CBSE NCERT Solutions for Class 9 mathematics Chapter 4

Exercise

Q.1. The cost of a notebook is twice the cost of pen. Write a linear equation in two variables to represent this statement.

Solution: Let the cost of a notebook be ₹x and cost of a pen be ₹y.

Given that, cost of a notebook =2× Cost of a pen

⇒x=2y ⇒x-2y=0 Hence, x-2y=0 is the representation of the given statement.

Q.2. Express the linear equation in the form ax+by+c=0 and indicate the values of a, b and c.

2x+3y=9.35-

Solution: Given, 2x+3y=9.35-

⇒2x+3y-9.35-=0

Comparing above equation with ax+by+c=0, we get a=2, b=3 and c=-9.35-.

Q.3. Express the linear equation in the form ax+by+c=0 and indicate the values of a, b and c.

x-y5-10=0

Solution: Given, x-y5-10=0

To convert the given equation in the form ax+by+c=0.

Now, x-y5-10=0 ⇒x+-15y+-10=0 Comparing above equation with ax+by+c=0, we get, a=1, b=-15 and c=-10

Q.4. Express the linear equation in the form ax+by+c=0 and indicate the values of a, b and c.

-2x+3y=6

Solution: Given, -2x+3y=6

⇒-2x+3y-6=0

Comparing above equation with ax+by+c=0, we get, a=-2, b=3 and c=-6

Q.5. Express the linear equation in the form ax+by+c=0 and indicate the values of a, b and c.

x=3y

Solution: Given, x=3y

⇒x-3y=0

⇒x-3y+0=0 Comparing equation x-3y+0=0 with ax+by+c=0, we get, a=1, b=-3 and c=0

Q.6. Express the linear equation in the form ax+by+c=0 and indicate the values of a, b and c.

2x=-5y

Solution: Given, 2x=-5y

⇒2x+5y=0

⇒2x+5y+0=0 Comparing the equation 2x+5y+0=0 with ax+by+c=0, we get, a=2, b=5 and c=0

Q.7. Express the linear equation in the form ax+by+c=0 and indicate the values of a, b and c.

3x+2=0

Solution: Given, 3x+2=0

⇒3x+0×y+2=0

Comparing the equation 3x+0×y+2=0 with ax+by+c=0, we get, a=3, b=0 and c=2

Q.8. Express the linear equation in the form ax+by+c=0 and indicate the values of a, b and c.

y-2=0

Solution: Given, y-2=0

⇒0×x+1×y+-2=0

Comparing the equation 0×x+1×y+-2 with ax+by+c=0, we get, a=0, b=1 and c=-2

Q.9. Express the linear equation in the form ax+by+c=0 and indicate the values of a, b and c.

5=2x

Solution: Given, 5=2x

⇒2x-5=0

⇒2x+0·y+-5=0 Comparing above equation 2x+0·y+-5=0 with ax+by+c=0, we get, a=2, b=0 and c=-5

Q.10. Write whether y=3x+5 has a unique solution, only two solutions or infinitely many solutions. Why?

Solution: Given equation is: y=3x+5

Substituting x=1, we get,

y=3×1+5=8 Substituting x=2, we get, y=3×2+5=11 Substituting x=3, we get, y=3×3+5=14 Similarly, For every value of x∈R, there will exist a value of y. Hence, the linear equation y=3x+5 has infinitely many solutions.

Q.11. Write four solutions for the equation 2x+y=7.

Solution: Given, 2x+y=7

⇒y=7-2x

For x=0, ⇒y=7-2×0=7 ∴0,7 is a solution. For x=1, ⇒y=7-2×1=7-2=5 ∴1,5 is a solution. For x=2, ⇒y=7-2x=7-2×2=7-4=3 ∴2,3 is a solution. For x=3, ⇒y=7-23=7-6=1 ∴3,1 is a solution. Therefore, four of the solutions of the given equation are 0,7, 1,5, 2,3 and 3,1.

Q.12. Write four solutions for the equation πx+y=9.

Solution: Given, πx+y=9

⇒y=9-πx

For x=1π, y=9-π×1π=9-1=8 ∴1π,8 is a solution of the equation. For x=2π, y=9-π×2π=9-2=7 ∴2π,7 is a solution of the equation.

For x=3π,

y=9-π×3π=9-3=6

∴3π,6 is a solution of the equation. For x=0, y=9-π×0=9-0=9 ∴0,9 is a solution of the equation. Therefore, four of the solutions of the given equation are 1π,8, 2π,7, 3π,6 and 0,9.

Q.13. Write four solutions for the equation x=4y.

Solution: Given, x=4y

For y=1,

x=4×1=4 So, 4,1 is a solution of the equation. For y=2, x=4×2=8 So, 8,2 is a solution of the equation. For y=3 x=4×3=12 So, 12,3 is a solution of the equation. For y=4, x=4×4=16 So, 16,4 is a solution of the equation. Therefore, four of the solutions of the given equation are 4,1, 8,2, 12,3 and 16,4.

Q.14. Check whether 0,2 is a solution of the equation x-2y=4?

Solution: Given, x-2y=4

To find 0,2 is a solution of the equation or not.

x=0 and y=2. Substituting the values of x and y in the LHS of the equation, we get, ⇒x-2y=0-2×2 =-4 ≠RHS ∴LHS≠RHS Hence, 0,2 is not a solution of the equation x-2y=4.

Q.15. Check whether 2,0 is a solution of the equation x-2y=4?

Solution: Given, x-2y=4

2,0 is a solution of the equation.

So, x=2 and y=0. Substituting the values of x and y in the LHS of the equation, we get, x-2y =2-2×0 =2-0 =2 ≠RHS ∴LHS≠RHS Hence, 2,0 is not a solution of the equation x-2y=4.

Q.16. Check whether 4,0 is a solution of the equation x-2y=4?

Solution: Given, x-2y=4

4,0 is a solution of the equation.

So, x=4 and y=0. Substituting the values of x and y in the LHS of the equation, we get, x-2y =4-2×0 =4-0 =4 =RHS ∴LHS=RHS Hence, 4,0 is a solution of the equation x-2y=4.

Q.17. Check whether 2, 42 is a solution of the equation x-2y=4.

Solution: Given, x-2y=4 and we need to check whether 2,42 is a solution of the equation.

So, x=2 and y=42.

Substituting the values of x and y in the LHS of the equation, we get, x-2y =2-2×42 =2-82 =-72 ≠RHS ∴LHS≠RHS Hence, 2,42 is not a solution of the equation x-2y=4.

Q.18. Check whether 1,1 is a solution of the equation x-2y=4?

Solution: Given, x-2y=4

1,1 is a solution of the equation.

So, x=1 and y=1. Substituting the values of x and y in the LHS of the equation, we get, x-2y =1-2×1 =1-2 =-1 ≠RHS ∴LHS≠RHS Hence, 1,1 is not a solution of the equation x-2y=4.

Q.19. Find the value of k, if x=2, y=10 is a solution of the equation 2x+3y=k

Solution: Given, 2x+3y=k and x=2, y=10.

Substituting the value of x and y in the given equation, we get,

22+310=k ⇒4+30=k ⇒k=34 Therefore, the value of k is 34.

Q.20. Draw the graph of given linear equation in two variables:

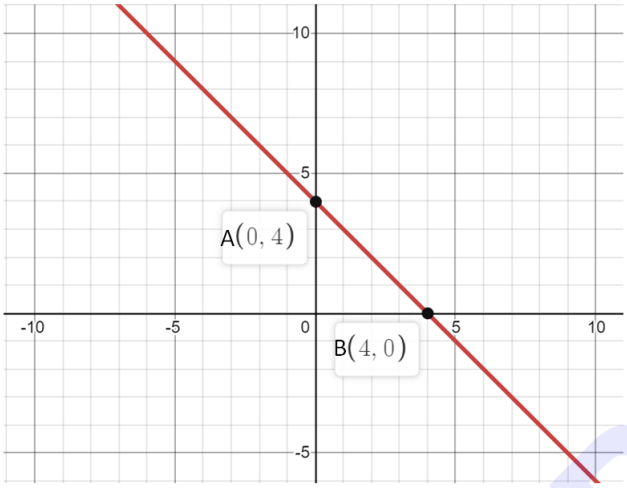
x+y=4

Solution: Given, x+y=4

⇒y=4-x

x	0	4
y	4-x=4-0=4	4-x=4-4=0

∴0,4 and 4,0 are solutions of the given equation. So, we plot the points A0,4 and B4,0 on the graph. Join the points A and B. The line AB is the graph for the linear equation x+y=4.



Q.21. Draw the graph of given linear equation in two variables:

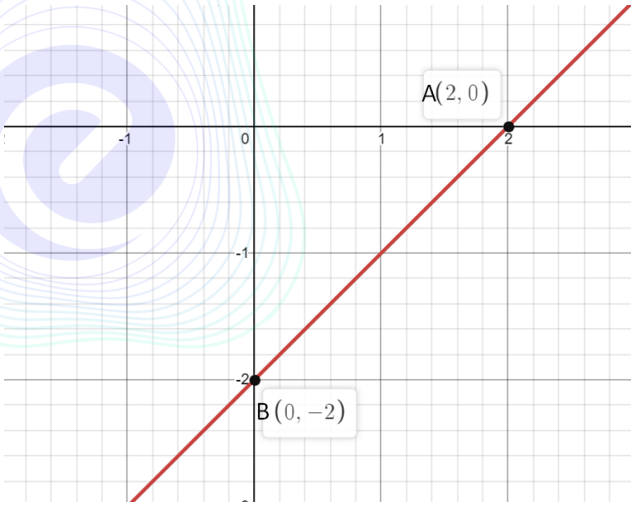
x-y=2

Solution: Given, x-y=2

⇒y=x-2

x	0	2
y	x-2=0-2=-2	x-2=2-2=0

∴(2,0) and (0,-2) are solutions of the given equation. Plot points A2,0 and B0,-2 on the graph. Join the points A and B. The line AB is the graph of the equation x-y=2.



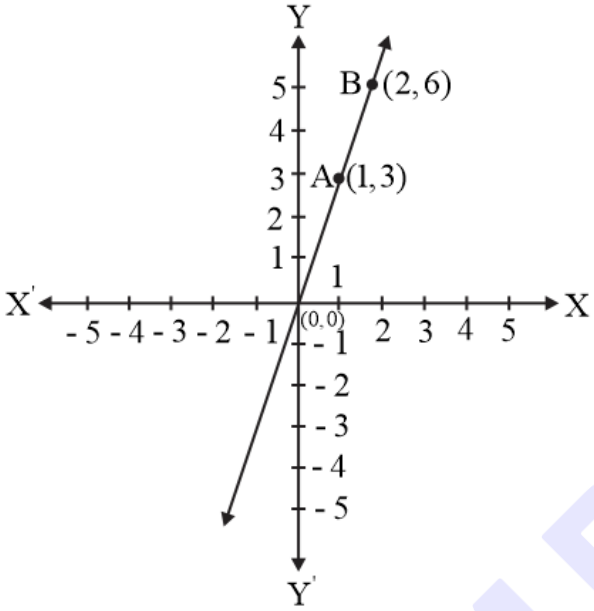
Q.22. Draw the graph of given linear equation in two variables:

y=3x

Solution: Given, y=3x

x	0	1	2
y	3x=3×0=3	3x=3×1=1	3x=3×2=6

∴0,0, 1,3 and (2,6) are the solutions of given equation. So, we plot the points O0,0, B1,3 and A2,6 on the graph. Join the points A, B and O. The line AO is the graph of the equation y=3x.



Q.23. Draw the graph of given linear equation in two variables:

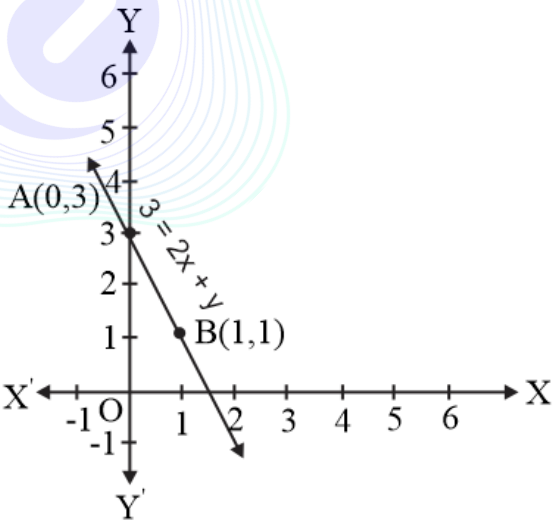
3=2x+y

Solution: Given, 3=2x+y

⇒y=3-2x

x	0	1
y	3-2x=3-2×0=3	3-2x=3-2×1=1

∴(0,3) and 1,1 are solutions of the equation 3=2x+y. So, we plot the points A0,3 and B1,1 on the graph. Join the points A and B. The line AB is the graph of the linear equation 3=2x+y.



Q.24. Give the equations of two lines passing through 2,14. How many more such lines are there, and why?

Solution: Given point is 2,14.

So, x=2 and y=14

Now, y=14=7×2 Thus, the value of y is seven times x. So, the equation y=7x passes through the point (2,14). Again, y=14=2+12 Now, the sum of x and 12 is equal to y. So, the equation x+12=y also passes through the point 2,14. ∴ The equations y=7x and y=x+12 are two lines passing through 2,14. From above process we can say that there are different possible combinations of lines which passing through 2,14. Therefore, from a given point 2,14, there are infinite lines passing through it.

Q.25. If the point 3,4 lies on the graph of the equation 3y=ax+7, find the value of a.

Solution: Given that point 3,4 lies on graph of the equation 3y=ax+7.

So, x=3 and y=4

Substituting the value of x and y in the given equation, we get, 34=a3+7 ⇒12=3a+7 ⇒3a=12-7 ⇒a=53 Therefore, the value of a is 53.

Q.26. For the first kilometre, the fare is ₹8 and for the subsequent distance it is ₹5 per km. Taking the distance covered as x km and total fare as ₹y. Write a linear equation for this information and draw its graph.

Solution: Given,

Total distance covered =x km

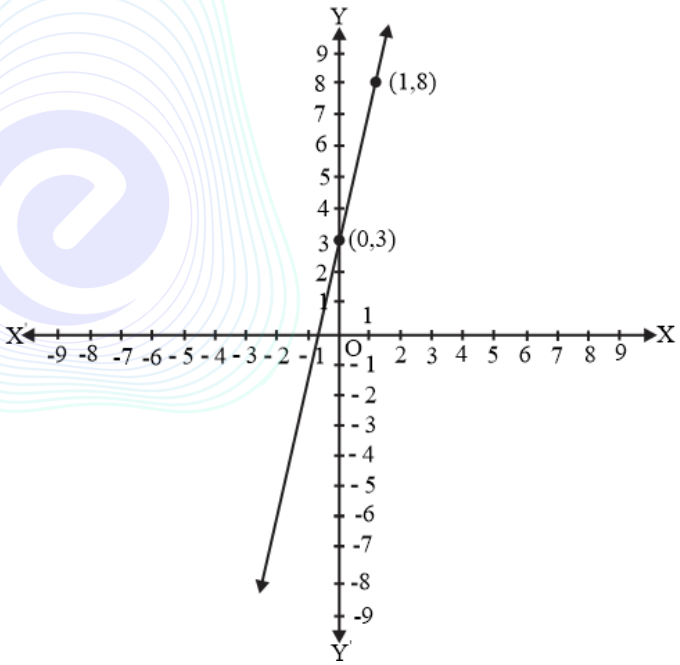
Total fare =₹y Fare for first km =₹8 Fare for subsequent distance =₹5 Total fare = Fare for first kilometre + Fare for rest of the distance ⇒y=8+x-15 ⇒y=8+5x-5 ⇒y=5x+3 ⇒5x-y+3=0 Therefore, 5x-y+3=0 is the linear equation for the given information.

Graph of 5x-y+3=0

⇒y=3+5x

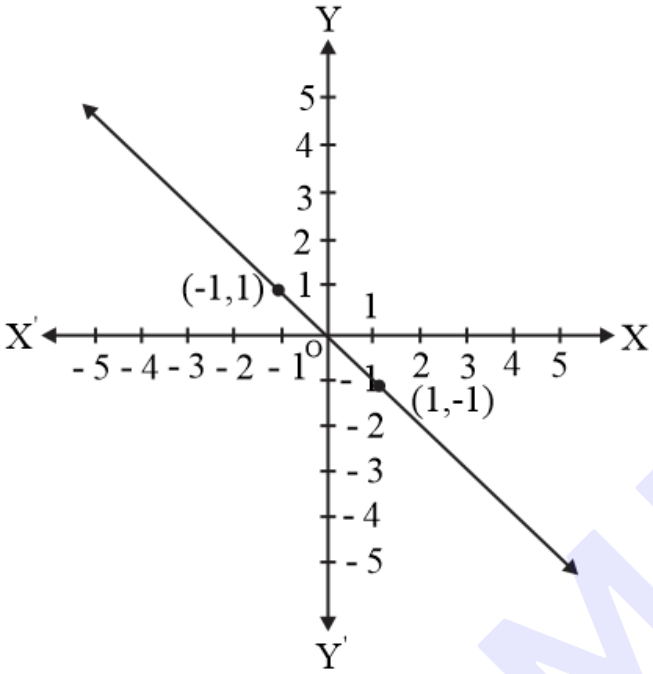
x	0	1
y	3+5x=3+5×0=3	3+5x=3+5×1=8

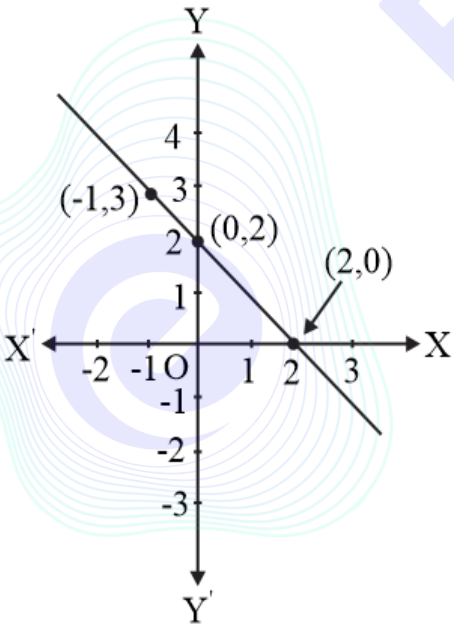
∴0,3 and 1,8 are the solutions of 5x-y+3=0. The required graph is drawn below.



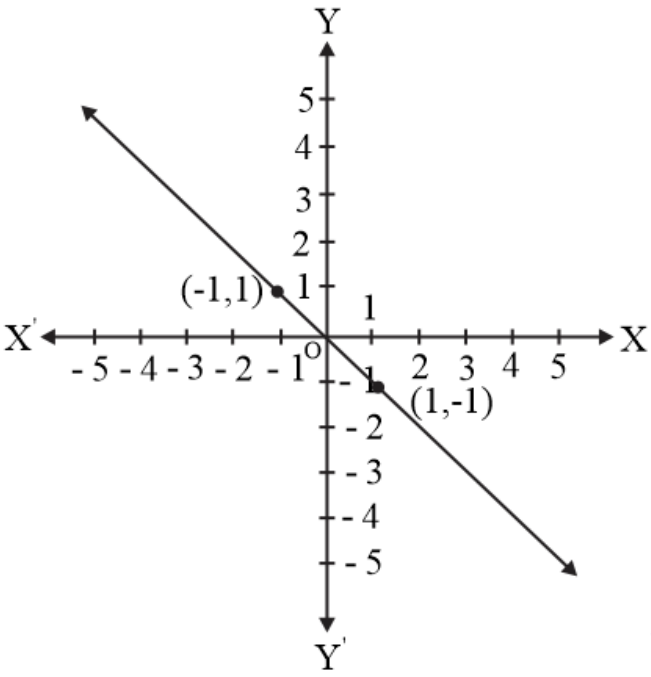
Q.27. From the choices given below, choose the equation whose graphs are given below

A	B
y=x	y=x+2
y+x=0	y=x-2
y=2x	y=-x+2
2+3y=7x	x+2y=5



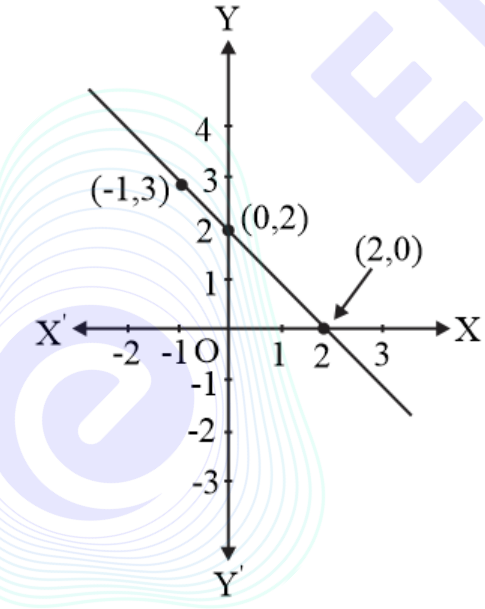


Solution:



In the above graph, 0,0, 1,-1 , -1,1 are points.

In equation x+y=0, if x=0 and y=0 LHS=x+y=0+0=0=RHS If x=1 and y=-1, LHS=x+y=1+-1=0=RHS If x=-1 and y=1, LHS=x+y=-1+1=0=RHS Therefore, the line in the above graph represents the equation x+y=0.



In the above graph, 2,0, 0,2, -1,3 are the points.

In equation x+y=2, if x=2 and y=0 LHS=x+y=2+0=2=RHS If x=0 and y=2, LHS=x+y=0+2=2=RHS If x=-1 and y=3, LHS=x+y=-1+3=2=RHS Therefore, the line in the above graph represents the equation y=x-2.

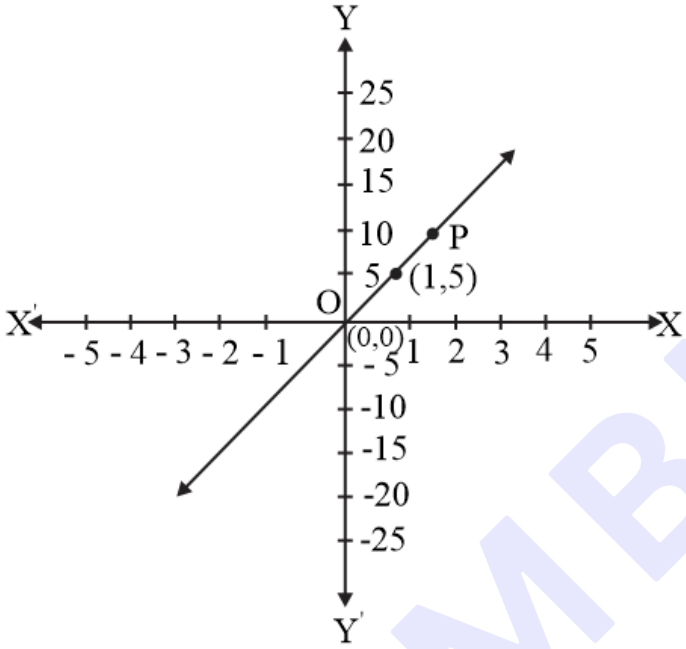
Q.28. If the work done by a body on application of a constant force is directly proportional to the distance travelled by the body, express this in the form of an equation in two variables and draw the graph of the same by taking the constant force as 5 units. Also read from the graph the work done when the distance travelled by the body is 2 units.

Solution: Let distance travelled be x and work done be y units

Given that y is directly proportional to x.

So, $y \propto x \Rightarrow y=kx$ where k is an arbitrary constant. Given, k=5 units. So, y=kx becomes y=5x.

x	0	1
y	5x=5×0=0	5x=5×1=5



From the graph, work done by the body, when distance travelled by it is 2 units is 10 units.

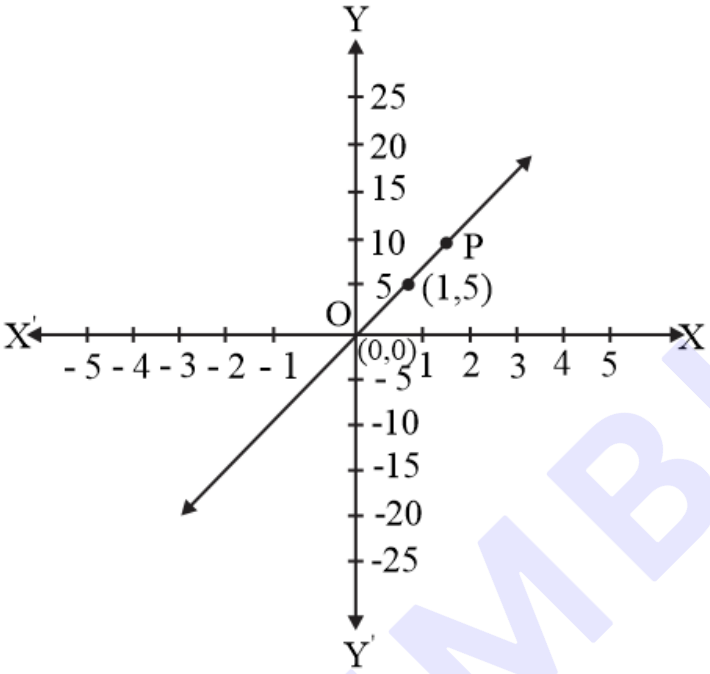
Q.29. If the work done by a body on application of a constant force is directly proportional to the distance traveled by the body, express this in the form of an equation in two variables and draw the graphs of the same by taking the constant force as 5 units. Also read from the graph the work done when the distance traveled by the body is 0 units.

Solution: Let distance travelled be x and work done be y units

Given that y is directly proportional to x.

So, $y \propto x \Rightarrow y=kx$ where k is an arbitrary constant. Given, k=5 units. So, y=kx becomes y=5x.

x	0	1
y	5x=5×0=0	5x=5×1=5



From the graph, work done by the body is 0 units when the distance traveled by it is 0 units.

Q.30. Yamini and Fatima, two students of class IX of school, together contributed ₹100 towards the Prime Minister's Relief Fund to help the earthquake victims. Write a linear equation which satisfies this data. Draw the graph of the same.

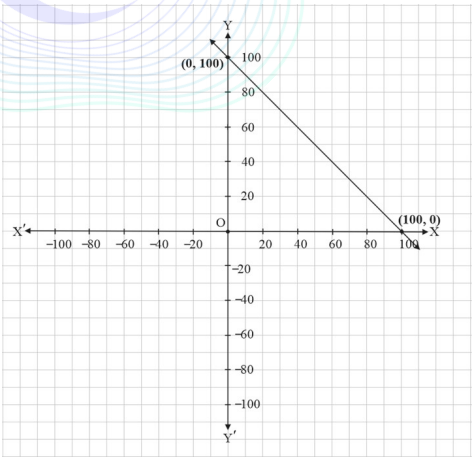
Solution: Let Yamini's contribution be ₹x and Fatima's contribution be ₹y.

Total amount contributed =₹100

So, x+y=100 Now, x+y=100 $\Rightarrow$y=100-x

x	0	100
y	100-x=100-0=100	100-x=100-100=0

So, the coordinates to be plotted are 0,100 and 100,0. The required graph:



Q.31. In countries like USA and Canada, 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.

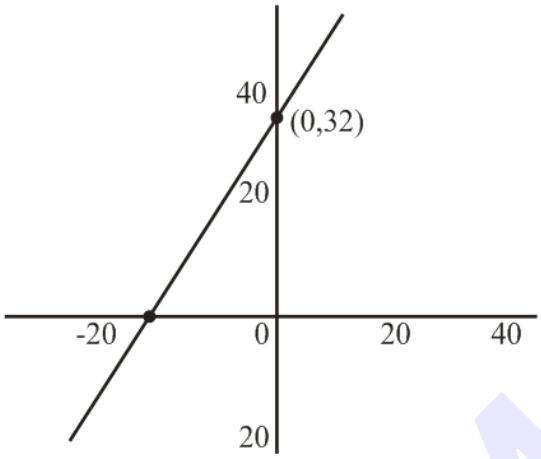
F=95C+32

Draw the graph of the linear equation above using Celsius for x-axis and Fahrenheit for y-axis.

Solution: Given, F=95C+32

C	0	-5
F	95×0+32=0+32=32	95×-5+32=-9+32=23

Thus, **0,32** and **-5,23** are solutions of equation **F=95C+32.** Plot the points 0,32 and -5,23 on the graph and join the points. The required graph:



Q.32. In countries like USA and Canada, 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=95C+32.

If the temperature is 30°C=k°F, then find the value of k.

86

Solution: Given temperature is **30°C.**

Substituting the value in the given linear equation, we get

F=95C+32 ⇒**F=95×30+32** ⇒**F=95×30+32** ⇒**F=54+32** ⇒**F=86** Therefore, the temperature in Fahrenheit is 86° F. Hence, k=86.

Q.33. In countries like USA and Canada, the 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=95C+32

If the temperature in Fahrenheit is 95°F, and the corresponding temperature in degree Celsius is k°C, find k.

35

Solution: Given temperature, 95° F.

Converting Fahrenheit to Celsius, we get

F=95C+32 ⇒95=95C+32 ⇒95C=63 ⇒C=63×59 ⇒C=35° Therefore, the temperature in Celsius is 35°C and k=35.

Q.34. In countries like USA and Canada, 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=95C+32

If the temperature is 0°C, what is the temperature in Fahrenheit and if the temperature is 0°F, what is the temperature in Celsius?

Solution: Given, F=95C+32

If C=0, then

F=95×0+32 ⇒F=32 If the temperature in Fahrenheit, F=0 then 0=95C+32 ⇒95C=-32 ⇒C=-32×59 ⇒C=-1609 Therefore, if the temperature is 0°C, then the temperature in Fahrenheit is 32°F and if the temperature is 0°F, then the temperature in Celsius is -1609°C.

Q.35. In countries like USA and Canada, the 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=95C+32

Is there a temperature which is numerically the same in both Fahrenheit and Celsius? If yes, find it. If the required temperature in Fahrenheit and Celsius is k°F and k°C then, write the value of k as final answer.

-40

Solution: Yes, there is a temperature which is numerically the same in both Fahrenheit and Celsius.

We will substitute F in C in the given equation we get,

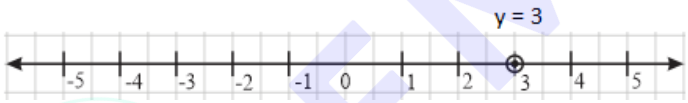
F=95C+32⇒F=95F+32⇒F-95F=32⇒-45F=32⇒F=-40°F -40°F or -40°C is a temperature which is numerically the same in both Fahrenheit and Celsius. Hence, the value of k is -40.

Q.36. Give the geometric representation of y=3 as an equation in one variable.

Solution: Given, y=3

The representation of the equation has to be on a number line where 0 will as act as the origin.

Since, the value of y is positive. So, move three point to the right of 0 to 3 and mark it. Therefore, the geometric representation y=3 in one variable:

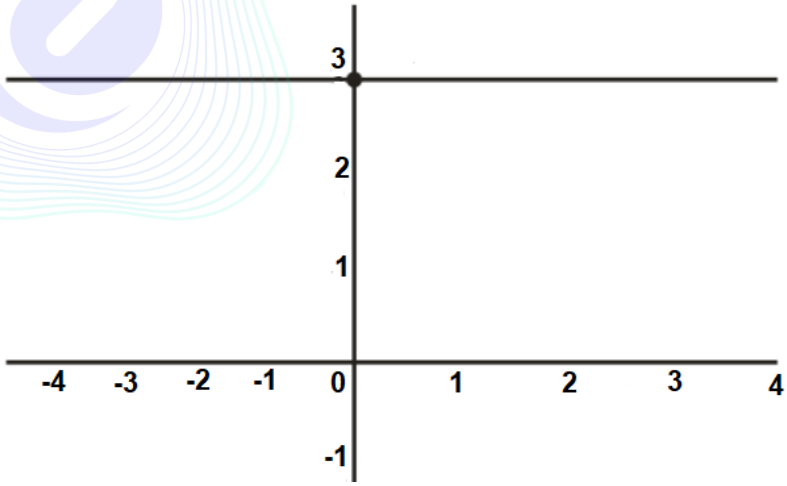


Q.37. Give the geometric representation of y=3 as an equation in two variables.

Solution: Given, y=3

We know that equation of a line parallel to the x−axis at distance k units is y=k.

So, the line of the given equation is parallel to x−axis at a distance of 3 units to the top of x−axis. Therefore, the graph is shown below:

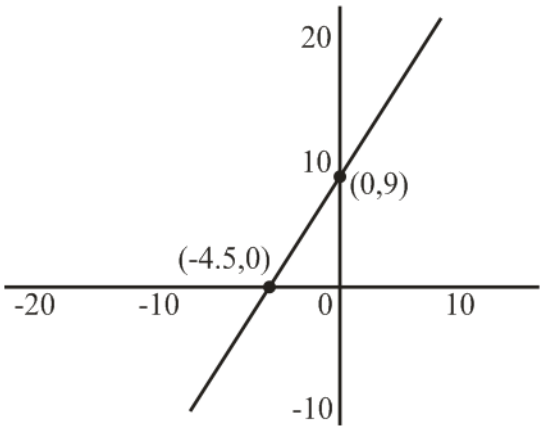


Q.38. Give the geometric representations of 2x+9=0 as an equation in one variable.

Solution: Given, 2x+9=0

⇒2x=-9

⇒x=-92 ⇒x=-4.5 The representation of the equation has to be on a number line where 0 will as act as the origin. Thus, the point in a number line is shown below.



Q.39. Give the geometric representations of 2x+9=0 as an equation in two variables which is parallel to the y-axis.

Solution: Given, 2x+9=0

⇒2x=-9

⇒x=-92 ⇒x=-4.5 We know that equation of a line parallel to the y−axis at distance k units is x=k. So, the line of the given equation is parallel to y−axis at a distance of 4.5 units to the left of y−axis. Therefore, the graph of the line is shown below: