equation whose graph is given in figure –

- (i) $x+2y=5$
- (ii) $x-2y=5$
- (iii) $y+2x=5$



22. Write the statement in linear equation in two variables showing relationship between Fahrenheit and Celsius.

Part – C

23. 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.
24. Find the value of 'a' if (1, -1) is the solution of the equation $2x + ay = 5$. Find the other two solutions of the equation.
25. 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.
26. Find two solutions of the equation $4x + 5y=28$. Check whether (-2, 10) is the solution of the given equations.
27. Give the geometrical representation of $5x+7=0$ as equation.
- (i) in one variable
- (ii) in two variables
28. The length of the rectangular park is 10m more than its breadth. Perimeter of the park is 180m. Find out the dimensions of park using linear equations in two variables.
29. Draw the graph for the linear equations $3x - 4y = 12$. If $x = 8$ Find the value of y with the help of graph.
30. Find the different solutions of $3m - 8n = 27$.
31. $F = (9/5)C + 32$.
- (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?
32. If $x = 3k - 2$, $Y=2k$ is a solution of equation $4x - 7y + 12 = 0$, then find the value of K.

Part – D

33. 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?
34. Solve of x

$$\frac{3x-5}{3} + \frac{4(x+2)}{5} = \frac{25x+7}{15}$$

35. A man went to the Bank with ₹ 1000. He asked the cashier to give him ₹ 5 and ₹ 10 notes only in return. Write the linear equation in two variables. If no. of ₹ 10 Notes are 25, then find the no. of ₹ 5 Notes? Also represent it graphically?
36. 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?
37. The age of father is 3 years more than three times the age of his son. Three years hence, father's age will be ten years more than twice the age of the son. Assuming father's age as x and son's age as y form two linear equations.
38. The force exerted to pull a cart is directly proportional to the acceleration produced in the body, write a linear equation in two variables to represent the statement by taking constant mass equal to 3kg. Read from the graph the force (in Newton) required when the acceleration produced is 5m/sec^2 .
39. 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. What values of both the students are depicted here?
40. Sarika distributes chocolates on the occasion of children's Day. She gives 5 chocolates to each child and 20 chocolates to adults. If no. of child is represented by ' x ' and total distributed chocolates as ' y '.
- Write it in form of linear equation in two variables.
 - If she distributed 145 chocolates in total, find out no. of children?
 - Which values are depicted here?
41. Priyanka and Arti decided to donate ₹ 1600 for the earthquake victims in Gujrat considering Priyanka's share as ' x ' and Arti share as ' y '.
- Form a liner equation in two variables.
 - If Priyanka donates thrice the amount donated by Arti, than find out the amount donated by both.
 - What values of both the children are depicted here?
42. In a Residential society, Rain water is stored in underground water tank. If the water stored at the rate of 30 cubic cm per second. If water store in ' x ' seconds and ' y ' cubic cm.

- (i) Write this statement in linear equation in two variables.
- (ii) Write this equation in the form of
 $ax + by + c = 0$
- (iii) What value of the society members shows in Rain water storage?
43. 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 Rs. 200.
- (a) Form the linear equation in two variables.
- (b) If no. of girls are 8, find out no. of boys.
- (c) What values of Riya & her friends are depicted here?
44. Find the value of $\left(\frac{x+y}{z}\right)$ If $x^2 + y^2 + z^2 - 4x - 8y - 6z + 29 = 0$
45. (i) If $56^2 - 51^2 = 5P$, then find the value of P.
- (ii) Find the value of $(625)^{0.16} \times (625)^{0.09}$
46. A pharmacist needs to strengthen a 10% alcohol solution to one of 20% alcohol. How much pure alcohol should be added to 400ml of 10% solution?
47. A and B together can do a piece of work in 10 days, but A alone can do it in 15 days. How many days would B alone take to do the same piece of work.
48. If a scootrist drives at the rate of 24 Km. per hour, he reaches his destination 5 minutes late, and if he drives at the rate of 30 Km. per hour, he reaches his destination 4 minutes earlier. Find how far is his destination.
49. A man is five times as old as his son. After 2 years the man will be four times as old as his son. Find their present ages.
50. The numerator of a fraction is 3 less than denominator. If numerator is added to the denominator, then the fraction becomes $\frac{2}{7}$. Find the fraction.

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ANSWERS

1. Paralled to y-axis
2. x-axis
3. $y = 0$
4. $2x - y = 12$ (or any other possible solution)
5. $k = -2$
6. $y = 2$
7. Infinitely many solutions
8. $0.x + 5.y = 9$
9. $K = 1$
10. $\sqrt{2}x - 5y - 4 = 0$
Where $a = \sqrt{2}$, $b = -5$, $c = -4$
11. $x = \frac{7 - 4y}{3}$
12. $y = \frac{9 - 5x}{3}$
13. Yes
14. $(1, 4)(0, 5)$ (or any other two possible solutions)
15. $P = \frac{4a - 10}{9}$
16. $3x - y + 1 = 0$ (or any other possible solution)
 $12x + 7y = 106$
17. $(0, 5)$ and $(2, 0)$
18. $a = -1$

19. $3x - y = 21$
20. $x - 2y = 5$
22. $f = \frac{(9)}{5}c + 32$
23. $a = -4$ $b = 4$
24. $a = -3$ (other two solutions may be $x = 4, y = 1$ and $x = 1, y = -1$ and any other possible solutions.)
25. $(3, 0), (0, 2)$
26. $(2, 4), (7, 0)$ (No)
28. 50m, 40m
29. $y = 3$
30. $(1, -3), (9, 0)$ and $(-7, -6)$ (or any other possible solutions)
31. $95^\circ \text{F}, 86^\circ \text{F}$
32. $K = 2$
33. No
34. $x = 4$
35. 150
36. $a = 8, b = -3, c = 0$ infinite solutions
Two solutions may be $x = 3, y = 8$ and $x = 6, y = 16$ (Any other solutions may possible)
37. $x = 3y + 3$
 $x = 2y + 13$

38. $y = 3x$ ($y = \text{force}$, $x = \text{acceleration}$), $F = 15 \text{ N}$
39. $x + y = 25$, Sharing, Self awareness (Any other values)
40. (i) $5x + 20 = y$
(ii) 25
(iii) Happiness, Sharing, Harmony
41. (a) $x + y = 1600$
(b) Priyanka ₹ = 1200, Arti ₹ = 400
(c) Helpfulness, caring, social responsibility, sensitivity)
42. (i) $y = 30x$
(ii) $30x - y + 0 = 0$
(iii) Environment Security, Co-operation
43. (a) $150x + 200y = 3600$
(b) Boys = 12
(c) Co-operation, sincerity, helpfulness
44. $\frac{x + y}{z} = 2$ ($x=2, y=4$ and $z=3$)
45. (i) 107
(ii) 5
46. 50 ml
47. 30 days
48. 18km far
49. Son's age = 6 years
Man's age = 30 years
50. $\frac{2}{5}$