MATHEMATICS

Chapter 4: Linear Equations in Two Variables

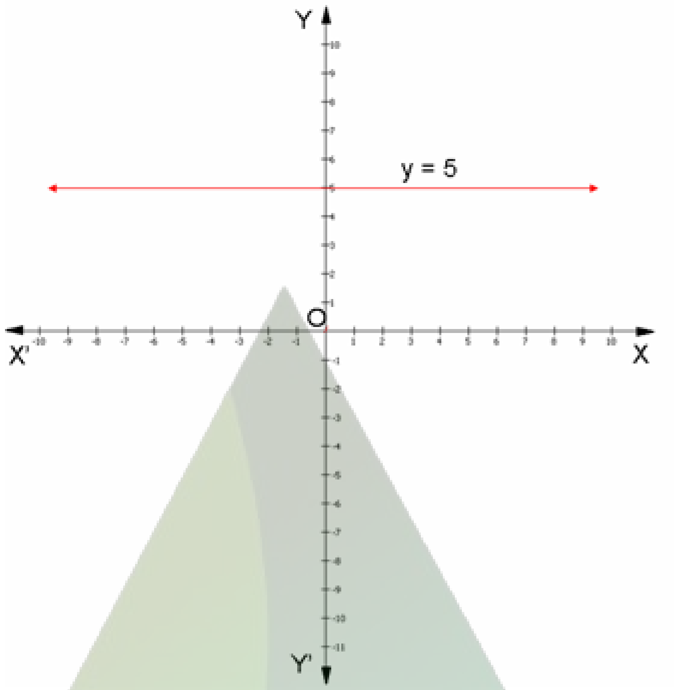
Linear Equations in Two Variables

1. An equation of the form ax + by + c = 0, where a, b and c are real numbers, such that a and b are not both zero, is called a **linear equation in two variables**.
2. Linear equations in one variable, of the type ax + b = 0, can also expressed as a linear equation in two variables. Since, ax + b = 0 ⇒ ax + 0.y + b = 0.
3. A **solution** of a linear equation in two variables is a pair of values, one for x and one for y, which satisfy the equation.
4. The solution of a linear equation is not affected when-
   i. The same number is added or subtracted from both the sides of an equation.
   ii. Multiplying or dividing both the sides of the equation by the same non-zero number.
5. A linear equation in two variables has **infinitely many solutions**.
6. Every point on the line satisfies the equation of the line and every solution of the equation is a point on the line.
7. A linear equation in two variables is represented geometrically by a straight line whose points make up the collection of solutions of the equation. This is called the **graph** of the linear equation.
8. x = 0 is the equation of the y-axis and y = 0 is the equation of the x-axis.
9. The graph of **x = k** is a straight line parallel to the y-axis.

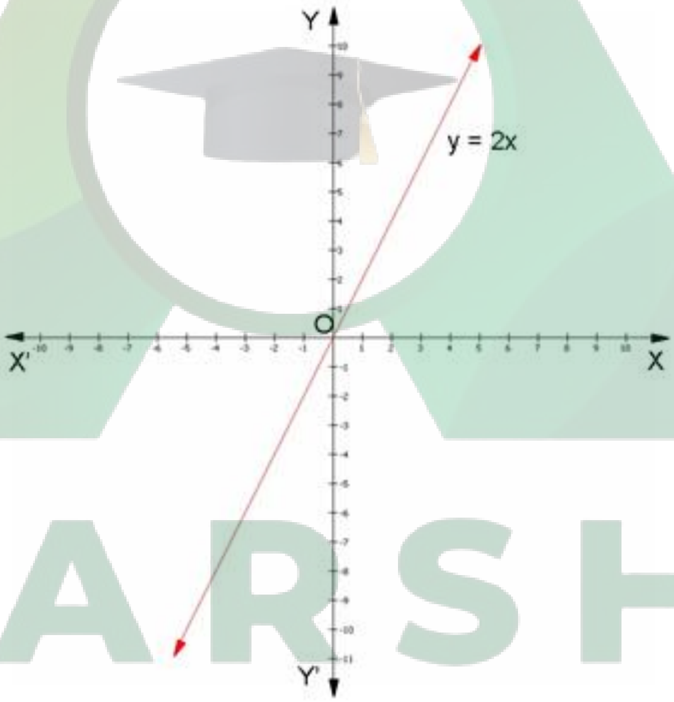
   For example, the graph of the equation x = 5 is as follows:

10. The graph of **y = k** is a straight line parallel to the x-axis.

For example, the graph of the equation y = 5 is as follows:



11. An equation of the type **y = mx** represents a line passing through the origin, where m is a real number. For example, the graph of the equation y = 2x is as follows:



Linear equation in one variable

When an equation has only one variable of degree one, then that equation is known as linear equation in one variable.

A linear equation in one variable is an equation which has a maximum of one variable of order 1. It is of the form ax + b = 0, where x is the variable.

- Standard form: ax + b = 0, where a and b ϵ R & a ≠ 0
- Examples of linear equation in one variable are:

– 3x - 9 = 0

– 2t = 5

Standard Form of Linear Equations in One Variable

The standard form of linear equations in one variable is represented as:

ax + b = 0

Where,

- 'a' and 'b' are real numbers.
- Both 'a' and 'b' are not equal to zero.

Thus, the formula of linear equation in one variable is ax + b = 0.

Solving Linear Equations in One Variable

For solving an equation having only one variable, the following steps are followed

- Step 1: Using LCM, clear the fractions if any.
- Step 2: Simplify both sides of the equation.
- Step 3: Isolate the variable.
- Step 4: Verify your answer.

Example of Solution of Linear Equation in One Variable

Let us understand the concept with the help of an example.

For solving equations with variables on both sides, the following steps are followed:

Consider the equation: 5x – 9 = -3x + 19

Step 1: Transpose all the variables on one side of the equation. By transpose, we mean to shift the variables from one side of the equation to the other side of the equation. In the method of transposition, the operation on the operand gets reversed.

In the equation 5x – 9 = -3x + 19, we transpose -3x from the right-hand side to the left-hand side of the equality, the operation gets reversed upon transposition and the equation becomes:

5x – 9 +3x = 19

⇒ 8x -9 = 19

Step 2: Similarly transpose all the constant terms on the other side of the equation as below:

8x -9 = 19

⇒ 8x = 19 + 9

⇒ 8x = 28

Step 3: Divide the equation with 8 on both sides of the equality.

8x/8 = 28/8

⇒ x = 28/8

If we substitute x = 28/8 in the equation 5x – 9 = -3x + 19, we will get 9 = 9, thereby satisfying the equality and giving us the required solution.

The Application of Linear equation

There are various applications of linear equations in Mathematics as well as in real life. An algebraic equation is an equality that includes variables and equal sign (=). A linear equation is an equation of degree one.

The knowledge of mathematics is frequently applied through word problems, and the applications of linear equations are observed on a wide scale to solve such word problems. Here, we are going to discuss the linear equation applications and how to use them in the real world with the help of an example.

A linear equation is an algebraic expression with a variable and equality sign (=), and whose highest degree is equal to 1. For example, $2x - 1 = 5$ is a linear equation.

- Linear equation with one variable and degree one is called a linear equation in one variable. (Eg, $3x + 5 = 0$)
- Linear equation with degree one and two variables is called a linear equation in two variables. (Eg, $3x + 5y = 0$)

The graphical representation of linear equation is $ax + by + c = 0$, where,

- a and b are coefficients
- x and y are variables
- c is a constant term

In real life, the applications of linear equations are vast. To tackle real-life problems using algebra, we convert the given situation into mathematical statements in such a way that it clearly illustrates the relationship between the unknowns (variables) and the information provided. The following steps are involved while restating a situation into a mathematical statement:

- Translate the problem statement into a mathematical statement and set it up in the form of algebraic expression in a manner it illustrates the problem aptly.
- Identify the unknowns in the problem and assign variables (quantity whose value can change depending upon the mathematical context) to these unknown quantities.
- Read the problem thoroughly multiple times and cite the data, phrases and keywords. Organize the information obtained sequentially.
- Frame an equation with the help of the algebraic expression and the data provided in the problem statement and solve it using systematic techniques of equation solving.
- Retrace your solution to the problem statement and analyze if it suits the criterion of the problem.

There you go!! Using these steps and applications of linear equations word problems can be solved easily.

Applications of Linear equations in Real life

- Finding unknown age
- Finding unknown angles in geometry
- For calculation of speed, distance or time
- Problems based on force and pressure

Let us look into an example to analyze the applications of linear equations in depth.

Applications of Linear Equations Solved Example

Example:

Rishi is twice as old as Vani. 10 years ago his age was thrice of Vani. Find their present ages.

Solution:

In this word problem, the ages of Rishi and Vani are unknown quantities. Therefore, as discussed above, let us first choose variables for the unknowns.

Let us assume that Vani's present age is 'x' years. Since Rishi's present age is 2 times that of Vani, therefore his present age can be assumed to be '2x'.

10 years ago, Vani's age would have been 'x – 10 ', and Rishi's age would have been '2x – 10'. According to the problem statement, 10 years ago, Rishi's age was thrice of Vani, i.e. 2x – 10 = 3(x – 10).

We have our linear equation in the variable 'x' which clearly defines the problem statement. Now we can solve this linear equation easily and get the result.

$$2x - 10 = 3(x - 10)$$
$$\Rightarrow 2x - 10 = 3x - 30$$
$$\Rightarrow x = 20$$

This implies that the current age of Vani is 20 years, and Rishi's age is '2x,' i.e. 40 years. Let us retrace our solution. If the present age of Vani is 20 years then 10 years ago her age would have been 10 years, and Rishi's age would have been 30 years which satisfies our problem statement. Thus, applications of linear equations enable us to tackle such real-world problems.

Linear Equations Formula

A linear equation looks like any other equation. It is made up of two expressions set equal to each other. It is equal to the product that is directly proportional to the other plus the constant.

The Linear equation formula is given by

$$y = mx + b$$

Where,

m determines the slope of that line,

b determines the point at which the line crosses

Solved Examples

Question 1: Solve for x: 5x + 6 = 11

Solution:

Given function is 5x + 6 = 11

5x = 11 – 6

$x = \frac{5}{5} = 1$

Therefore, x = 1.

Graphing of Linear Equations

Linear equations, also known as first-order degree equations, where the highest power of the variable is one. When an equation has one variable, it is known as linear equations in one variable. If the linear equations contain two variables, then it is known as linear equations in two variables, and so on. In this article, we are going to discuss the linear equations in two variables, and also going to learn about the graphing of linear equations in two variables with examples.

Linear Equations in Two Variables

Equations of degree one and having two variables are known as linear equations in two variables. It is of the form, ax + by + c = 0, where a, b and c are real numbers, and both a and b not equal to zero.

Equations of the form ax + by = 0; where a and b are real numbers, and a, b ≠ 0, is also linear equations in two variable.

Solution of a Linear Equation in Two Variables

The solution of a linear equation in two variables is a pair of numbers, one for x and one for y which satisfies the equation. There are infinitely many solutions for a linear equation in two variables.

For example, x + 2y = 6 is a linear equation and some of its solution are (0,3),(6,0),(2,2) because, they satisfy x + 2y = 6.

Graphing of Linear Equation in Two Variables

Since the solution of linear equation in two variable is a pair of numbers (x,y), we can represent the solutions in a coordinate plane.

Consider the equation,

2x + y = 6 —(1)

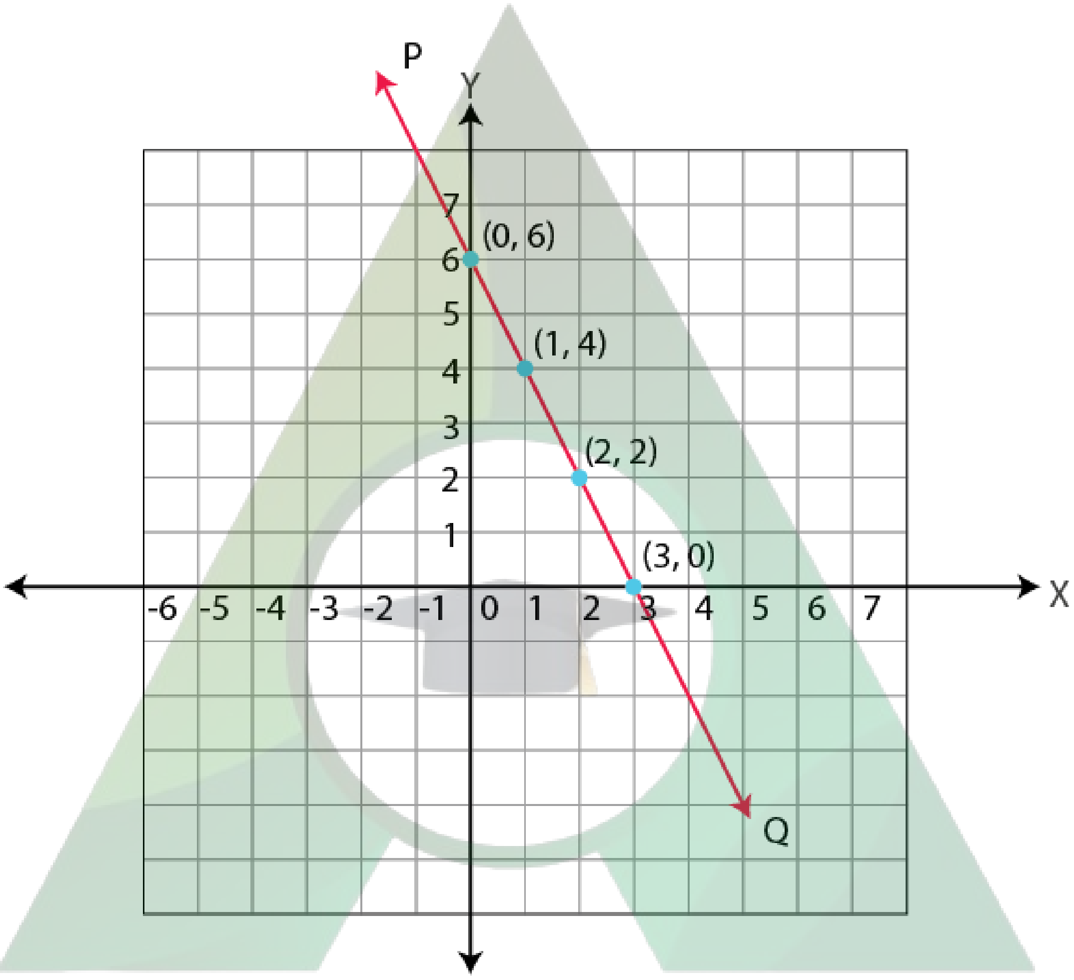
Some solutions of the above equation are, (0,6), (3,0), (1,4), (2,2) because, they satisfy (1).

We can represent the solution of (1) using a table as shown below.

x	0	3	1	2	...
y	6	0	4	2	...

We can plot the above points (0, 6), (3, 0), (1, 4), (2, 2) in a coordinate plane (Refer figure).

We can take any two points and join those to make a line. Let the line be PQ. It is observed that all the four points are lying on the same line PQ.



Consider any other point on the line PQ, for example, take point (4, -2) which lies on PQ.

Let's check whether this point satisfies the equation or not.

Substituting (4, -2) in (1) gives,

LHS = (2 × 4) -2 = 6 = RHS

Therefore (4, -2) is a solution of (1).

Similarly, if we take any point on the line PQ, it will satisfy (1).

It can be observed that,

- All the points say, (p, q) on the line PQ gives a solution of 2x + y = 6.
- All the solution of 2x + y = 6, lie on the line PQ.
- Points which are not the solution of 2x + y = 6 will not lie on the line PQ.

Graphing of Linear Equations keypoints

It can be concluded that, for a linear equation in two variables,

- Every point on the line will be a solution to the equation.
- Every solution of the equation will be a point on the line.

Therefore, every linear equation in two variables can be represented geometrically as a straight line in a coordinate plane. Points on the line are the solution of the equation. This why equations with degree one are called as linear equations. This representation of a linear equation is known as graphing of linear equations in two variables.

Linear equation in 2 variables

When an equation has two variables both of degree one, then that equation is known as linear equation in two variables.

Standard form: $ax + by + c = 0$, where $a, b, c \in R$ & $a, b \neq 0$

Examples of linear equations in two variables are:

– $7x+y=8$

– $6p-4q+12=0$

Examples of Linear Equations

The solution of linear equation in 2 variables

A linear equation in two variables has a pair of numbers that can satisfy the equation. This pair of numbers is called as the solution of the linear equation in two variables.

The solution can be found by assuming the value of one of the variable and then proceed to find the other solution.

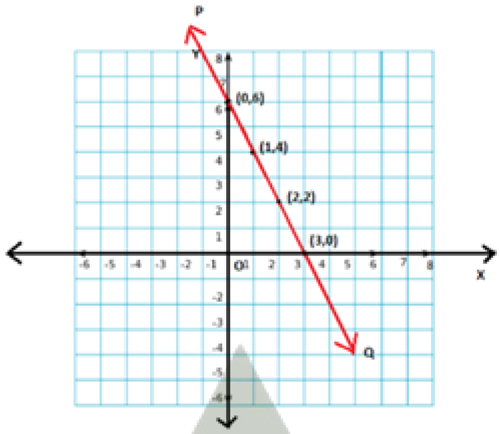
There are infinitely many solutions for a single linear equation in two variables.

Graph of a Linear Equation

Graphical representation of a linear equation in 2 variables

Any linear equation in the standard form $ax + by + c = 0$ has a pair of solutions in the form (x, y), that can be represented in the coordinate plane.

When an equation is represented graphically, it is a straight line that may or may not cut the coordinate axes.



Solutions of Linear equation in 2 variables on a graph

- A linear equation ax + by + c = 0 is represented graphically as a straight line.
- Every point on the line is a solution for the linear equation.
- Every solution of the linear equation is a point on the line.

Lines passing through the origin

- Certain linear equations exist such that their solution is (0, 0). Such equations when represented graphically pass through the origin.
- The coordinate axes namely x-axis and y-axis can be represented as y=0 and x=0, respectively.

Lines parallel to coordinate axes

- Linear equations of the form y = a, when represented graphically are lines parallel to the x-axis and a is the y-coordinate of the points in that line.
- Linear equations of the form x = a, when represented graphically are lines parallel to the y-axis and a is the x-coordinate of the points in that line.

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Chapter- 4: Linear Equations in Two Variables

Linear Equations in Two Variables

Linear equation

- Equation of the form ax + by + c = 0
- Where → a , b c - constants, $(a,b) \neq (0,0)$
- Example → x, y - variables

Steps to find solution

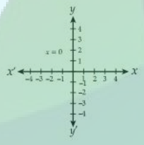
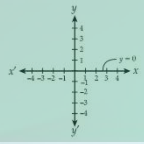
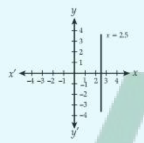
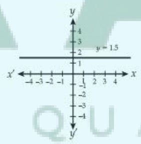
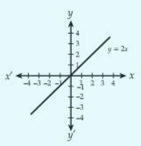
Step 1: Write the equation in two variables, if not present

Step 2: Reduce it to one variable by putting an arbitrary value of any variable, to find a pair of solution.

Step 3: Repeat step 2 for another arbitrary value of variable to find another pair of solution.

It can have one, no or infinitely many solutions.

Graphical Representation

Equation	Interpretation	Graphical representation
$x = 0$	Equation of y-axis	
$y = 0$	Equation of x-axis	
$x = K$	Straight line parallel to y-axis	
$y = K$	Straight line parallel to x-axis	
$y = mx$	Line passing through origin	

Example - Graph of Linear Equation

Linear equation: $2x + 3y + 12$

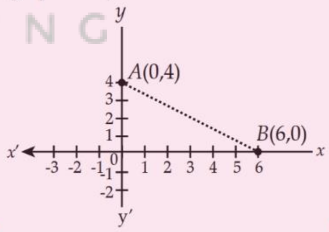
Step 1: From equation, we get

$$y = \frac{12 - 2x}{3}$$

Step 2: Put arbitrary value of x, y.

x	0	0
y	4	6

Step 3: Plot (0,4) and (6,0) on the graph and join them.



Important Questions

Multiple Choice Questions-

Question 1. The linear equation 3x - 11y = 10 has:

a) Unique solution

b) Two solutions

c) Infinitely many solutions

d) No solutions

Question 2. 3x + 10 = 0 will has:

a) Unique solution

b) Two solutions

c) Infinitely many solutions

d) No solutions

Question 3. The solution of equation x - 2y = 4 is:

a) (0,2)

b) (2,0)

c) (4,0)

d) (1,1)

Question 4. The value of k, if x = 1, y = 2 is a solution of the equation 2x + 3y = k.

a) 5

b) 6

c) 7

d) 8

Question 5. Point (3, 4) lies on the graph of the equation 3y = kx + 7. The value of k is:

a) 4/3

b) 5/3

c) 3

d) 7/3

Question 6. The graph of linear equation x + 2y = 2, cuts the y-axis at:

a) (2,0)

b) (0,2)

c) (0,1)

d) (1,1)

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

a) (k, -k)

b) (0, k)

c) (k, 0)

d) (k, k)

Question 8. The graph of x = 3 is a line:

a) Parallel to x-axis at a distance of 3 units from the origin

b) Parallel to y-axis at a distance of 3 units from the origin

c) Makes an intercept 3 on x-axis

d) Makes an intercept 3 on y-axis

Question 9. In equation, y = mx + c, m is:

a) Intercept

b) Slope of the line

c) Solution of the equation

d) None of the above

Question 10. If x and y are both positive solutions of equation ax + by + c = 0, always lie in:

a) First quadrant

b) Second quadrant

c) Third quadrant

d) Fourth quadrant

Very Short:

1. Linear equation x – 2 = 0 is parallel to which axis?

2. Express x in term of y : $\frac{x}{7} + 2y = 6$

3. If we multiply or divide both sides of a linear equation with a non-zero number, then what will happen to the solution of the linear equation?

4. Find the value of k for which x = 0, y = 8 is a solution of 3x – 6y = k.

5. Write the equation of a line which is parallel to x-axis and is at a distance of 2 units from the origin.

6. Find 'a', if linear equation 3x - ay = 6 has one solution as (4, 3).

7. Cost of a pen is two and half times the cost of a pencil. Express this

situation as a linear equation in two variables.

8. In an one day international cricket match, Raina and Dhoni together scored 198 runs. Express the statement as a linear equation in two variables.

9. The cost of a table is 100 more than half the cost of a chair. Write this statement as a linear equation in two variables.

Short Questions:

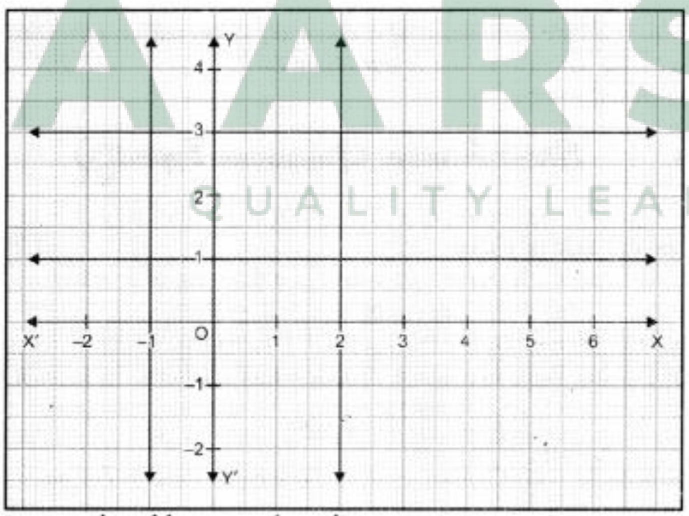
1. Write linear equation representing a line which is parallel to y-axis and is at a distance of 2 units on the left side of y-axis.
2. In some countries temperature is measured in Fahrenheit, whereas in countries like India it is measured in Celsius. Here is a linear equation that converts Fahrenheit to Celsius :

   $F = \left(\frac{9}{5}\right)C + 32°$

   If the temperature is – 40°C, then what is the temperature in Fahrenheit?
3. If the temperature is – 40°C, then what is the temperature in Fahrenheit?
4. If ax + 3y = 25, write y in terms of x and also, find the two solutions of this equation.
5. Find the value of k, if (1, -1) is a solution of the equation 3x - ky = 8. Also, find the coordinates of another point lying on its graph.
6. Let y varies directly as x. If y = 12 when x = 4, then write a linear equation. What is the value of y, when x = 5?

Long Questions:

1. Write the equations of the lines drawn in following graph:



Also, find the area enclosed between these lines.

2. If (2, 3) and (4, 0) lie on the graph of equation ax + by = 1. Find the value of a and b. Plot the graph of equation obtained.
3. Draw the graphs of the following equations on the same graph sheet:

   x = 4, x = 2, y = 1 and y - 3 = 0.
4. Cost of 1 pen is ₹ x and that of 1 pencil is ₹ y. Cost of 2 pens and 3 pencils together is ₹ 18. Write a linear equation which satisfies this data. Draw the graph for the same.
5. Sum of two numbers is 8. Write this in the form of a linear equation in two variables. Also, draw the line given by this equation. Find graphically the numbers, if difference between them is 2.

Assertion and Reason Questions-

1. In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

Assertion: There are infinite number of lines which passes through (2, 14).

Reason: A linear equation in two variables has infinitely many solutions.

2. In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

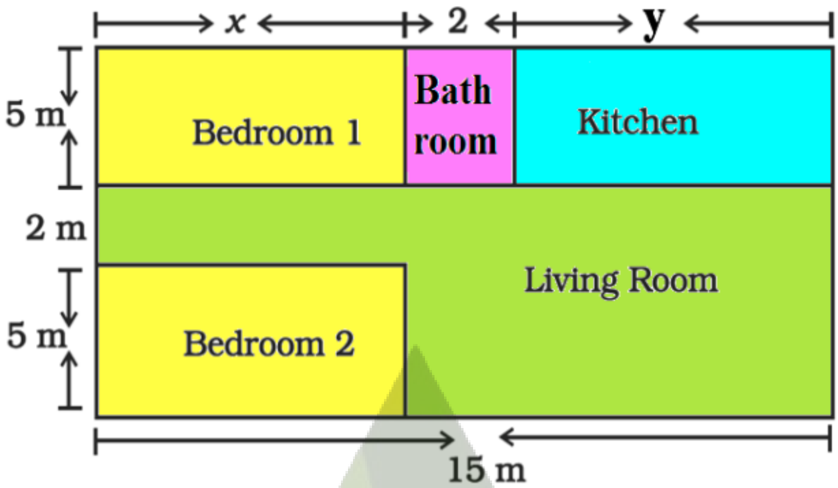
Assertion: All the points (1, 0), (,) - 1 0 , (2, 0) and (5, 0) lie on the x -axis.

Reason: Equation of the x -axis is y = 0.

Case Study Questions-

1. In the below given layout, the design and measurements has been made such that

area of two bedrooms and Kitchen together is 95 sq. m.



(i) The area of two bedrooms and kitchen are respectively equal to:

(a) 5x, 5y

(b) 10x, 5y

(c) 5x, 10y

(c) x, y

(ii) Find the length of the outer boundary of the layout.

(a) 27m

(b) 15m

(c) 50m

(d) 54m

(iii) The pair of linear equation in two variables formed from the statements are

(a) x + y = 13, x + y = 9

(b) 2x + y = 13, x + y = 9

(c) x + y = 13, 2x + y = 9

(d) None of the above

(iv) Which is the solution satisfying both the equations formed in (iii)?

(a) x = 7, y = 6

(b) x = 8, y = 5

(c) x = 6, y = 7

(d) x = 5, y = 8

(v) Find the area of each bedroom.

(a) 30 sq. m

(b) 35 sq. m

(c) 65 sq. m

(d) 42 sq. m

Case Study Answers-

(i) (b) 10x, 5y

Explanation:

Area of one bedroom = 5x sq.m

Area of two bedrooms = 10x sq.m

Area of kitchen = 5y sq. m

(ii) (d) 54m

Explanation:

Length of outer boundary = 12 + 15 + 12 + 15 = 54 m

(iii) (d) None of the above

Explanation:

Area of two bedrooms = 10x sq.m

Area of kitchen = 5y sq. m

So, 10x + 5y = 95, 2x + y = 19

Also, x + 2 + y = 15, x + y = 13

(iv) x = 6, y = 7

Explanation:

x + y = 6 + 7 = 13

2x + y = 2(6) + 7 = 19

x = 6, y = 7

(v) (a) 30 sq. m

Answer Key:

MCQ:

1. (c) Infinitely many solutions
2. (a) Unique solution
3. (c) (4,0)
4. (d) 8
5. (b) 5/3
6. (c) (0,1)
7. (d) (k, k)
8. (b) Parallel to y-axis at a distance of 3 units from the origin

9. (b) Slope of the line

10. (a) First quadrant

Very Short Answer:

1. Here, linear equation is x – 2 ⇒ 0 x = 2

   Thus, it is parallel to the y-axis.

2. Given equation is

   $\frac{x}{7} + 2y = 6$

   $\Rightarrow \frac{x}{7} = 6 - 2y$

   Thus, x = 7(6 − 2y).

3. Solution remains the same.

4. Since x = 0 and y = 8 is a solution of given equation

   3x – 6y = k

   3(0) – 6(8) = k

   ⇒ k = – 48

5. Here, required line is parallel to x-axis and at a distance of 2 units from the origin.

   ∴ Its equation is

   y + 2 = 0

   or y – 2 = 0

6. Since (4, 3) is a solution of given equation.

   ∴ 3(4) – a(3) = 6

   ⇒ 12 – 3a = 6

   $\Rightarrow a = \frac{-6}{-3}$

   Hence, a = 2

7. Let cost of a pen be ₹ x and cost of a pencil be ₹ y.

   According to statement of the question, we have

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

   ⇒ 2x = 5y or 2x − 5y = 0

8. Let runs scored by Raina be x and runs scored by Dhoni be y.

   According to statement of the question, we have

   x + y = 198

   x + y – 198 = 0

9. Let the cost price of a table be ₹ x and that of a chair be ₹ y.

Since the cost price of a table is 100 more than half the cost price of a chair.

$\therefore x = \frac{1}{2}y + 100$

$\Rightarrow 2x = y + 200$ or $2x - y - 200 = 0$.

Short Answer:

Ans: 1. Here, required equation is parallel to y-axis at a distance of 2 units on the left side of y-axis.

$x = -2$ or $x + 2 = 0$

Ans: 2. Given linear equation is

$F = \left(\frac{9}{5}\right)C + 32°$

Put C = -40°, we have

$F = \frac{9}{5}(-40°) + 32°$

$F = -72° + 32°$

$F = -40°$

Ans: 3. Since there are infinite lines passing through the point (2, 3).

Let, first equation is $x + y = 5$ and second equation is $2x + 3y = 13$.

Clearly, the lines represented by both equations intersect at the point (2, 3).

Ans: 4.

Given equation is

$$\pi x + 3y = 25$$

$$\therefore \quad y = \frac{25 - \pi x}{3}$$

When $x = 0$, then $y = \frac{25}{3}$.

When $x = 1$, then $y = \frac{25-\pi}{3}$.

Hence, the two solutions are $x = 0, y = \frac{25}{3}$ and $x = 1, y = \frac{25-\pi}{3}$.

Ans: 5. Since (1, -1) is a solution of the equation $3x - ky = 8$

$\therefore 3(1) - k(-1) = 8$

$\Rightarrow k = 8 - 3 = 5$

Thus, the given equation is

$3x - 5y = 8$

Put $x = 6$, then $y = \frac{3 \times 6 - 8}{5} = \frac{18-8}{5} = \frac{10}{5} = 2$

Hence, the coordinates of another point lying on the graph of 3x – 5y = 8 is (6, 2).

Ans: 6. Given y varies directly as x implies y = kx

But y = 12 for x = 4

⇒ 4k = 12 = k = 3

Put k = 3 in y = kx, we have

y = 3x

Now, when x = 5, y = 3 x 5 = y = 15 ...(i)

Ans: 7. Let numerator and denominator of the given fraction be respectively x and y. According to the statement, we obtain

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

⇒ 4x − 8 = y + 3

⇒ 4x − y − 11 = 0

Which is the required linear equation. When y = 1, then x = 3. When y = 5, then x = 4. Hence, the two solutions are (3, 1) and (4, 5).

Long Answer:

Ans: 1. Equations of the lines drawn in the graph are as :

x = -1 or x + 1 = 0,

x = 2 or x - 2 = 0,

y = 1 or y - 1 = 0 and

y = 3 or y - 3 = 0

Figure formed by these lines is a rectangle of dimensions 3 units by 2 units.

Hence, the area enclosed between given lines = 6 sq. units.

Ans: 2. (2, 3) and (4, 0) lie on the graph of equation

ax + by = 1 ...(i)

∴ We have 2a + 3b = 1 ... (ii)

and 4a + 0 = 1

$\Rightarrow \quad a = \frac{1}{4}$

Putting the value of a in eq. (*ii*), we have

$$2 \times \frac{1}{4} + 3b = 1$$

$$\frac{1}{2} + 3b = 1$$

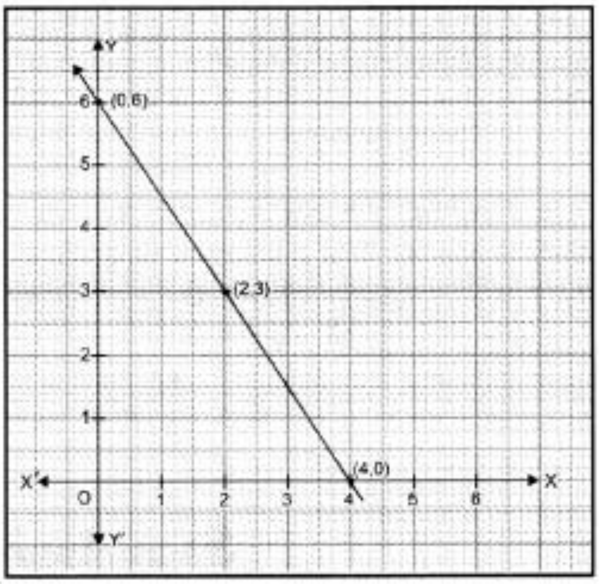
$$\Rightarrow \quad 3b = \frac{1}{2}$$

$$\Rightarrow \quad b = \frac{1}{6}$$

Putting the values of a and b in eq. (*i*), we have

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

$$\Rightarrow \quad \frac{3x+2y}{12} = 1 \Rightarrow \quad 3x + 2y = 12 \quad ...(iii)$$



Which is required linear equation.

Put x= 0 in eq. (iii), we have

⇒ 3(0) + 2y = 12

⇒ 2y = 12

⇒ y = 6

Put x = 2 in eq. (iii), we have

⇒ 3(2) + 2y = 12

⇒ 2y = 6

⇒ y = 3

Put x = 4 in eq. (iii), we have

⇒ 3(4) + 2y = 12

⇒ 2y = 0

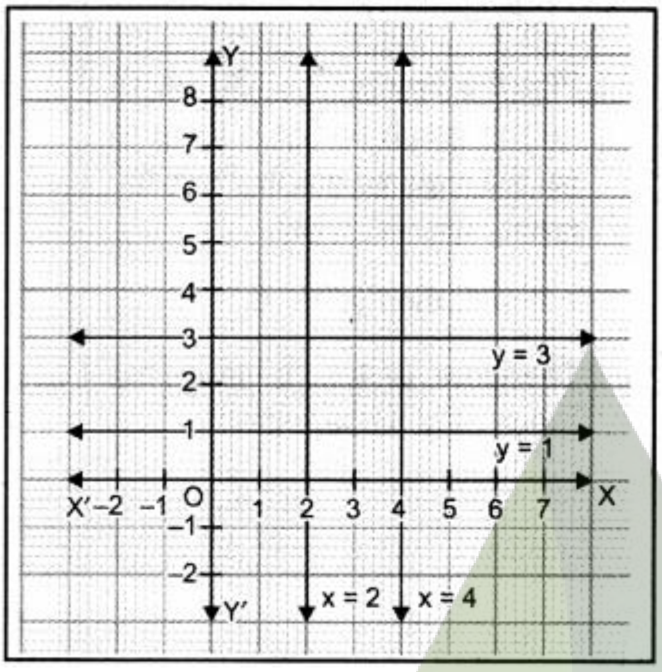
⇒ y = 0

We have the following table:

x	0	2	4
y	6	3	0

By plotting the points (0, 6), (2, 3) and (4, 0). Joining them, we obtained the graph of 3x + 2y = 12.

Ans: 3. By plotting the points (0, 6), (2, 3) and (4, 0). Joining them, we obtained the graph of 3x + 2y = 12.



Ans: 4. Here, cost of 1 pen is ₹x and that

of 1 pencil is ₹ y According to the statement of the question, we have

$2x + 3y = 18$

$\Rightarrow x = \frac{18-3y}{2}$

When y = 0, x = 9

When y = 4, x= 3.

When y = 6, x = 0

Table of solutions is

x	0	3	9
y	6	4	0

Plot the points (0, 6), (3, 4) and (9, 0). Join them in pairs to get the required line.

Ans: 5. Let the two numbers be x and y.

It is given that sum of two numbers is 8.

$\therefore x + y = 8$

$y = 8 - x$

When x = 0,

When x = 4, y = 4

When x = 8, y = 0

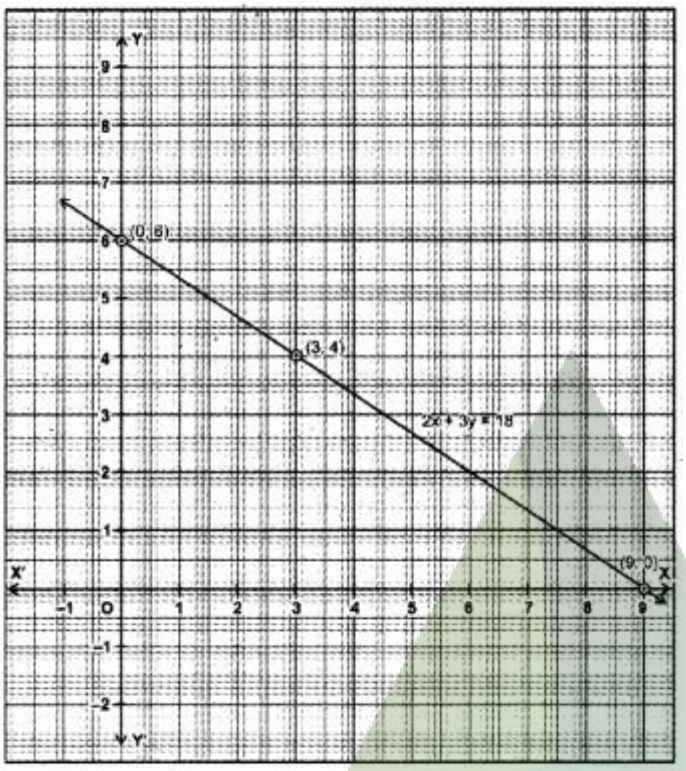


Table of solutions is:

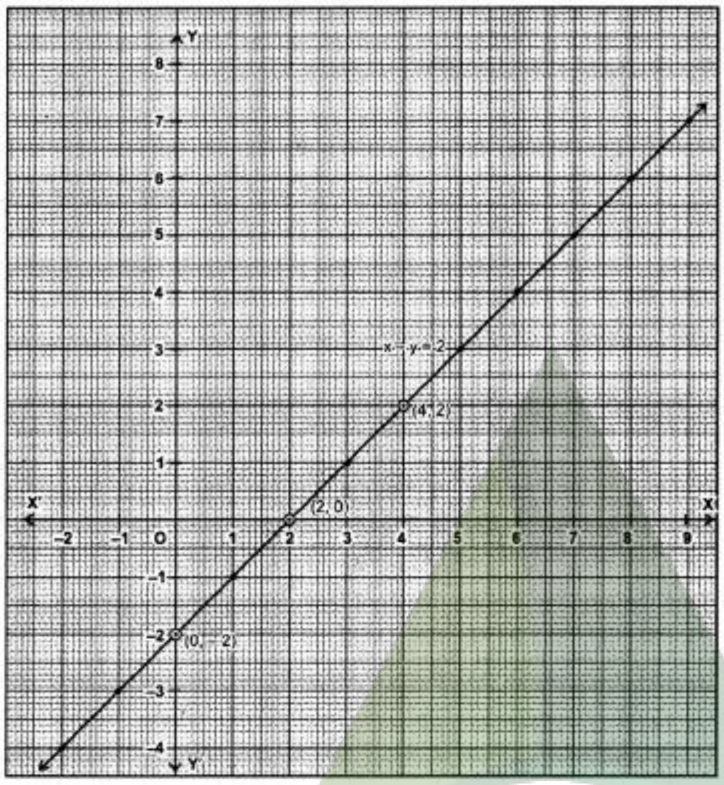
x	0	4	8
y	8	4	0

Plot the points (0, 8), (4, 4), (8, 0) and join them in pairs, we get the required graph.

When difference between two number is 2, then

$x - y = 2, x > y$

$\Rightarrow x = y + 2$



When x = 0, y = -2

When x = 2, y = 0

When x = 4, y = 2

Table of solutions is:

x	0	2	4
y	–2	0	2

Plot these points (0, -2), (2, 0), (4, 2) and join them to get the required line.

Graphically, the numbers are: (-2; 4), (-1, -3), (0, -2), (1, -1), (2, 0), (3, 1), (4, 2), (5, 3), (6, 4), (7,5) etc.

Assertion and Reason Answers-

1. b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Explanation:

Assertion : There are infinite number of lines which passes through (2 , 14) .

For a given point there can be infinite number of line passing through

Hence Assertion is true

to Define one line , there should be atleast 2 distinct points

Reason : A linear equation in two variables has infinitely many solutions.

ax + by = c

Has infinitely many solutions as infinite point lies on a line

Hence Reason is True

But Reason is not the the correct explanation of assertion as reason is about infinite points on a given line

while assertion is about infinite lines passing through a point.

Hence,

Both assertion and reason are true but reason is not the correct explanation of assertion.

2. a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

Explanation:

Points on x-axis have '0' as their ordinate.

So, (1,0), (-1, 0), (2, 0) and (5, 0) all lie on x-axis.

Equation of x-axis is $y = 0$

∴ Both assertion and reason are correct.