Exercise 4.1

Q1. Write the correct answer in each of the following:

1. The linear equation 2x – 5y = 7 has

A. A unique solution

B. Two solutions

C. Infinitely many solutions

D. No solution

Answer: C. Infinitely many solutions

Given

$2x - 5y = 7$

By rearranging

$5y = 2x - 7$

So we get

$y = (2x - 7)/ 5$

Here we will get different values of y for various x values

Therefore, the linear equation has infinitely many solutions.

Q2. The equation 2x + 5y = 7 has a unique solution, if x, y are:

A. Natural numbers

B. Positive real numbers

C. Real numbers

D. Rational numbers

Answer: A. Natural numbers

The given equation is

$2x + 5y = 7$

Let us consider the value (1, 1)

a. The solution of 2x + 5y = 7 is (1, 1)

b. 2x + 5y = 7 will have many solutions if positive real numbers are considered

c. 2x + 5y = 7 will have infinitely many solutions if real numbers are considered

d. 2x + 5y = 7 will have many solutions if rational numbers are considered

We know that

A linear equation in two variables has infinitely many solutions.

For the linear equations system, there is a solution set of infinite points for which the L.H.S of an equation becomes R.H.S.

Therefore, the equation has a unique solution if x, and y are natural numbers.

Q3. If (2, 0) is a solution of the linear equation 2x + 3y = k, then the value of k is
A. 4
B. 6
C. 5
D. 2

Answer: A. 4

The given linear equation is

2x + 3y = k

The point given here is

(x, y) = (2, 0)

Let us substitute the given values in the equation

2 (2) + 3(0) = k

By further calculation

4 + 0 = k

So we get

k = 4

Therefore, the value of k is 4.

Q4. Any solution of the linear equation 2x + 0y + 9 = 0 in two variables is of the form

A. (-9/2 , m)

B. (n, -9/2)

C. (0, -9/2)

D. (– 9, 0)

Answer: A. (-9/2 , m)

The given linear equation is

2x + 0y + 9 = 0

We can write it as

2x + 9 = 0

2x = -9

x = -9/2

As the y coefficient is 0 it can take any value and will not affect the answer.

Therefore, the linear equation in two variables is of the form (-9/2, m).

Q5. The graph of the linear equation 2x + 3y = 6 cuts the y – axis at the point

A. (2, 0)
B. (0, 3)
C. (3, 0)
D. (0, 2)

Answer: D. (0, 2)

The given linear equation is

2x + 3y = 6

It is given that the equation cuts the y-axis which means that the x-coordinate is 0

Substituting x = 0 in the linear equation

2 (0) + 3y = 6

0 + 3y = 6

3y = 6

Dividing both sides by 3

y = 2

So the coordinates are (0, 2)

Therefore, the graph of the linear equation cuts the y-axis at the point (0, 2).

Q6. The equation x = 7, in two variables, can be written as

A. 1. x + 1. y = 7
B. 1. x + 0. y = 7
C. 0. x + 1. y = 7
D. 0. x + 0. y = 7

Answer: B. 1. x + 0. y = 7

Let us simplify the options

a. 1 . x + 1 . y = 7

It can be written as

x + y = 7

b. 1. x + 0. y = 7

It can be written as

x = 7

c. 0 . x + 1 . y = 7

It can be written as

y = 7

d. 0 . x + 0 . y = 7

0 = 7

Therefore, the equation in two variables can be written as 1. x + 0. y = 7.

Q7. Any point on the x-axis is of the form

A. (x, y)
B. (0, y)
C. (x, 0)
D. (x, x)

Answer: C. (x, 0)

We know that

The graph of every linear equation in two variables is a straight line and every point on the graph (straight line) represents a solution of the linear equation.

Thus, every solution of the linear equation can be represented by a unique point on the graph of the equation.

The graphs of x = a and y = a are lines parallel to the y-axis and x-axis, respectively.

Any point on the y-axis is of the form (x, 0)

Therefore, the point on the y-axis is (x, 0).

Q8. Any point on the line y = x is of the form

A. (a, a)
B. (0, a)
C. (a, 0)
D. (a, – a)

Answer: A. (a, a)

We know that

Any point on the line y = x will have the same x and y coordinate

So any point on the line y = x will be (a, a)

Therefore, any point on the line y = x will be (a, a).

Q9. The equation of the x-axis is of the form

A. x = 0
B. y = 0
C. x + y = 0
D. x = y

Answer: B. y = 0

We know that

Points on the x-axis are of the form (a, 0) where a is any real number

y-coordinate of the point of the x-axis is 0

y = 0 is the equation of the x-axis

Therefore, the equation of the x-axis is y = 0.

Q10. The graph of y = 6 is a line
(A) parallel to the x-axis at a distance of 6 units from the origin.
(B) parallel to the y-axis at a distance of 6 units from the origin.
(C) making an intercept 6 on the x-axis.
(D) making an intercept 6 on both axes.

Answer: (A) parallel to the x-axis at a distance of 6 units from the origin.

The given equation is y = 6

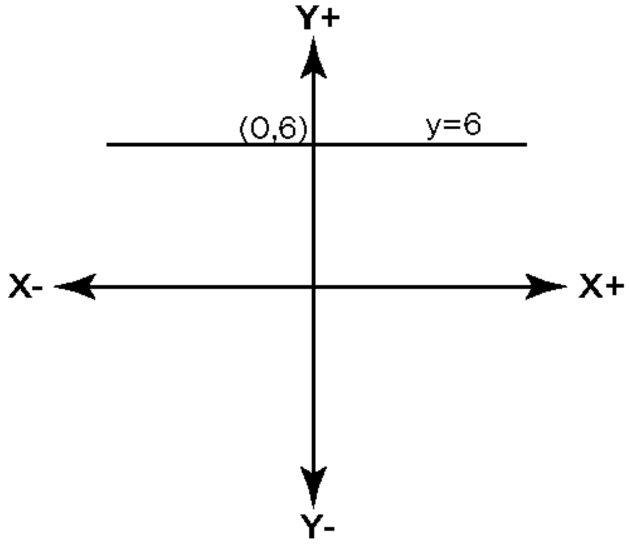
It can be written as

y = 0.x + 6

Here y = 6 for every value of x

The points are (0,6), (-1, 6), (1, 6), (3, 6) …

By plotting these points, we obtain a straight line which is parallel to the x-axis at a distance of 6 units from x-axis



Therefore, the line is parallel to the x-axis at a distance 6 units from the origin.

Q11. x = 5, y = 2 is a solution of the linear equation

(A) x + 2y = 7

(B) 5x + 2y = 7

(C) x + y = 7

(D) 5x + y = 7

Answer: (C)

The solution of the linear equation given is x = 5, y = 2

Let us substitute it in each option to get the linear equation

a. x + 2y = 7

5 + 2 (2) = 7

5 + 4 = 7

9 ≠ 7

b. 5x + 2y = 7

5(5) + 2(2) = 7

25 + 4 = 7

29 ≠ 7

c. x + y = 7

5 + 2 = 7

7 = 7

d. 5x + y = 7

5(5) + 2 = 7

25 + 2 = 7

27 ≠ 7

Therefore, the solution is of the linear equation x + y = 7.

Q12. If a linear equation has solutions (-2, 2), (0,0) and (2, -2), then it is of the form

(A) y – x = 0

(B) x + y = 0

(C) -2x + y = 0

(D) -x + 2y = 0

Answer: (B) x + y = 0

The points (-2, 2), (0, 0) and (2, - 2) are the solutions of the linear equation

We know that

y = mx + c is the equation of a line

As (0, 0) lies on it, c = 0

As (-2, 2) lies on it,

2 = -2 (m)

m = -1

So we get

y = -x

x + y = 0 is the equation of the line.

Therefore, the linear equation is x + y = 0.

Q13. The positive solutions of the equation ax + by + c = 0 always lie in the

(A) 1st quadrant

(B) 2nd quadrant

(C) 3rd quadrant

(D) 4th quadrant

Write whether the following statements are True or False. Justify your answers:

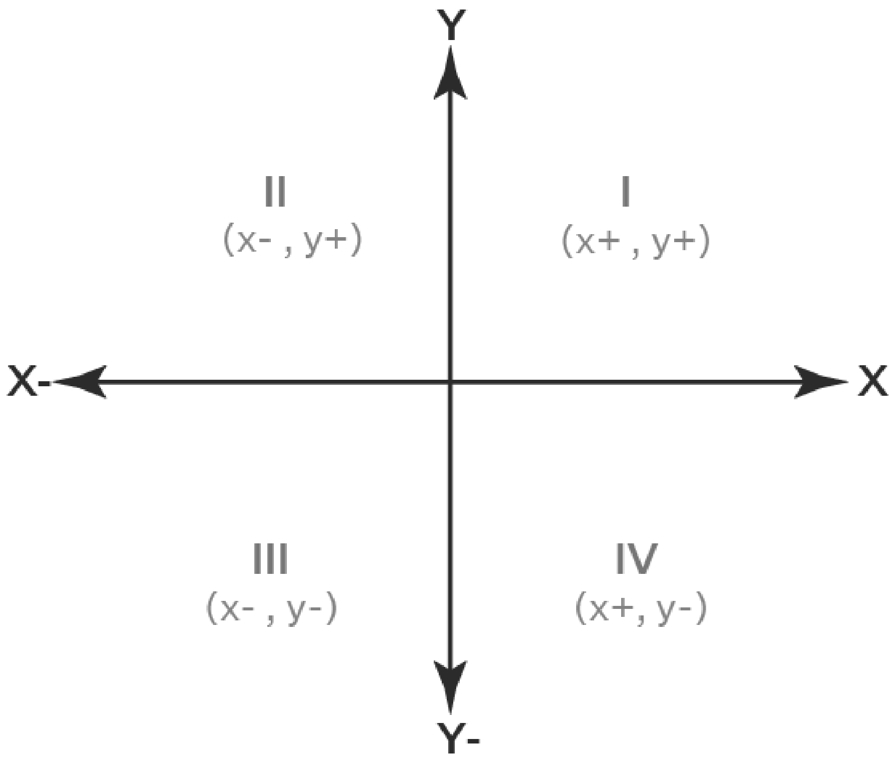
Answer: (A) 1st quadrant

Consider the positive solutions as (p, q)

As p which is the abscissa is positive, it will lie toward the positive direction of the x-axis

As q which is the ordinate is positive, it will lie toward the positive direction of the y-axis

So (p, q) will lie on the first quadrant



Therefore, the positive solutions will lie in the 1st quadrant.

Q14. The graph of the linear equation 2x+ 3y= 6 is a line which meets the x-axis at the point

(A) (0, 2)

(B) (2, 0)

(C) (3, 0)

(D) (0, 3)

Answer: (C) (3, 0)

An equation that has the highest degree of 1 is known as a linear equation.

It means that no variable in a linear equation has an exponent more than 1.

The given linear equation is 2x + 3y = 6

It meets the x-axis which means that y = 0

Let us substitute it in the equation

2x + 3(0) = 6

2x = 6

Dividing both sides by 2

x = 3

Therefore, the graph of the linear equation is (3, 0).

Q15. The graph of the linear equation y = x passes through the point

(A) (3/2, -3/2)

(B) (0, 3/2)

(C) (1, 1)

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

Answer: (C) (1, 1)

We know that

A linear equation is an equation in which the highest power of the variable is always 1.

An equation that has the highest degree of 1 is known as a linear equation.

The linear equation y = x has the same x and y coordinates

From the given option (1, 1) is the graph

Therefore, the graph of the linear equation passes through (1, 1).

Q16. If we multiply or divide both sides of a linear equation with a non-zero number, then the solution of the linear equation:

(A) Changes

(B) Remains the same

(C) Changes in case of multiplication only

(D) Changes in case of division only

Answer: (B) Remains the same

Consider a linear equation x + 2y = 5 … (1)

Substitute x = 1 in the equation

1 + 2y = 5

2y = 5 - 1

2y = 4

Dividing both sides by 2

y = 2

The solution of the equation is (1, 2)

Let us multiply equation (1) by 3

3x + 6y = 15

Substitute x = 1 and y = 2

LHS = 3 (1) + 6 (2)

= 3 + 12

= 15

= RHS

The solution remains the same by multiplying an equation with a non zero number

Now by dividing equation (1) by 2

x/2 + y = 5/2

Substitute x = 1 and y = 2 in equation (1)

LHS = 1/2 + 2

Taking LCM

= (1 + 4)/2

= 5/2

= RHS

The solution remains the same by dividing an equation with a non-zero number.

Therefore, the solution remains the same.

Q17. How many linear equations in x and y can be satisfied by x = 1 and y = 2?

(A) Only one

(B) Two

(C) Infinitely many

(D) Three

Answer: (C) Infinitely many

Consider the linear equation as **ax + by + c = 0**

The points given are x = 1 and y = 2

So we get

a + 2b + c = 0

Where a, b, and c are real numbers

Here different values satisfy the equation

Infinitely many linear equations in x and y can be satisfied.

Therefore, infinitely many linear equations in x and y can be satisfied.

Q18. The point of the form (a, a) always lies on:

(A) x-axis

(B) y-axis

(C) On the line y = x

(D) On the line x + y = 0

Answer: (C) On the line y = x

The point given is of the form (a, a)

Here both x and y coordinate values are the same

So it must lie on the line y = x

Therefore, the point lies on the line y = x.

Q19. The point of the form (a, – a) always lies on the line

(A) x = a

(B) y = -a

(C) y = x

(D) x + y = 0

Answer: (D) x + y = 0

The point given is of the form (a, -a)

Here both x and y coordinate values are different

So it must lie on the line x + y = 0

Therefore, the point lies on the line x + y = 0.

Exercise 4.2

Write whether the following statements are True or False. Justify your answers:

1. The point (0, 3) lies on the graph of the linear equation 3*x* + 4*y* = 12.

Answer: The linear equation given is 3x + 4y = 12

The point given is (0, 3)

Let us substitute it in the equation

3 (0) + 4 (3) = 12

12 = 12

Therefore, the statement is true.

2. The graph of the linear equation *x* + 2*y* = 7 passes through the point (0, 7).

Answer: The linear equation given is x + 2y = 7

The point given is (0, 7)

Let us substitute it in the equation

0 + 2 (7) = 7

14 ≠ 7

Therefore, the statement is false.

3. The graph given below represents the linear equation *x* + *y* = 0.

Answer:

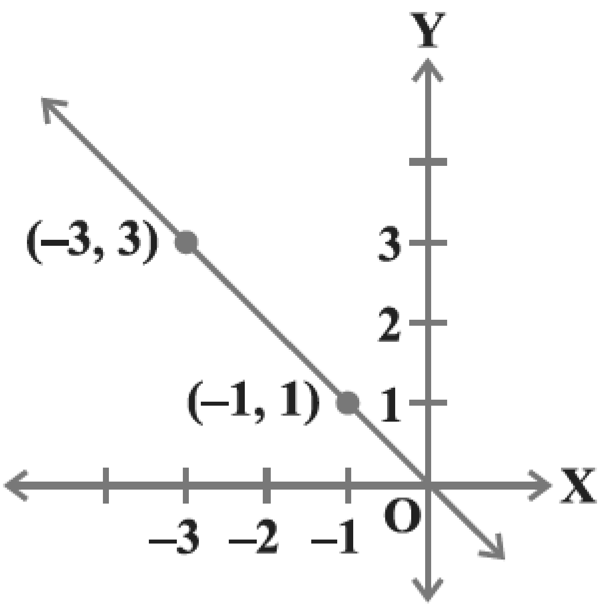


Fig. 4.1

The linear equation given x + y = 0

It can be written as

x = -y

The points from the graph are (-3, 3) and (-1, 1)

Considering (-3, 3)

x = -3 and y = 3

-3 = 3

Satisfies the equation

Considering (-1, 1)

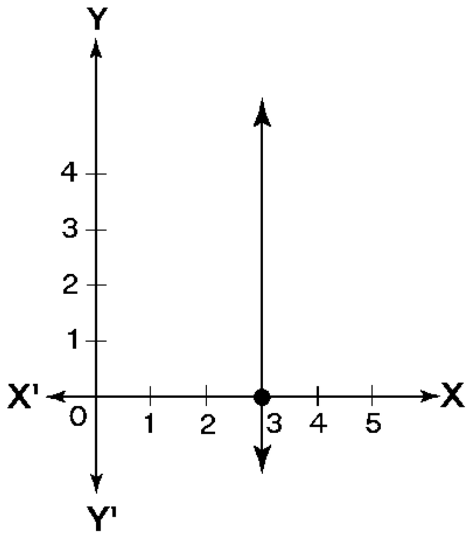
x = -1 and y = 1

-1 = 1

Satisfies the equation

Therefore, the statement is true.

Q4. The graph given below represents the linear equation x = 3. (See fig.)



Answer:

From the graph

A line is parallel to the y-axis at a distance of 3 units to the right of origin

So the linear equation will be x = 3

Therefore, the statement is true.

Q5. The coordinates of points in the table:

x	**0**	**1**	**2**	**3**	**4**
y	**2**	**3**	**4**	**-5**	**6**

represent some of the solutions of the equation x – y + 2 = 0.

Answer:

The given equation x - y + 2 = 0

Let us substitute the coordinates

If x = 0 and y = 2

0 - 2 + 2 = 0

0 = 0

If x = 1 and y = 3

1 - 3 + 2 = 0

0 = 0

If x = 2 and y = 4

2 - 4 + 2 = 0

0 = 0

If x = 3 and y = -5

3 - (-5) + 2 = 0

3 + 5 + 2 = 0

10 ≠ 0

If x = 4 and y = 6

4 - 6 + 2 = 0

0 = 0

Therefore, the statement is false.

Q6. Every point on the graph of a linear equation in two variables does not represent a solution of the linear equation. Justify your answer.

Answer: We know that

A graph of a linear equation in two variables is constructed by joining the points that are the solutions of the equations.

So the point on the graph will be the solution to the linear equation

Therefore, the statement is false.

Q7. The graph of every linear equation in two variables need not be a line. Is the given statement true or false? Justify your answer

Answer:

We know that

Graph of a linear equation in two variables is a line.

For example -

Let us consider a linear equation x + y = 4

It can be written as

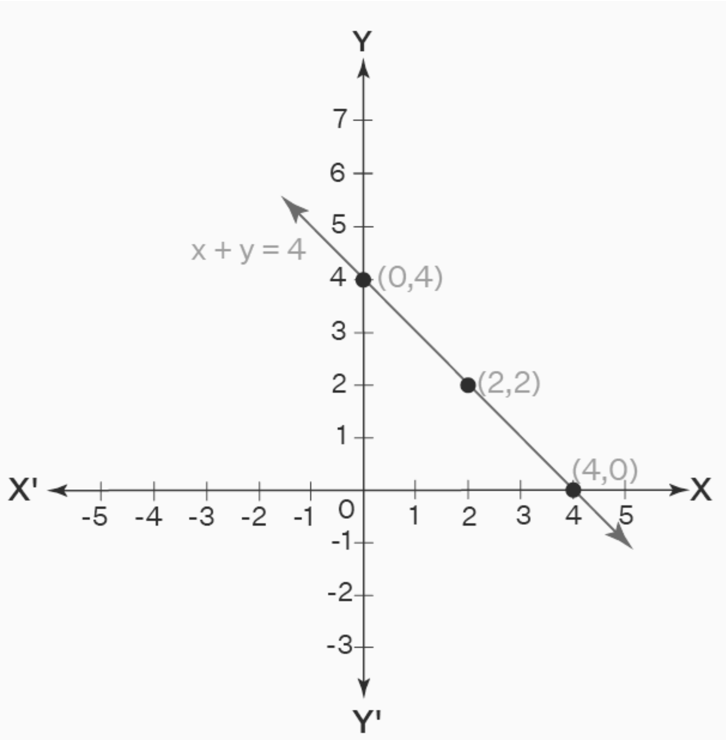
y = 4 - x

If x = 0, y = 4 - 0 = 4

If x = 2, y = 4 - 2 = 2

If x = 4, y = 4 - 4 = 0

So the graph will be



Therefore, the statement is false.

Exercise 4.3

Q1. Draw the graphs of linear equations y = x and y = – x on the same Cartesian plane. What do you observe?

Answer: Given, the linear equations are y = x and y = -x

We have to draw the graphs of the equations on the same cartesian plane.

Considering the equation y = x

We need a few points to plot on the graph.

For x = 1, y = 1

For x = 4, y = 4

Therefore, the points of the equation are (1, 1) and (4, 4)

By plotting the points (1, 1) and (4, 4) on the graph and joining the points we get a straight line which is the graph of y = x

Considering the equation y = -x

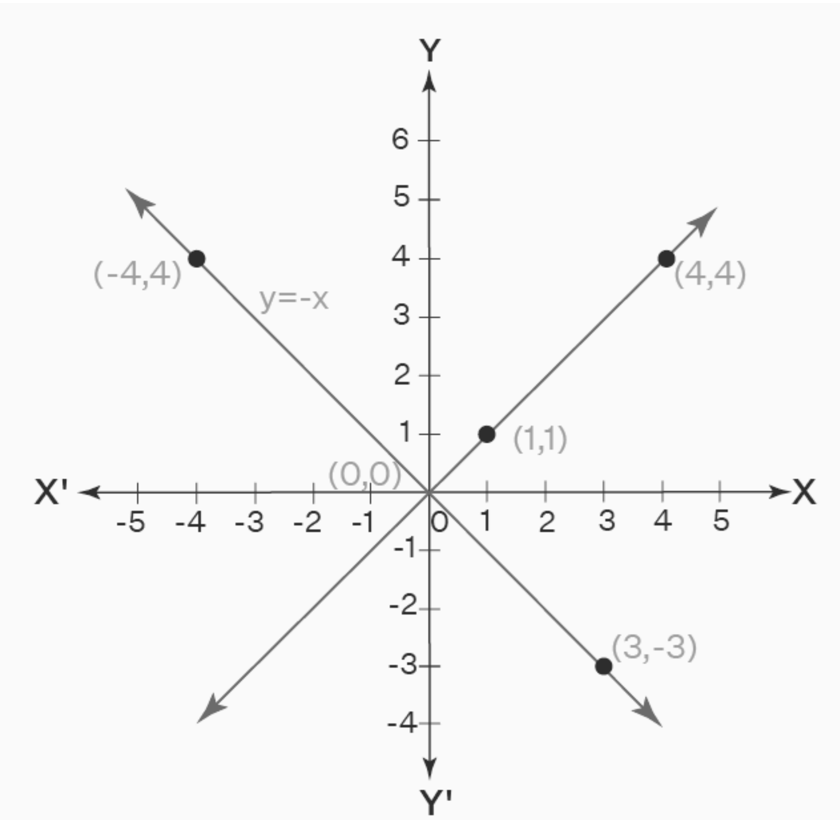
We need a few points to plot on the graph.

For x = 3, y = -3

For x = -4, y = 4

Therefore, the points of the equation are (3, -3) and (-4, 4)

By plotting the points (3, -3) and (-4, 4) on the graph and joining the points we get a straight line which is the graph of y = -x.



From the graphs of y = x and y = -x we observe that both the graphs intersect at the point (0, 0).

Q2. Determine the point on the graph of the linear equation 2x + 5y = 19 whose ordinate is 1½ times its abscissa.

Answer: Given, the equation is 2x + 5y = 19

The ordinate is 1 1/2 times its abscissa i.e., x-coordinate

We have to determine the point.

Given, y = (3 /2) x

On cross multiplication,

2y = 3x

x = (2 / 3)y

Put x = (2 / 3) y in the equation,

2(2 / 3) y + 5y = 19

(4 / 3) y + 5y = 19

(4y + 15y) / 3 = 19

19 y /3 = 19

Y /3 = 1

y = 3

Put y = 3 in the equation,

2x + 5(3) = 19

2x + 15 = 19

2x = 19 - 15

2x = 4

x = 4/2

x = 2

Therefore, the point is (2, 3).

Q3. Draw the graph of the equation represented by a straight line which is parallel to the x-axis and at 3 units below.

Answer: Given, a straight line is parallel to the x-axis 3 units below it.

We have to draw the graph of the equation.

The equation of a straight line parallel to x-axis is given by y = -a

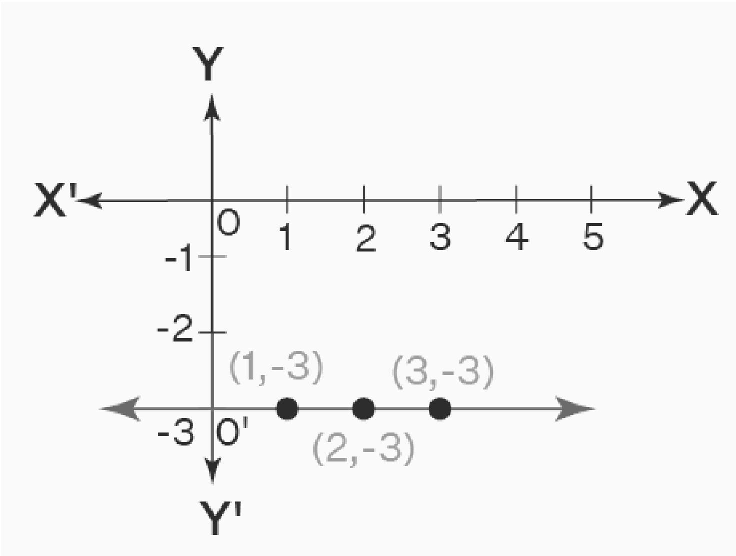
Where a is the distance of the line from x-axis

Given, distance of the line from the x-axis is 3 units

Therefore, the equation of the line is y = -3

To plot the graph, the points are (1, -3) (2, -3) (3, -3).

Plot the points on the graph and join them, we can obtain the graph of the equation y = -3



Q4. Draw the graph of the linear equation whose solutions are represented by the points having the sum of the coordinates as 10 units.

Answer: Given, the sum of the coordinates of the graph is 10 units.

We have to draw the graph of the linear equation whose solutions are represented by the points having the sum of the coordinates are 10 units.

Let x and y be the coordinates

Given, x + y = 10

When x = 0

0 + y = 10

y = 10

When x = 3

3 + y = 10

y = 10 - 3

y = 7

When x = 5

5 + y = 10

y = 10 - 5

y = 5

When x = 10

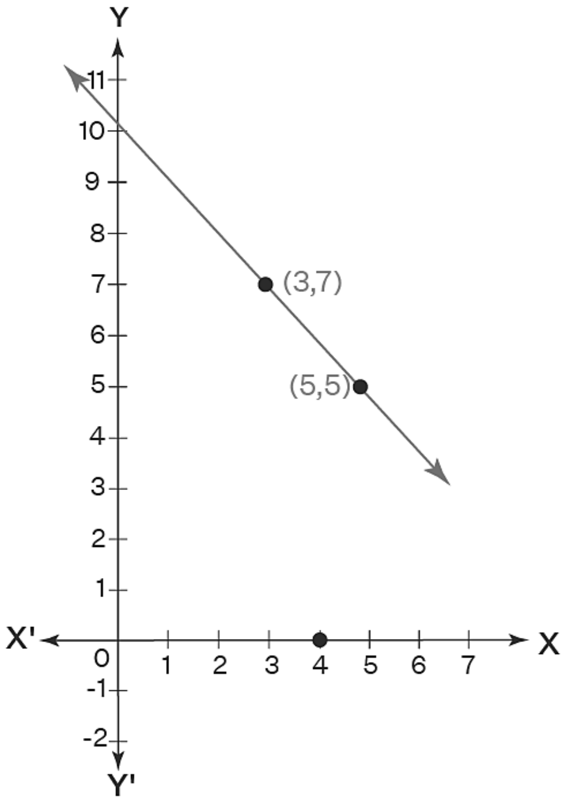
10 + y = 10

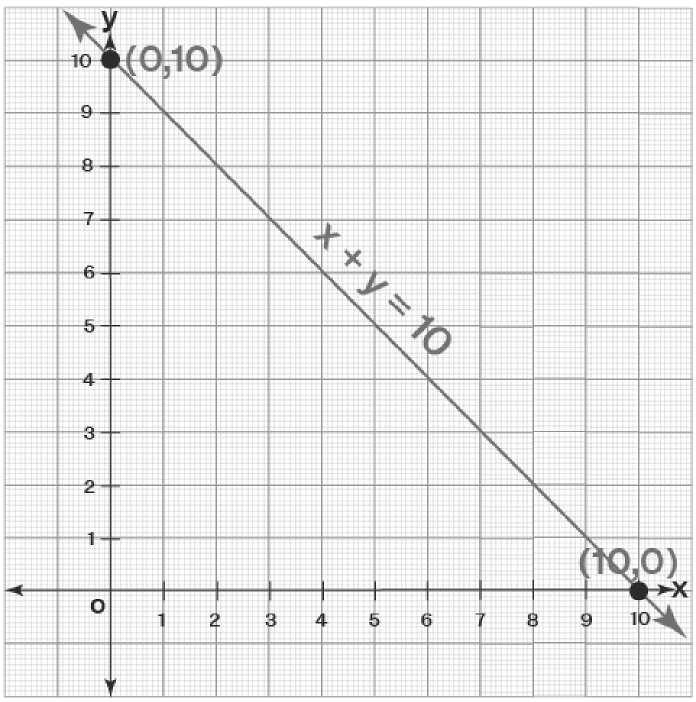
y = 10 - 10

y = 0

Therefore, the points are (0, 10), (3, 7), (5, 5) and (10, 0).

On plotting the points on the graph we obtain the graph of the equation x + y = 10.





Q5. Write the linear equation such that each point on its graph has an ordinate 3 times its abscissa.

Answer: Given, the ordinate is 3 times its abscissa

We have to write the linear equation of the graph.

The y-coordinate is times its x-coordinate.

So, y = 3x

When x = 1,

y = 3(1)

y = 3

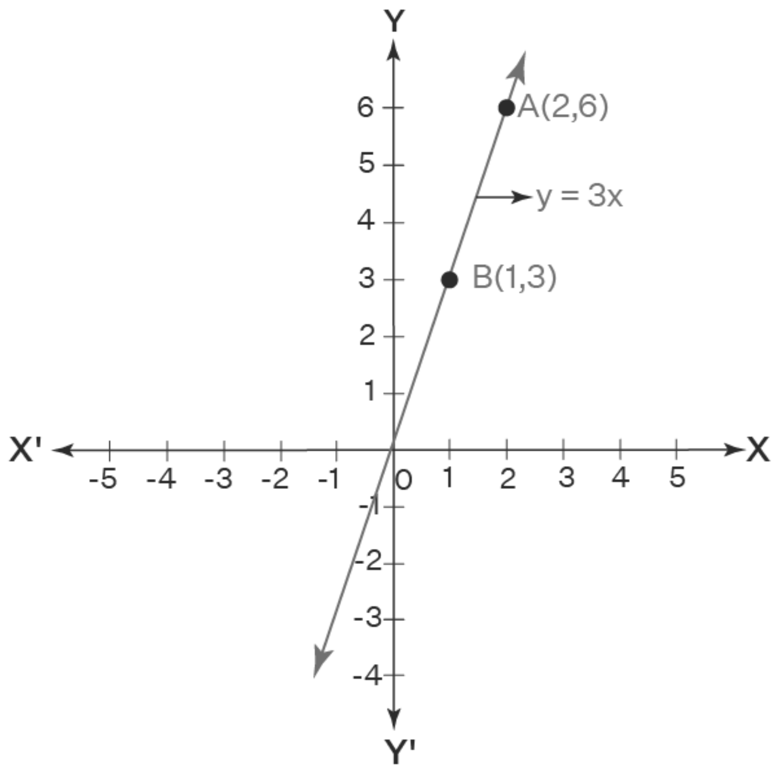
When x = 2,

y = 3(2)

y = 6

Therefore, the points are (1, 3) and (2, 6)

Plotting the points (1, 3) and (2, 6) on the graph,



Joining the points we obtain a straight line AB whose equation is y = 3x

Therefore, the linear equation is y = 3x.

Q6. If the point (3, 4) lies on the graph of 3y = ax + 7, then find the value of a.

Answer: Given: Linear equation 3y = ax + 7.

We can find the value of 'a' by substituting the values of x and y in the given equation

By substituting the value of x = 3 and y = 4 in the the equation 3y = ax + 7, we get

3(4) = a(3) + 7

12 = 3a + 7

3a = 5

a = 5/3

Hence, the value a = 5/3

Q7. How many solution(s) of the equation 2x + 1 = x – 3 are there on the:

(i) Number line
(ii) Cartesian plane

Answer: Given, the equation is 2x + 1 = x - 3

We have to find the number of solutions of the equation.

(i) solutions of the equation on the number line

The equation 2x + 1 = x - 3 can be rewritten as

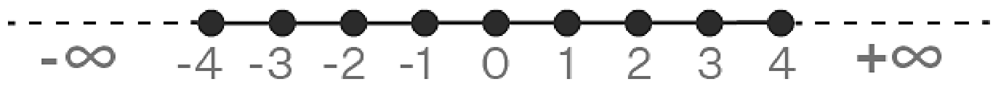
2x - x + 1 = -3

x = -3 - 1

x = -4

The number line represents all real values of x lying on the x-axis.

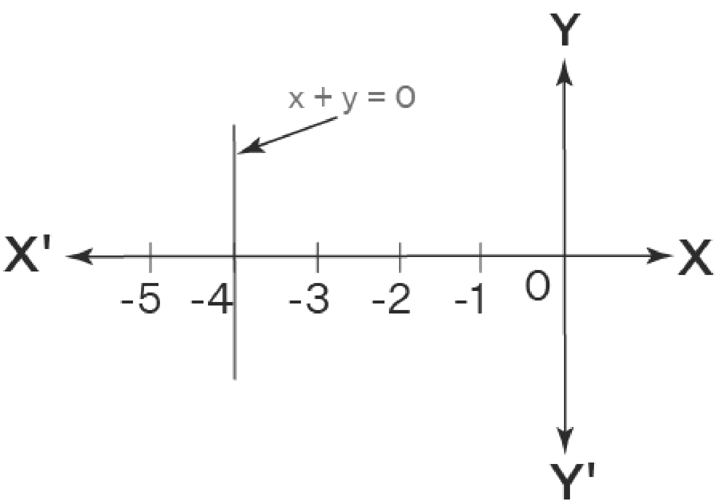
Therefore, x = -4 is the only point which lies on the number line.



(ii) solutions of the equation on the Cartesian plane

The equation on the Cartesian plane can be written as x + 0y = -4

The equation can be rewritten as x + 4 = 0



The equation x + 4 = 0 is a straight line parallel to y-axis.

The equation has infinitely many solutions.

Q8. Find the solution of the linear equation x + 2y = 8 which represents a point on

(i) x-axis

(ii) y-axis

Answer:

Given, the linear equation is x + 2y = 8

We have to find the solution of the linear equation on the x-axis and y-axis.

(i) To find a point on the x-axis

When the point lies on the x-axis, y = 0

Put y = 0 in the given equation,

x + 2(0) = 8

x = 8

Therefore, the point on the x-axis is (8, 0)

(ii) To find the point on the y-axis

When the point lies on the y-axis, x = 0

Put x = 0 in the given equation,

0 + 2y = 8

y = 8/2

y = 4

Therefore, the point on the y-axis is (0, 4)

Q9. For what value of c, the linear equation 2x + cy = 8 have equal values of x and y for its solution?

Answer: Given, the linear equation is 2x + cy = 8

The equation has equal values of x and y for the solution.

We have to find the value of c.

Given, x = y

Put y = x in the given equation,

2x + c(x) = 8

cx = 8 - 2x

c = (8 - 2x)/x

Where x is not equal to zero.

Therefore, the value of c is (8 - 2x)/x

Q15. Let y vary directly as x. If y = 12 when x = 4, then write a linear equation. What is the value of y when x = 5?

Answer: Given, y varies directly as x.

Also, y = 12 when x = 4.

We have to write a linear equation and find the value of y when x = 5.

As y varies directly as x, $y \propto x$

Therefore, the linear equation is **y = kx**

Where k is an arbitrary constant

From the given point,

12 = k(4)

k = 12/4

k = 3

Therefore, the linear equation is y = 3x

Put x = 5 in the equation,

y = 3(5)

y = 15

Therefore, the value of y is 15.

Exercise 4.4

Q1. Show that the points A (1, 2), B (– 1, – 16), and C (0, – 7) lie on the graph of the linear equation y = 9x – 7.

Answer: Given, the points are A(1, 2), B(-1, -16) and C(0, -7)

The linear equation is y = 9x - 7

We have to show that the given points lie on the graph of the linear equation.

When x = 2,

y = 9(2) - 7

y = 18 - 7

y = 11

When x = -2,

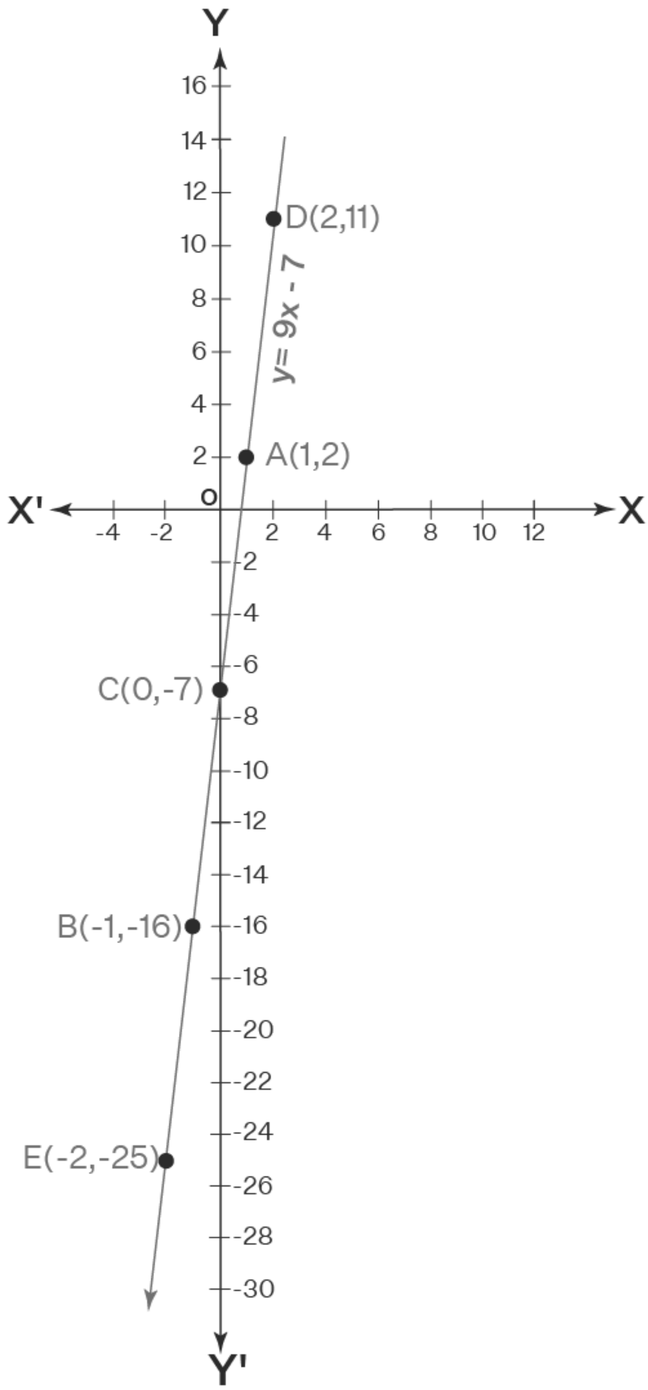
y = 9(-2) - 7

y = -18 - 7

y = -25

Therefore, the points are (2, 11) and (-2, -25)

On plotting the points on the graph and joining them, we obtain a straight line.



The graph of the equation is a straight line.

We observe that the points A, B, and C lie on the straight line.

Q2. The following observed values of x and y are thought to satisfy a linear equation. Write the linear equation-

x	6	– 6
y	– 2	6

Draw the graph using the value of x, y as given in the above table. At what points the graph of the linear equation (i) cuts the X-axis? (ii) cuts the Y-axis?

Answer:

Given, the table represents the values of x and y that satisfy a linear equation.

We have to draw the graph using the values and find the points at which the equation cuts the x-axis and the y-axis.

The linear equation of a line is given by

y = mx + c

Where, m is the slope

c is the y-intercept.

To find slope use the formula,

$m = (y_2 - y_1) / (x_2 - x_1)$

Given, $x_2 = -6$, $x_1 = 6$, $y_2 = 6$ and $y_1 = -2$

m = (6 + 2) / (-6 - 6)

m = 8/-12

m -2/3

Using the point (6, -2)

-2 = (-2/3)6 + c

-2 = -2(2) + c

-2 = -4 + c

c = 4 - 2

c = 2

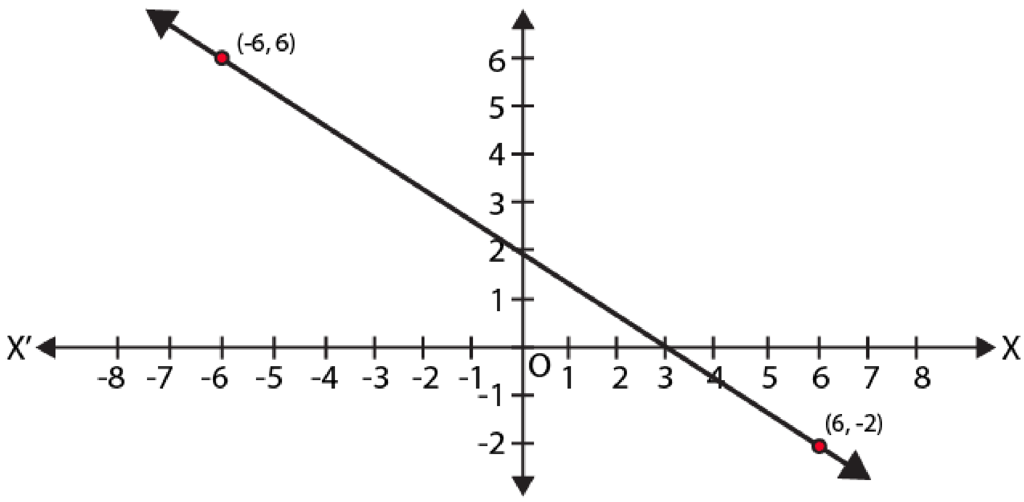
Put m = -2/3 and c = 2 in the equation,

y = (-2/3) x + 2

3y = -2x + 6

2x + 3y = 6

Therefore, the linear equation is 2x + 3y = 6



The graph cuts the x-axis when y = 0

Put y = 0 in the linear equation

2x + 3(0) = 6

2x = 6

x = 6/2

x = 3

Therefore, the graph cuts the x-axis at the point (3, 0)

The graph cuts the y-axis at x = 0

Put x = 0 in the linear equation

2(0) + 3y = 6

3y = 6

y = 6/3

y = 2

Therefore, the graph cuts the y-axis at the point (0, 2)

Q3. Draw the graph of the linear equation 3x + 4y = 6. At what points, the graph cut X and Y-axis?

Answer:

Given, the linear equation is 3x + 4y = 6

We have to draw the graph of the equation and find the points at which the graph cuts the x-axis and the y-axis.

The equation can be rewritten as

4y = 6 - 3x

y = (6 - 3x)/4

When x = 0,

y = (6 - 3(0)) / 4

y = 6/4

y = 3/2

When y = 0

0 = (6 - 3x)/4

6 - 3x = 0

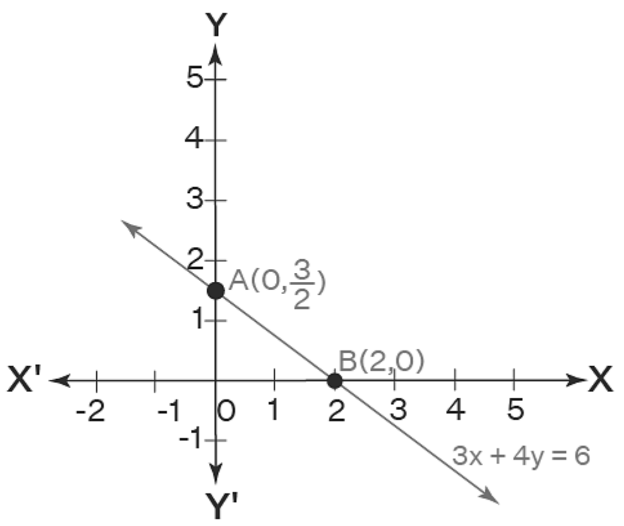
3x = 6

x = 6/3

x = 2

Therefore, the points are (2, 0) and (0, 3/2)

On plotting the points on the graph,



Joining the points, we obtain a straight line which is the graph of the equation 3x + 4y = 6

From the graph, we observe that

The graph cuts the x-axis at the point (2, 0)

The graph cuts the y-axis at the point (0, 3/2)

Q4. The linear equation that converts Fahrenheit (F) to Celsius (C) is given by the relation, C = (5F - 160)/9.

(i) If the temperature is 86°F, what is the temperature in Celsius?

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

(iii) 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?

(iv) What is the numerical value of the temperature which is same in both the scales?

Answer:

(i) If the temperature is 86°F, what is the temperature in Celsius?

Given, the linear equation that converts Fahrenheit (F) to Celsius (C) is C = (5F-160)/9

We have to find the temperature in Celsius if the temperature is 86°F

The relation can be rewritten as

9C = 5F - 160

Given, F = 86°F

9C = 5(86) - 160

9C = 430 - 160

9C = 270

C = 270/9

C = 30°C

Therefore, the temperature is 30°C

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

Given, the linear equation that converts Fahrenheit (F) to Celsius (C) is C = (5F-160)/9

We have to find the temperature in Fahrenheit if the temperature is 35°C

The relation can be rewritten as

9C = 5F - 160

5F = 9C + 160

Given, C = 35°C

5F = 9(35) + 160

5F = 315 + 160

5F = 475

F = 475/5

F = 95°F

Therefore, the temperature is 95°F

(iii) 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?

We know that, F = (9/5)C + 32

If C = 0°, then by substituting this value in the above equation,

F = (9/5)0 + 32

F = 0 + 32

F = 32

Therefore, if C = 0°, then F = 32°

If F = 0° F, then by substituting this value in the above equation,

0 = (9/5)C + 32

(9/5)C = - 32

C = (- 32 × 5)/9

C = - 17.77

Therefore, if F = 0° F, then C = -17.8° C

(iv) What is the numerical value of the temperature which is the same in both scales?

We know that, F = (9/5) C + 32

Let us consider, F = C

By Substituting this value in the equation above,

F = (9/5) C + 32

(9/5 - 1)F + 32 = 0

(4/5)F = - 32

F = (- 32 × 5)/4

Hence, F = - 40

Yes, there is a temperature, of -40°, which is numerically the same for both Fahrenheit and Celsius.

Q5. If the temperature of a liquid can be measured in Kelvin units as x°K or in Fahrenheit units as y°F, the relation between the two systems of measurement of temperature is given by the linear equation

y = 95 (x – 273) + 32

(i) Find the temperature of the liquid in Fahrenheit, if the temperature of the liquid is 313°K.

(ii) If the temperature is 158°F, then find the temperature in Kelvin.

Answer:

(i) Find the temperature of the liquid in Fahrenheit, if the temperature of the liquid is 313°K.

Given, the temperature of a liquid in Kelvin units is x°K

The temperature of a liquid in Fahrenheit units is y°F

The relation between the two systems of measurement of temperature is given by the linear equation y = (9 / 5) (x - 273) + 32

We have to find the temperature of the liquid in Fahrenheit if the temperature of the liquid is 313°K.

Given, x = 313°K

Substituting the value of x in the relation,

y = (9 / 5) (313 - 273) + 32

y = (9 / 5) (40) + 32

y = 9(8) + 32

y = 72 + 32

y = 104°F

Therefore, the temperature is 104°F

(i) If the temperature is 158°F, then find the temperature in Kelvin.

Given, the temperature of a liquid in Kelvin units is x°K

The temperature of a liquid in Fahrenheit units is y°F

The relation between the two systems of measurement of temperature is given by the linear equation y = (9/5)(x - 273) + 32

We have to find the temperature in Kelvin if the temperature is 158° F

Given, y = 158° F

Substituting the value of y in the given relation,

158 = (9/5)(x - 273) + 32

158 - 32 = (9/5)(x - 273)

126(5/9) = x - 273

x - 273 = 14(5)

x - 273 = 70

x = 70 + 273

x = 343°K

Therefore, the temperature is 343°K

Q6. The force exerted to pull a cart is directly proportional to the acceleration produced in the body. Express the statement as a linear equation of two variables and draw the graph of the same by taking the constant mass equal to 6 kg. Read from the graph, the force required when the acceleration produced is

(i) 5 m/sec^2
(ii) 6 m/sec^2

Answer:

Given, the force exerted to pull a cart is directly proportional to the acceleration produced in the body.

We have to write a linear equation and draw the graph of the equation by taking the constant mass equal to 6 kg.

We have to read from the graph the force required when the acceleration produced is 5 m/sec^2

Given, F ∝ a

So, F = ma

Where m is the arbitrary constant i.e.,constant mass

Given, m = 6 kg

Now, F = 6a

(i) The force required when acceleration is 5 m/sec² is

F = 6(5)

F = 30 N

Therefore, the force is 30 N

(i) The force required when acceleration is 6 m/sec² is

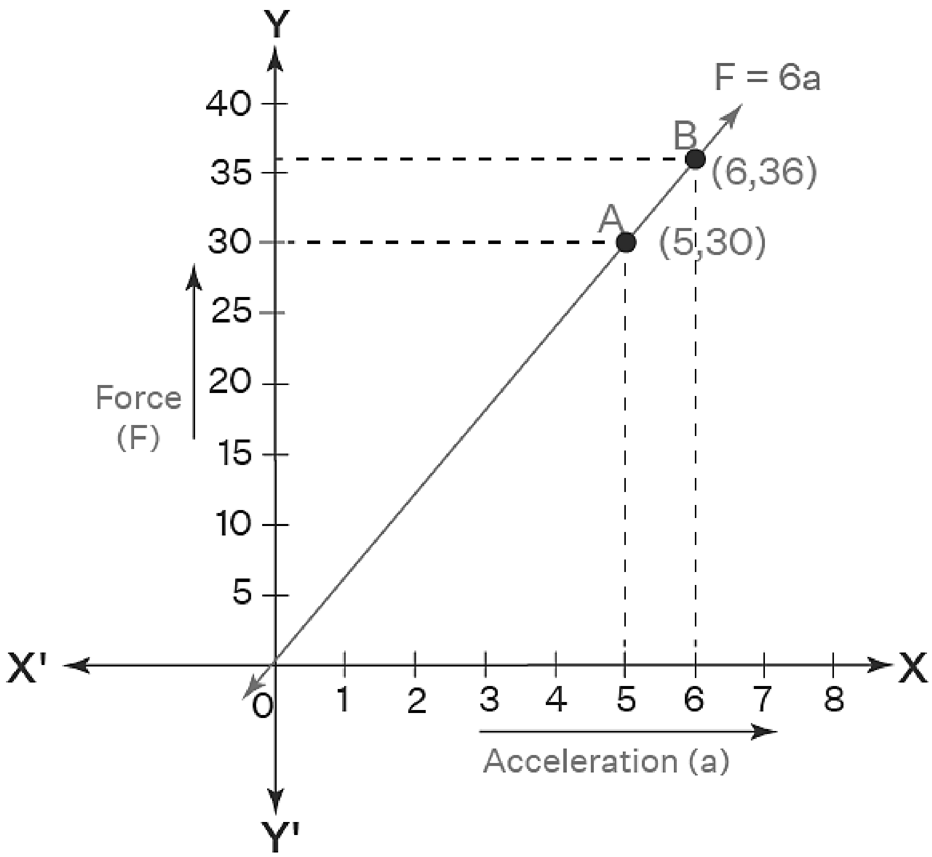
F = 6(6)

F = 36 N

Therefore, the force is 36 N

The points are (5, 30) and (6, 36)

On plotting the points on the graph and joining them



We obtain a straight line which is the graph of the equation F = 6a.