# Chapter 1 Linear Equations in Two Variables

## Very Short Answer Type Questions

**Question.1 Linear equation x – 2 = 0 is parallel to which axis ? [CBSE-15-6DWMW5A]**

**Solution.** Here, linear equation is x-2 = 0 ⇒ x = 2
Thus, it is parallel to y-axis.

**Question.2 If (1, -2) is a solution of the equation 2x – y = p, then find the value of p.**

**Solution.**

$$2x - y = p$$

Put $x = 1, y = -2$, we have

$$2(1) - (-2) = p \quad \Rightarrow \quad 4 = p$$

$$\Rightarrow \quad p = 4.$$

**Question.3 Express x/4 – 3y = – 7 in the form of ax + by + c = 0. [CBSE-15-6DWMW5A]**

**Solution.**

$$\frac{x}{4} - 3y = -7 \quad \Rightarrow x - 12y + 28 = 0$$

Which is in the form $ax + by + c = 0$

**Question. 4 Find the value of k for which x = 0, y — 8 is a solution of 3x – 6y = k. [CBSE-15-NS72LP7]**

**Solution.**

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

$$3x - 6y = k$$

$$\therefore \quad 3(0) - 6(8) = k \quad \Rightarrow \quad k = -48$$

**Question .5 Cost of a pen is two and half times the cost of a pencil. Express this situation as a
linear equation in two variables. [CBSE-15-NS72LP7]**

**Solution.**

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

According to statement of the question, we have

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

$$\Rightarrow \quad 2x = 5y \quad \text{or} \quad 2x - 5y = 0$$

**Question.6 Express x in term of y : x/7 + 2y = 6 [CBSE-14-17DIG1U]**

**Solution.**

Given equation is

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

Thus, $x = 7(6 - 2y)$.

**Question.7 Find the two solutions of the linear equation 2x – 3y = 12.**

**Solution.**

Given linear equation is $2x - 3y = 12$

Put $x = 0$, $y = -4$, we have

$$\text{L.H.S.} = 2(0) - 3(-4) = 0 + 12 = 12 = \text{R.H.S.}$$

Again, put $x = 6$, $y = 0$, we have

$$\text{L.H.S.} = 2(6) - 3(0) = 12 - 0 = 12 = \text{R.H.S.}$$

Hence, $(0, -4)$ and $(6, 0)$ are the required solutions.

**Question.8 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 ? [NCERT Exemplar Problem]**

**Solution.** Solution remains the same.

**Question. 9 How many linear equations in x and y can be satisfied by x = 1 and y = 2? [NCERT Exemplar Problem]**

**Solution.** Infinitely many.

**Question.10 In an one day international cricket match, Raina and Dhoni together scored 198 runs. Express the statement as a linear equation in two variables. [CBSE-14-17DIG1U]**

**Solution.** 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
or x + y – 198 = 0

**Question.11 Write the equation of a line which is parallel to x-axis and is at a distance of 2 units from the origin. [CBSE-14-ERFKZ8H**

**Solution.** 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

**Question.12 Find 'a', if linear equation 3x – ay = 6 has one solution as (4, 3).[CBSE -14-ERFKZ8H]**

**Solution.**

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

$$\therefore \quad 3(4) - a(3) = 6$$

$$\Rightarrow \quad 12 - 3a = 6$$

$$\Rightarrow \quad a = \frac{-6}{-3} = 2$$

Hence, $a = 2$

**Question.13 The cost of a notebook is Rs 5 less than twice the cost of a pen. Write this statement as a linear equation in two variables.**

**Solution.** Let Rs x be the cost of a notebook and Rs y be the cost of a pen, then, we have
$x = 2y - 5$
$\Rightarrow \quad x - 2y + 5 = 0.$

**Question.14 Total cost of a laptop and a mobile phone is Rs 60000. Write a linear equation in two variables to represent this statement.**

**Solution.** Let the cost price of a laptop be Rs l and cost price of a mobile phone be Rs m.
Since combined cost of a laptop and a mobile phone is Rs 60000 So, $l + m = 60000$

**Question.15 The cost of a table is Rs 100 more than half the cost of a chair. Write this statement as a linear equation in two variables.**

**Solution.**

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.

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

$$\Rightarrow \qquad 2x = y + 200 \text{ or } 2x - y - 200 = 0.$$

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## Short Answer Questions Type-1

**Question.16 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=[9/5] c+32**
**If the temperature is – 40°C, then what is the temperature in Fahrenheit ?[CBSE-14-GDQNI3 W]**

**Solution.**

Given linear equation is

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

Put $C = -40^\circ$, we have

$$F = \frac{9}{5}(-40^\circ) + 32^\circ$$

$$F = -72^\circ + 32^\circ$$

$$F = -40^\circ$$

**Question.17 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. [CBSE-14-GDQNI3W]**

**Solution**. Here, required equation is parallel to y-axis at a distance of 2 units on the left side of y-axis.
$x = -2$ or $x + 2 = 0$

**Question.18 Find the value ofk, if (1, -1) is a solution of the equation 3x-ky = 8. Also, find the coordinates of another point lying on its graph. [CBSE-15-NS72LP7]**

**Solution.**

Since (1, –1) is a solution of the equation $3x - ky = 8$

$\therefore \quad 3(1) - k(-1) = 8 \quad \Rightarrow k = 8 - 3 = 5$

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).

**Question. 19 If (p, 2p + 1) is the solution of the linear equation 4x + 3y = 23. Find the value of p.**

**Solution.**

If $(p, 2p + 1)$ is the solution of the linear equation $4x + 3y = 23$, then, we have

$$4p + 3(2p + 1) = 23$$

$\Rightarrow \quad 4p + 6p + 3 = 23 \quad \Rightarrow \quad 10p = 20$

$\Rightarrow \quad p = 2$

**Question.20 Find the value of m, if (5,8) is a solution of the equation 11 x-2y = 3m, then find one more solution of this equation. [CBSE March 2013]**

**Solution.**

Here, (5,8) is the solution of the equation

$$11x - 2y = 3m$$

$\Rightarrow \quad 11(5) - 2(8) = 3m$

$$55 - 16 = 3m$$

$\Rightarrow \quad 39 = 3m \quad \Rightarrow \quad m = 13$

Now, equation becomes $11x - 2y = 39$

Take $x = 3$, we have

$$11(3) - 2y = 39$$

$$33 - 2y = 39$$

$$-2y = 6$$

$$y = -3$$

Thus, (3, – 3) is another solution of the given equation.

**Question. 21 If π x + 3y = 25, write y in terms of x and also, find the two solutions of this equation. [CBSE-14-17DIG1U]**

**Solution.**

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

**Question. 22 Find four solutions of 2x-y = 4. [CBSE March 2011 ]**

**Solution.**

Given equation is $2x - y = 4$

$$\Rightarrow \quad y = 2x - 4$$

Put $x = 0$ in $(i)$, we have

$$y = 2(0) - 4 = -4$$

Put $x = 1$ in $(i)$, we have

$$y = 2(1) - 4 = -2$$

Put $x = 2$ in $(i)$, we have $y = 2(2) - 4 = 0$

Put $x = 3$ in $(i)$, we have $y = 2(3) - 4 = 2$

Thus, $(0, -4)$, $(1, -2)$, $(2, 0)$ and $(3, 2)$ are required four solutions of $2x - y = 4$.

**Question. 23 Give equation of two lines on same plane which are intersecting at the point (2, 3). [CBSE March 2012]**

**Solution.**

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).

**24. Let y varies directly as x. Ify = 12 when x = 4, then write a linear equation. What is the value of y,when x = 5 ? [NCERT Exemplar Problem]**

**Solution.**

Given $y$ varies directly as $x$ implies $y = kx$ ...$(i)$

But $y = 12$ for $x = 4$

$$\Rightarrow \quad 4k = 12 \Rightarrow k = 3$$

Put $k = 3$ in $y = kx$, we have

$$y = 3x$$

Now, when $x = 5$, $y = 3 \times 5 \Rightarrow y = 15$

**Question.25 Give the equations of two lines passing through (2, 14). How many more such lines are there and why ?**

**Solution.**

Let $7x - y = 0$ ...(i)

$2x + y = 18$ ...(ii)

be two linear equations. We observe (i) and (ii) satisfy $x = 2, y = 14$

From (i), we have $7(2) - 14 = 14 - 14 = 0$

*i.e.*, (2, 14) is the solution of (i).

From (ii), we have $2(2) + 14 = 4 + 14 = 18$

It is quite obvious that graphs of (i) and (ii) are two straight lines and the point (2, 14) lies on both the lines. Hence, the two lines pass through the point (2, 14).

We can find infinitely many linear equations whose one pair of solution is (2, 14) and correspondingly, there are infinitely many straight lines in the cartesian plane which pass through the point (2, 14).

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## Short Answer Questions Type-II

**Question. 26 Find the value of a for which the equation 2x + ay = 5 has (1, -1) as a solution. Find two more solutions for the equation obtained. [CBSE March 2011 ]**

**Solution.**

Here, $(1, -1)$ is a solution of the equation

$2x + ay = 5$

$\therefore \quad 2(1) + a(-1) = 5$

$2 - a = 5 \Rightarrow -a = 3 \Rightarrow a = -3$

Substituting the value of $a$ in

$2x + ay = 5$, we have

$2x - 3y = 5$

Take $x = 4$, we have

$2(4) - 3y = 5$

$\Rightarrow \quad -3y = -3 \Rightarrow y = 1$

Again, take $x = -2$, we have

$2(-2) - 3y = 5$

$-4 - 3y = 5$

$\Rightarrow \quad -3y = 9 \Rightarrow y = -3$

Thus, $(4, 1)$ and $(-2, -3)$ are the two more solutions of the equation

$2x - 3y = 5.$

**Question. 27 A fraction becomes 1/4 when 2 is subtracted from the numerator and 3 is added to the denominator. Represent this situation as a linear equation in two variables. Also, find two solutions for this. [CBSE-15-17DIG1U]**

**Solution.** Let numerator and denominator of the given fraction be respectively x and y. According to the statement, we obtain

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

$\Rightarrow \quad 4x - 8 = y + 3$

$\Rightarrow \quad 4x - y - 11 = 0$

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).

**Question.28 Draw the graph of the linear equation y = 2/3 x + 1/3 . Check from the graph that (7, 5)is a solution of the linear equation.**

**Solution.**

Given linear equation is $y = \frac{2}{3}x + \frac{1}{3} \Rightarrow y = \frac{2x+1}{3}$ ...(i)

Putting $x = 1$ in (i), we have $y = \frac{2(1)+1}{3} = \frac{3}{3} = 1$

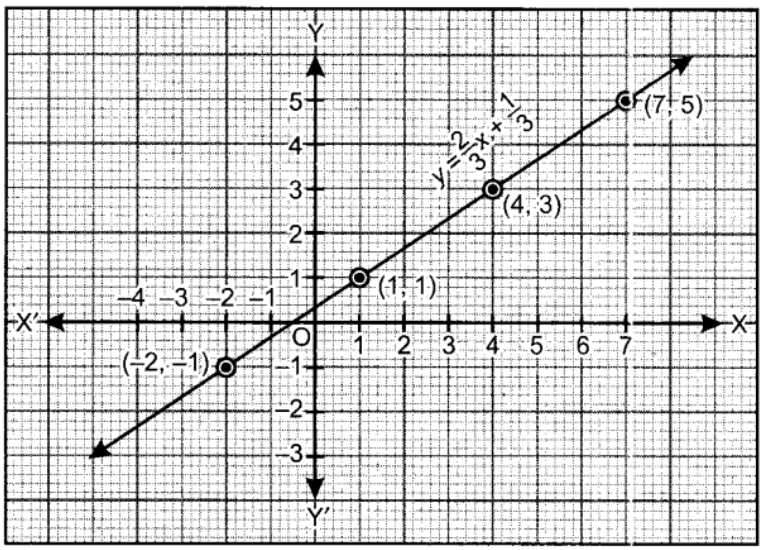
Putting $x = 4$ in (i), we have $y = \frac{2(4)+1}{3} = \frac{9}{3} = 3$

Putting $x = -2$ in (i), we have $y = \frac{2(-2)+1}{3} = \frac{-3}{3} = -1$

To draw the graph, we use the following table :

| $x$ | 1 | 4 | –2 |
|---|---|---|---|
| $y$ | 1 | 3 | –1 |

Plotting the points (1, 1), (4, 3) and (– 2, –1) on the graph and drawing a straight line passing through these points, we obtain the graph of linear equation $y = \frac{2}{3}x + \frac{1}{3}$ as shown in figure.




From the graph, we see that the point (7, 5) lies on the straight line represented by the equation $y = \frac{2}{3}x + \frac{1}{3}$.

**Question. 29 The cost of two pizzas and 1 burger is Rs 450. Represent this situation algebraically and also, draw the graph. [CBSE-14-ERFKZ8H], [CBSE-15-6DWMW5A]**

**Solution.** Let cost price of one pizza be Rs x and that of one burger be Rs y.

∴ According to given statement, we have

**2x + y = 450**

$\Rightarrow$ **y = 450 – 2x**

**When x = 100, y = 250**

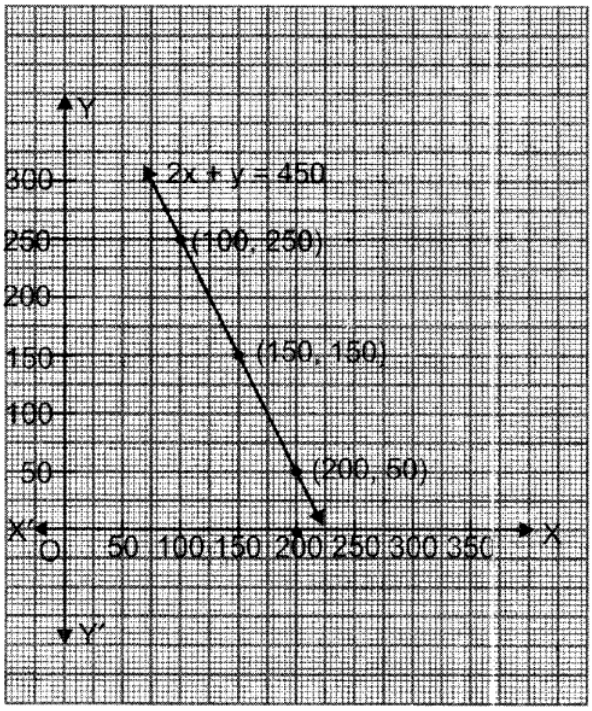
When $x = 150$, $y = 150$

When $x = 200$, $y = 50$

Table of solutions is :

| $x$ | 100 | 150 | 200 |
|---|---|---|---|
| $y$ | 250 | 150 | 50 |

Plot the points (100, 250), (150, 150), (200, 50) and join them to get the required graph.




**Question.30 Express y in terms of x for the equation 3x – 4y + 7 = 0. Check whether the points (23, 4) and (0,7/4)lie on the graph of this equation or not.**

**Solution.** Given equation is 3x – 4y + 7 = 0

$\therefore \quad y = \dfrac{3x+7}{4}$

When $x = -1$, then $y = 1$

When $x = 3$, then $y = 4$

When $x = 7$, then $y = 7$

Table of solutions is :

| $x$ | –1 | 3 | 7 |
|---|---|---|---|
| $y$ | 1 | 4 | 7 |

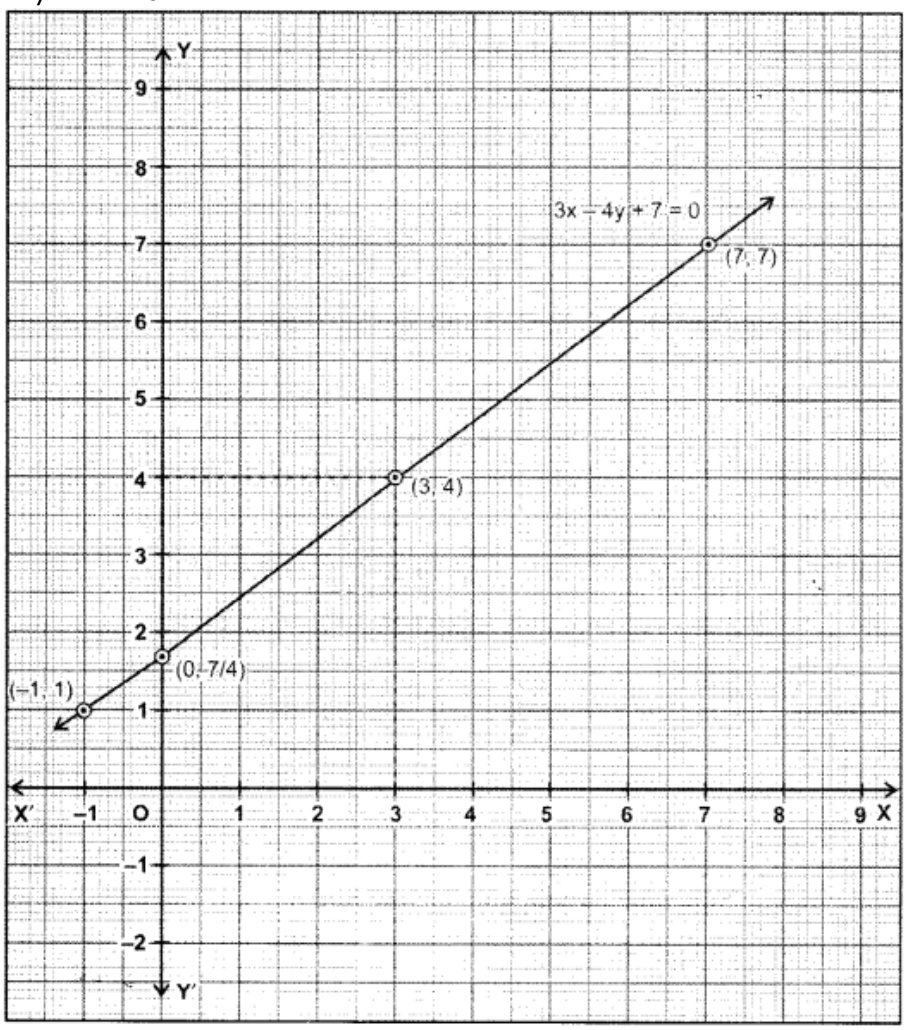
Plot the points (–1, 1), (3, 4), (7, 7) and join them to get the given graph.

From the graph, we see that,

when $x = 0$, then $y = \dfrac{7}{4}$

and when $y = 4$, then $x = 3$.

Thus, $(0, \dfrac{7}{4})$ lies on the graph, whereas (23, 4) does not lie on the graph.



**Question. 31 The path of an aeroplane is given by the equation 3x – 4y = 12. Represent the graph graphically. Also, show that the point (- 4, – 6) lies on the graph. [CBSE-15-NS72LP7]**

**Solution.** Given equation is 3x – 4y = 12

Given equation is $3x - 4y = 12$

$$\therefore \quad y = \frac{3x - 12}{4}$$

When $x = 0$, then $y = -3$

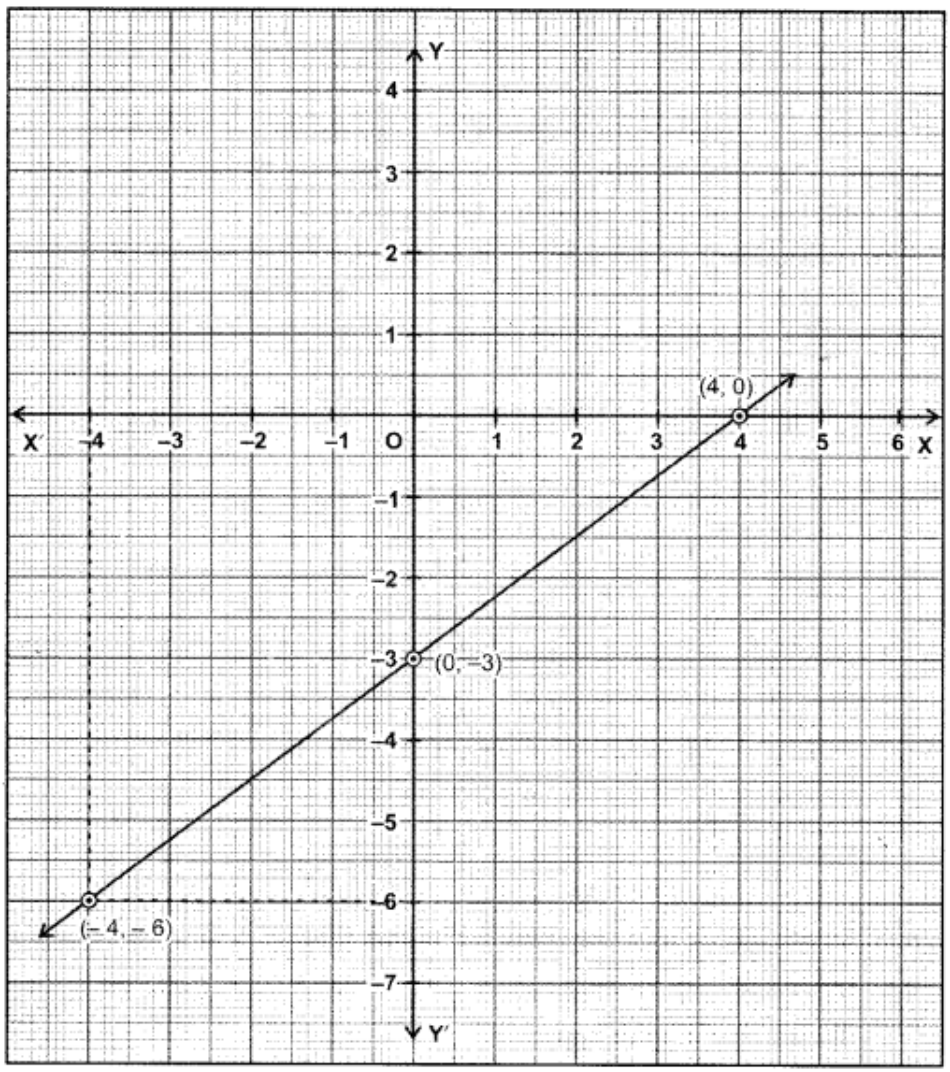
When $x = 4$, then $y = 0$

Table of solutions is :

| $x$ | 0 | 4 |
|---|---|---|
| $y$ | –3 | 0 |

Plot the points (0, – 3), (4, 0) on the graph and join them to get the required graph. From the graph, we see, when $x = -4$, then $y = -6$.

Therefore, (– 4, – 6) lies on the graph of given equation.




**Question.32 Rupinder and Deepak two students of a vidyalaya contribute to charity. The Contribution of Rupinder is 2/5 of the contribution of Deepak. Write a linear equation According to the above statement and draw the graph for the linear equation.**

**Solution.**

Let the contribution of Deepak be ₹ $x$ and the contribution of Rupinder be ₹ $y$. According to the statement of the question

$$y = \frac{2}{5}x$$

$$5y = 2x$$

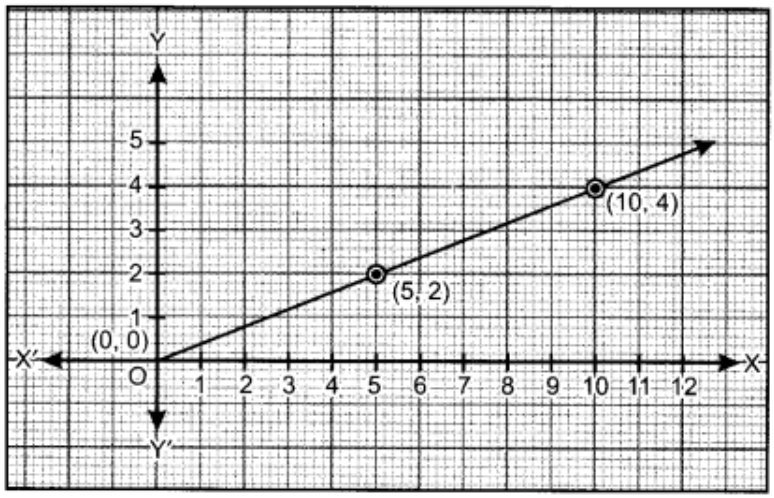
When $x = 0$, then $y = 0$

When $x = 5$, then $y = 2$

When $x = 10$, then $y = 4$

To draw the graph, we use the following table :

| $x$ | 0 | 5 | 10 |
|---|---|---|---|
| $y$ | 0 | 2 | 4 |




**Question. 33 Draw the graph of the equation y = mx + c for m = 3 and c = – 1 (a straight line in Cartesian plane). Read from the graph the value of when x = 2.**

**Solution.**

For $m = 3$ and $c = -1$, the linear equation becomes

$$y = 3x - 1$$

When $x = 0$, then

$$y = 0 - 1 = -1$$

When $x = 1$, then

$$y = 3 - 1 = 2$$

When $x = -1$, then

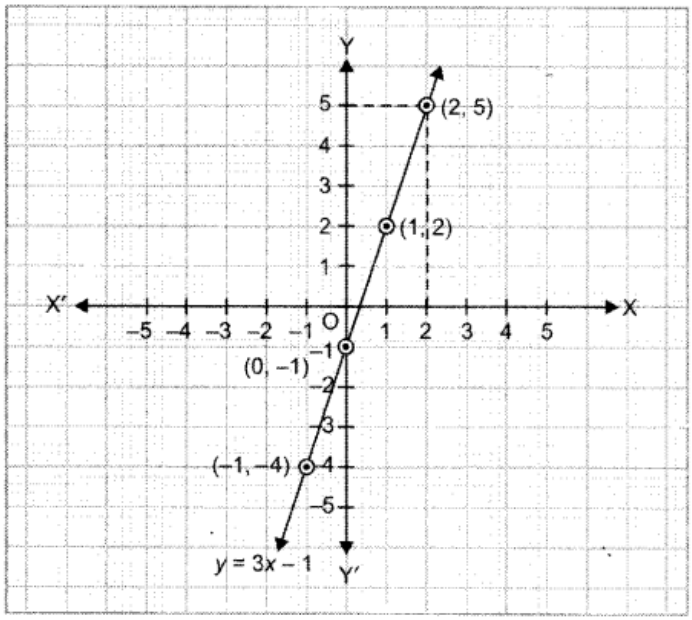
$$y = -3 - 1 = -4$$

**Table :**

| $x$ | 0 | 1 | – 1 |
|---|---|---|---|
| $y$ | –1 | 2 | – 4 |

By plotting the points (0, –1), (1, 2) and (–1, – 4) on a graph paper and joining them, we have the graph for linear equation $y = mx + c$ *i.e.*,

$y = 3x - 1$ (see fig.)



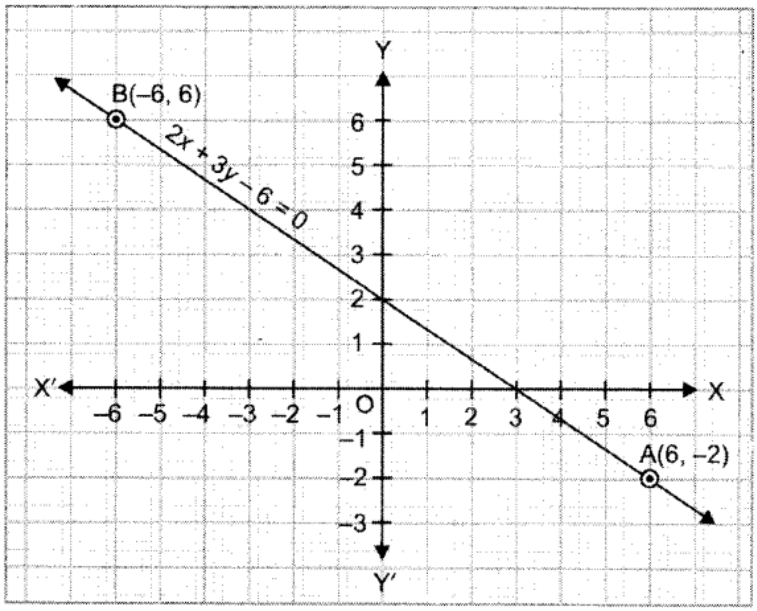

From the graph, we read the value of $y = 5$ when $x = 2$.

**Question. 34 The following observed values of x Write the linear equation : Draw the graph using the values of x, graph of the linear equation.**

| ***x*** | ***6*** | ***–6*** |
|---|---|---|
| ***y*** | ***–2*** | ***6*** |

**(i) cuts the x-axis (ii) cuts the y-axis**

**Solution.**




Let $ax + by + c = 0$ ...(*i*)
be the linear equation in two variables. From the table, we have two points A(6, –2) and B(–6, 6) which lie on the graph of the linear equation

$\Rightarrow \quad 6a - 2b + c = 0$

and $-6a + 6b + c = 0$

Adding the above two equations, we obtain

$$b = -\frac{1}{2}c$$

By putting $b = -\frac{1}{2}c$ in $6a - 2b + c = 0$, we obtain

$$a = -\frac{1}{3}c$$

Now, from equation (*i*), we have

$$-\frac{1}{3}cx - \frac{1}{2}cy + c = 0 \quad \Rightarrow \quad \frac{x}{3} + \frac{y}{2} - 1 = 0$$

or $\quad 2x + 3y - 6 = 0$

Which is the required linear equation in two variables. Plots the points A(6, –2) and B(–6, 6) on the graph. Join them to get line AB.

From the graph, we see that the graph cuts the *x*-axis at (3, 0) and the *y*-axis at (0, 2).

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## Long Answer Type Questions

**Question.35 On the graph paper draw the straight line 3x – 2y = 4 and x + y – 3 = 0. Also, find their point of intersection on the graph.**

**Solution.** The two given equations are

$$3x - 2y = 4 \quad \ldots(i)$$

$$x + y = 3 \quad \ldots(ii)$$

From eq. $(i)$, we have $y = \dfrac{3x-4}{2}$

When $x = 0 \Rightarrow y = \dfrac{0-4}{2} = \dfrac{-4}{2} = -2$

When $x = 4 \Rightarrow y = \dfrac{12-4}{2} = \dfrac{8}{2} = 4$

When $x = 6 \Rightarrow y = \dfrac{18-4}{2} = \dfrac{14}{2} = 7$

**Table–1**

| $x$ | 0 | 4 | 6 |
|---|---|---|---|
| $y$ | $-2$ | 4 | 7 |

By plotting the points $(0, -2)$, $(4, 4)$ and $(6, 7)$ on the graph paper and drawing a line passing through these two points, we obtain the graph of the equation $3x - 2y = 4$ as shown in figure.

From eq. $(ii)$, we have

$$x + y - 3 = 0 \Rightarrow y = 3 - x$$

When $x = 0 \Rightarrow y = 3 - 0 = 3$

When $x = 4 \Rightarrow y = 3 - 4 = -1$

When $x = -1 \Rightarrow y = 3 - (-1) = 4$

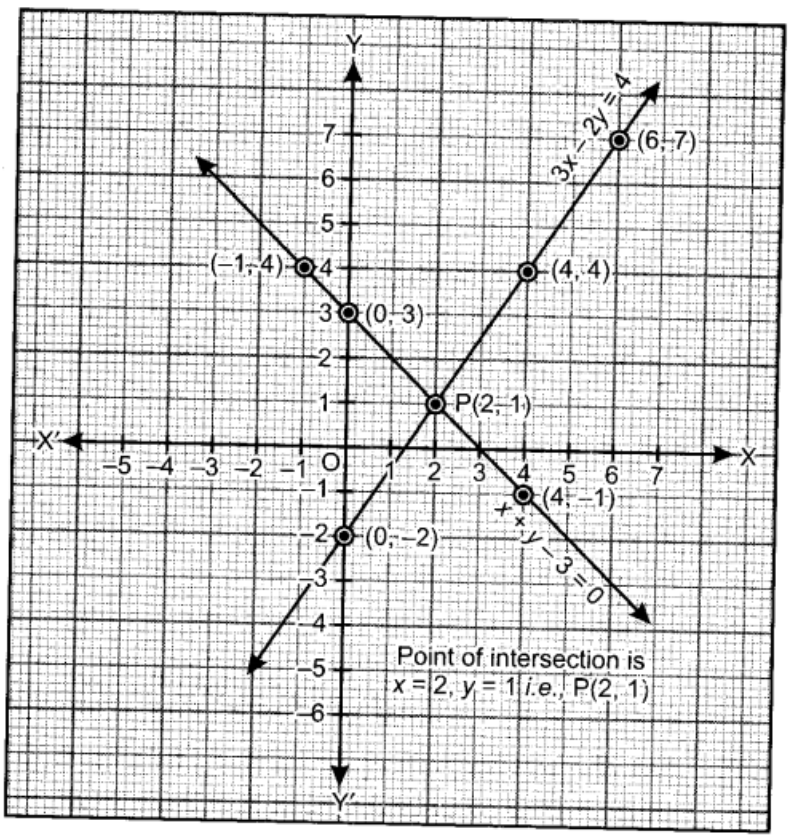
**Table–2**

| $x$ | 0 | 4 | $-1$ |
|---|---|---|---|
| $y$ | 3 | $-1$ | 4 |

By plotting the points $(0, 3)$, $(4, -1)$ and $(-1, 4)$ and joining them by a line, we obtain the graph of the equation $x + y - 3 = 0$ as shown in graph.

Clearly, lines represented by the equations $3x - 2y = 4$ and $x + y - 3 = 0$ intersect at point P whose coordinates are $(2, 1)$.

Hence, the required point of intersection is P(2,1).




**Question. 36 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. [CBSE March 2012]**

**Solution.**

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

$$ax + by = 1 \quad \ldots(i)$$

$\therefore$ We have $2a + 3b = 1 \quad \ldots(ii)$

and $4a + 0 = 1$

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

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

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

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

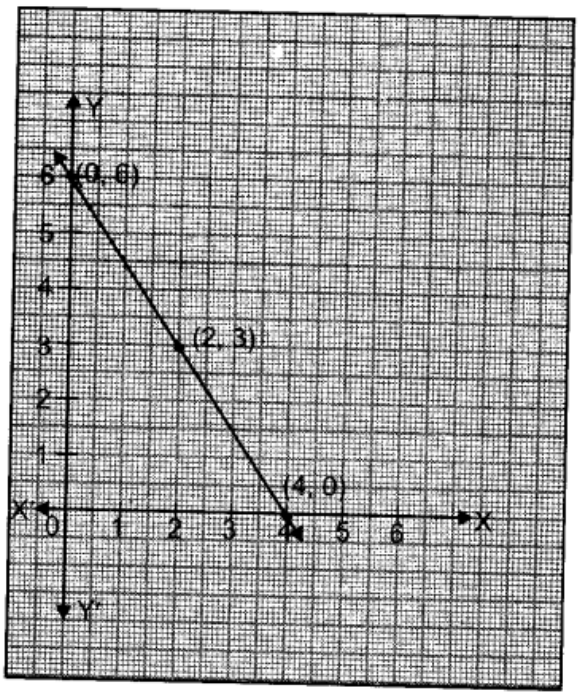
$$\Rightarrow \quad 3b = \frac{1}{2}$$

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

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

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

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




Which is required linear equation.

Put $x = 0$ in eq. $(iii)$

$$\Rightarrow \quad 3(0) + 2y = 12 \quad \Rightarrow \quad 2y = 12$$

$$\Rightarrow \quad y = 6$$

Put $x = 2$ in eq. $(iii)$

$$\Rightarrow \quad 3(2) + 2y = 12 \quad \Rightarrow \quad 2y = 6$$

$$\Rightarrow \quad y = 3$$

Put $x = 4$ in eq. $(iii)$

$$\Rightarrow \quad 3(4) + 2y = 12 \quad \Rightarrow \quad 2y = 0$$

$$\Rightarrow \quad y = 0$$

We have the following table :

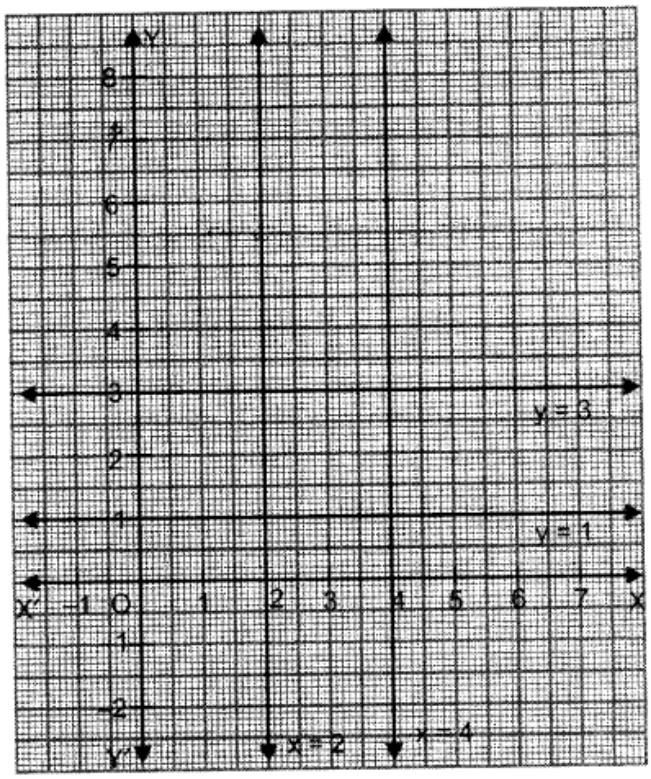
| $x$ | 0 | 2 | 4 |
|---|---|---|---|
| $y$ | 6 | 3 | 0 |

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

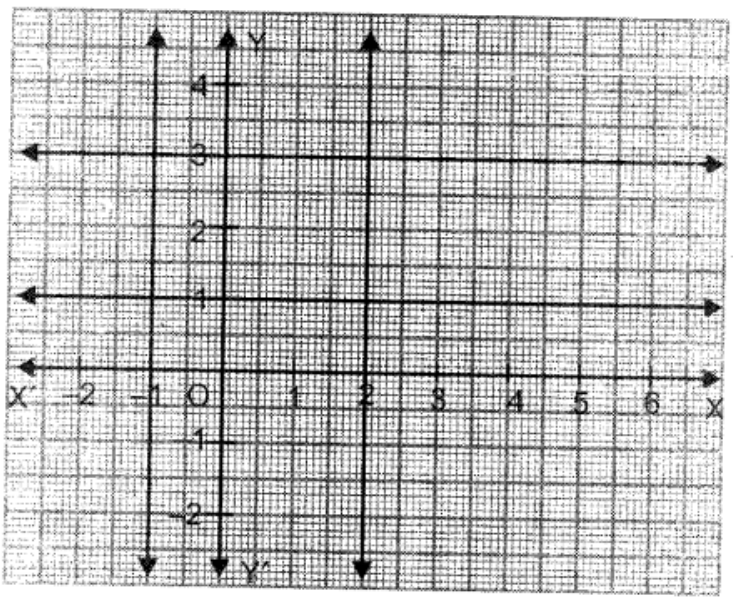
**Question. 37 Draw the graphs of the following equations on the same graph sheet: x = 4,x = 2,y = l and y – 3 = 0**

**Solution.**

Graphs of the given equations are drawn on graph sheet.




**Question. 38 Write the equations of the lines drawn in following graph :**




***Also, find the area enclosed between these lines.***

**Solution.**

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.

**Question. 39 Represent 2x + 3y = 6 by a graph. Write the coordinates of the point where it meets: (a) x-axis (b) y-axis [CBSE-14-GDQNI3W]**

**Solution.**

Given equation is :

$2x + 3y = 6$

$\Rightarrow x = \dfrac{6 - 3y}{2}$

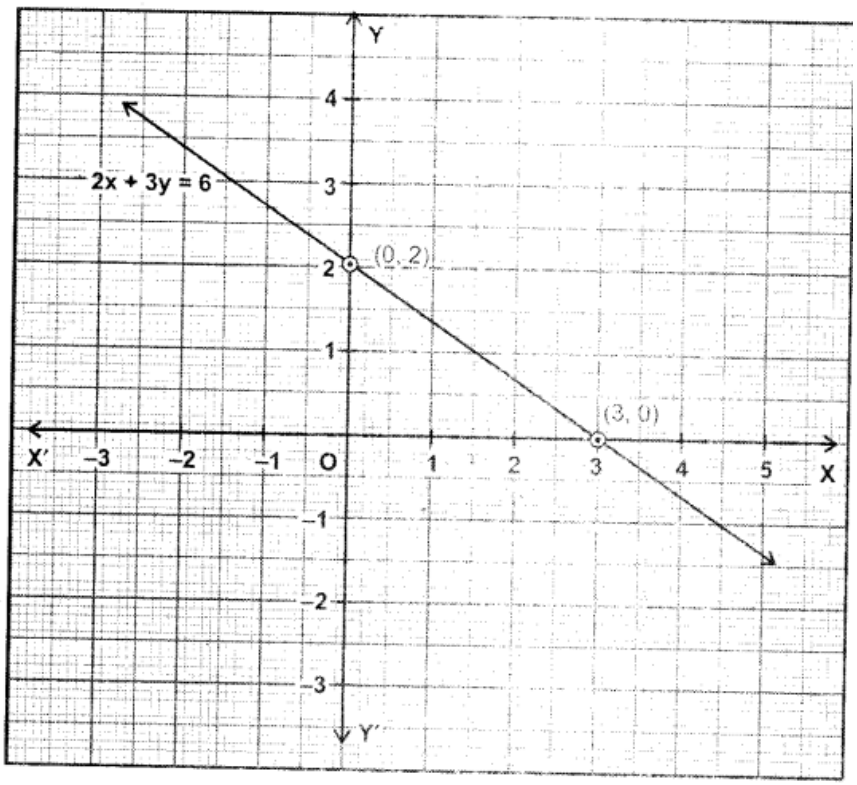
When $y = 0$, $x = 3$

When $y = 2$, $x = 0$

Table of solutions is :

| $x$ | 0 | 3 |
|---|---|---|
| $y$ | 2 | 0 |

Plot the points (0, 2), (3, 0) and join them to get the required line. Line meet the $x$-axis at (3, 0) and $y$-axis at (0, 2).




**Question. 40 You know that the force applied on a body is directly proportional to the acceleration produced in the body. Write an equation to express this situation and plot the graph of the equation, taking constant as 5, force on y-axis and acceleration on x-axis. Also, find acceleration produced in a body, if force applied on it is 20 units. [CBSE-14-ERFKZ8H]**

**Solution.** Let x be the acceleration produced in the body on application of a force of y units. According to the statement of the question. We have y = kx, where k is a constant.

Here, $k = 5$

$\therefore \quad y = 5x$

When $x = 0$, $y = 0$

When $x = 2$, $y = 10$

When $x = 1$, $y = 5$

Table of solutions is :

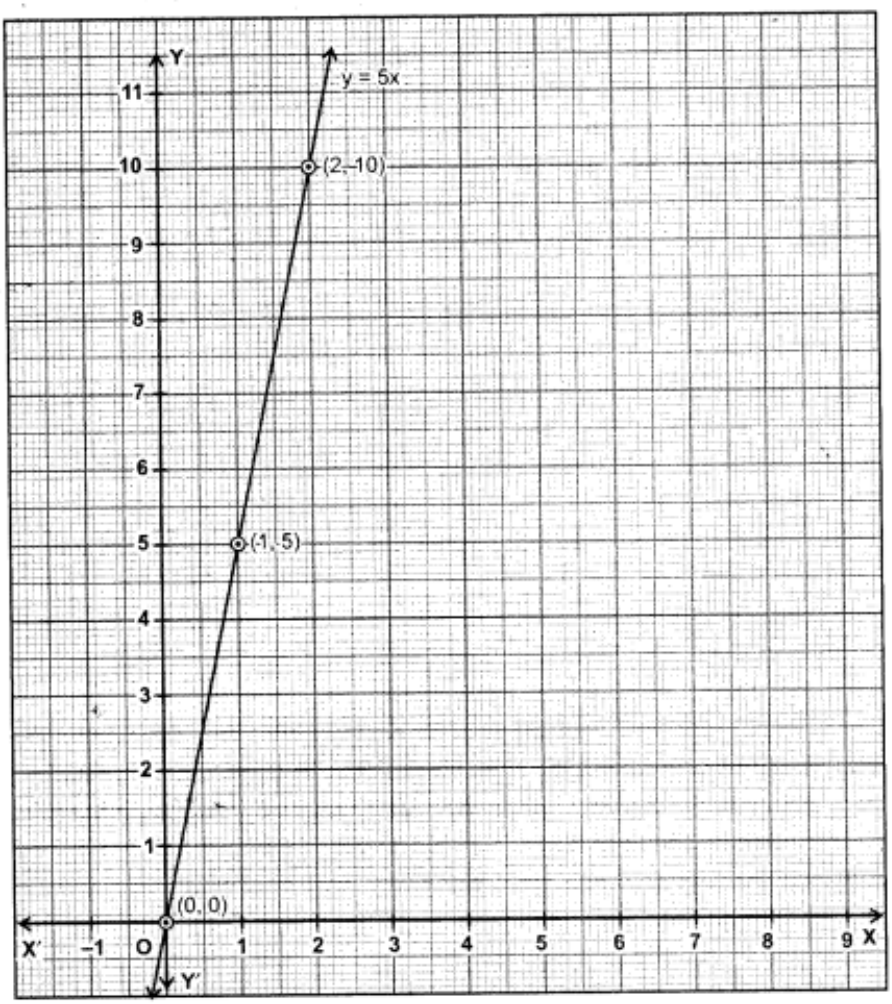
| $x$ | 0 | 1 | 2 |
|---|---|---|---|
| $y$ | 0 | 5 | 10 |

If $y = 20$ units, then

$20 = 5x$

$\Rightarrow x = 4$ units

Hence, acceleration produced by a force of 20 units is 4 units.




**Question. 41 Cost of 1 pen is Rs x and that of 1 pencil is Rs y. Cost of 2 pens and 3 pencils together is Rs 18. Write a linear equation which satisfies this data. Draw the graph for the same. [CBSE- 14ERFKZ8H]**

**Solution.**

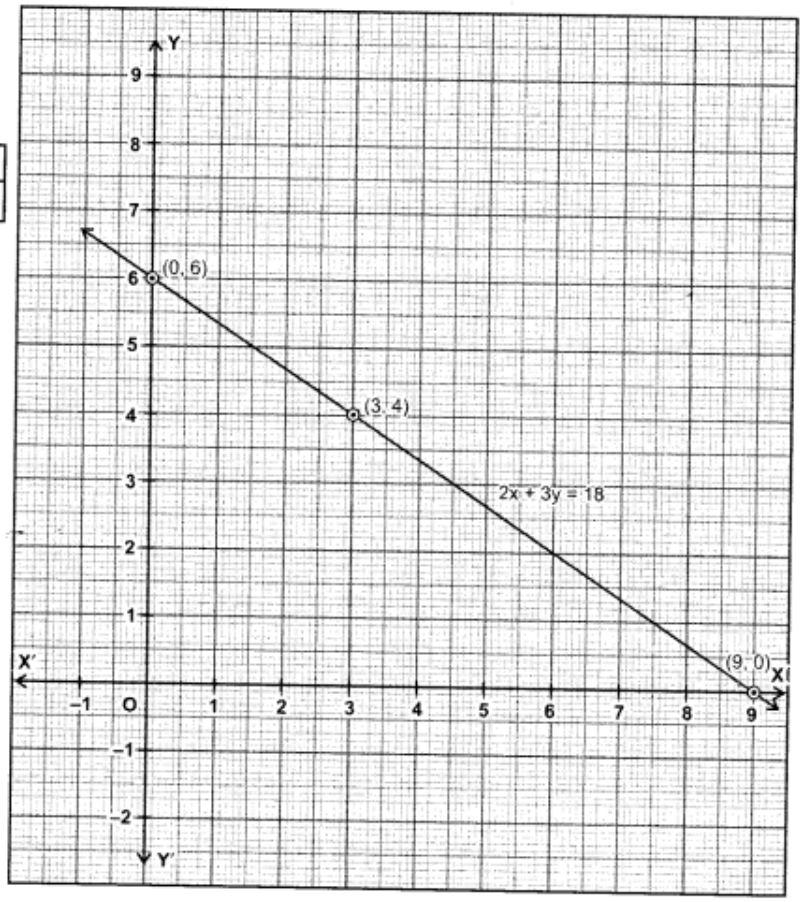
Here, cost of 1 pen is ₹ $x$ and that of 1 pencil is ₹ $y$.
According to the statement of the question, we have

$$2x + 3y = 18$$

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

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.

**Question.42 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. [CBSE-15-6DWMW5A]**

**Solution.**

Let the two numbers be $x$ and $y$.

It is given that sum of two numbers is 8.

$\therefore \quad x + y = 8$

$y = 8 - x$

When $x = 0$, $y = 8$

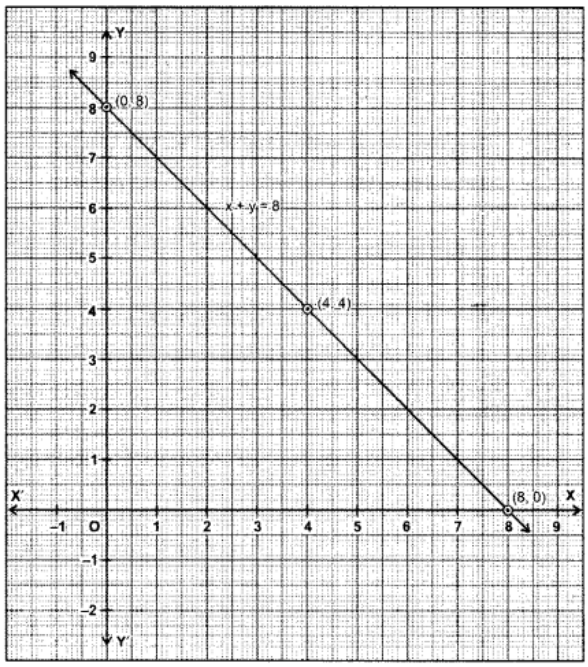
When $x = 4$, $y = 4$

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

$x - y = 2, x > y$

$\Rightarrow \quad x = y + 2$

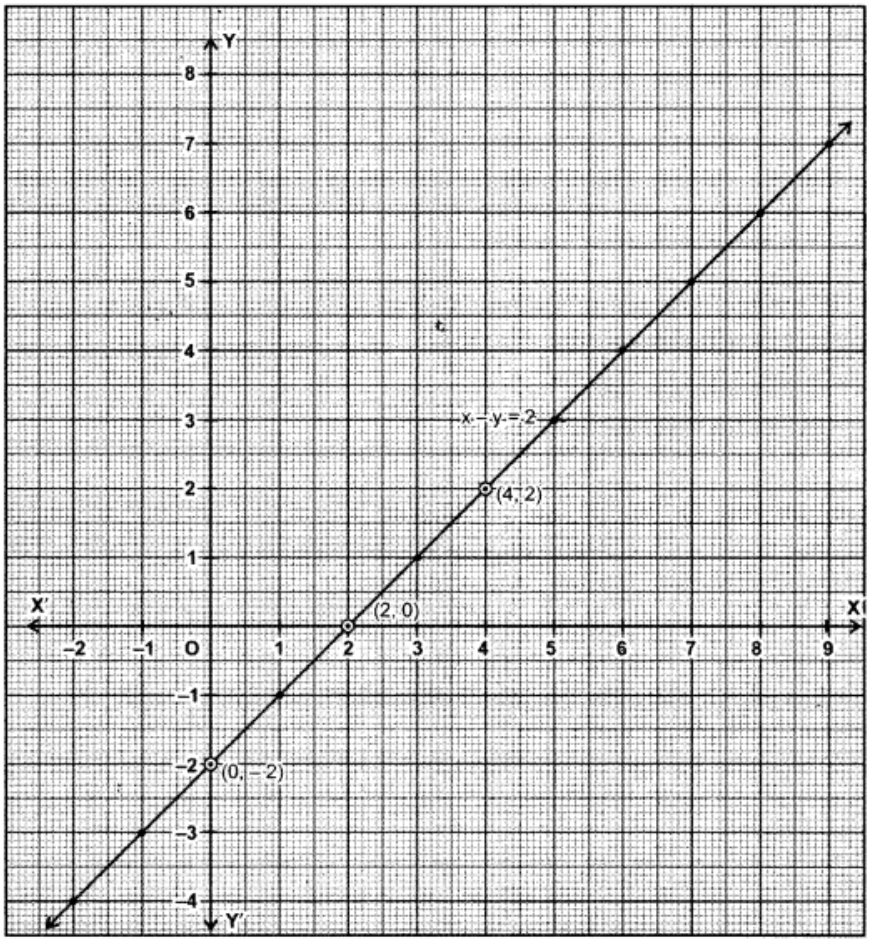
When $x = 0$, $y = -2$

When $x = 2$, $y = 0$

When $x = 4$, $y = 2$

Table of solutions is :

| $x$ | 0 | 2 | 4 |
|---|---|---|---|
| $y$ | –2 | 0 | 2 |




Plot these poitns (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.

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## Value Based Questions (Solved)

**Question.1 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 :**
**(i) 2 units (ii) 0 unit.**
**(iii) In context of values, if work done relates with 'Hard work' and 'Knowledge' relates with 'key' then what will one achieve ?**

**Solution.** Let the work done by constant force be y units and the distance travelled by the body be x units. Since the work done by a body on application of a constant force (F) is directly proportional to the distance travelled by the body.
It can be expressed in the form of a linear equation in two variables is as

$y = Fx$, where F is a constant

Now, we have to draw the graph by taking the constant force as 5 units.

From equation $(i)$, we have

$y = 5x$

When $x = 0$ unit

From equation $(ii)$, we have

$y = 5(0) = 0$ unit

When $x = 1$ unit

From equation $(ii)$, we have

$y = 5(1) = 5$ units

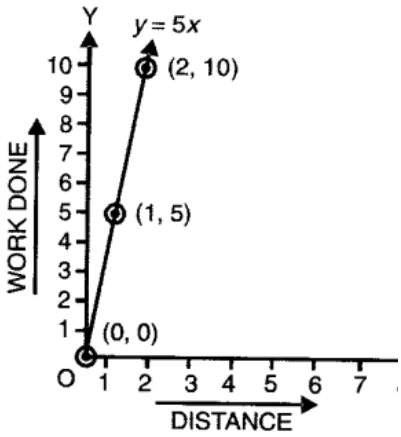
When $x = 2$ units

From equation $(ii)$, we have

$y = 5(2) = 10$ units

To draw the graph, we use the following table :

| $x$ | 0 | 1 | 2 |
|---|---|---|---|
| $y$ | 0 | 5 | 10 |




Now, we have to draw the graph by taking the constant force as 5 units.
From equation (i), we have
From graph:

1. When the distance travelled is 2 units, then the work done is 10 units.
2. When the distance travelled is 0 unit, then the work done is also 0 unit.
3. Success

**Question.2 Lipsa and Mona are two students of IX class of DAV school. Together they contributed? 100 towards the old age home to help the old persons.**
**(i) Write a linear equation which satisfies the given data and draw the graph.**
**(ii)What values are depicted in their plan?**

**Solution.**

(i) Let the contribution of Lipsa be ₹ $x$ and that of Mona be ₹ $y$

$\therefore$ We have $x + y = 100$

$y = 100 - x$ ...$(i)$

Put $x = 10$ in $(i)$ $\Rightarrow$ $y = 100 - 10 = 90$

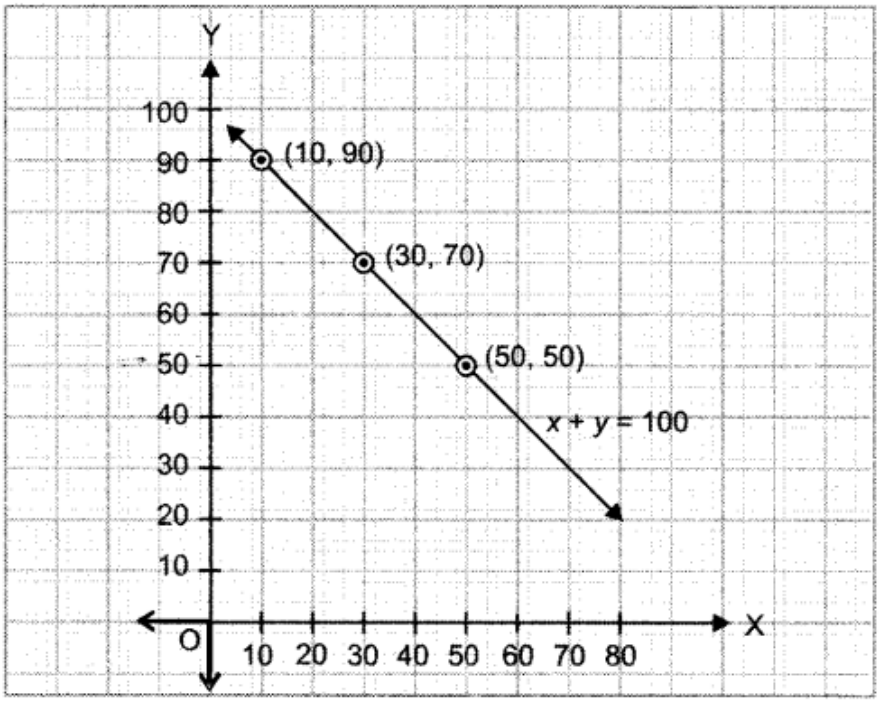
Put $x = 30$ in $(i)$ $\Rightarrow$ $y = 100 - 30 = 70$

Put $x = 50$ in $(i)$ $\Rightarrow$ $y = 100 - 50 = 50$

We have the following table :

| $x$ | 10 | 30 | 50 |
|---|---|---|---|
| $y$ | 90 | 70 | 50 |

By plotting the points (10, 90), (30, 70) and (50, 50) on the graph and by joining them, we obtained the graph of the equation $(i)$ as shown in figure.




(*ii*) We should respect and help our elders.

**Question. 3 Mrs Sharma lost her purse containing 50 rupee and 100 rupee notes amount to Rs 1500 in a shop. Next day shopkeeper found the purse during dusting. He immediately went to Mrs Sharma's house and returned the purse and rupees. Mrs Sharma appreciates the shopkeeper for his act. `**
**(i) Represent the situation as an equation and draw the graph.**
**(ii)What value do you learn from shopkeeper's act ?**

**Solution.**

(*i*) Let the number of 50 rupee notes be $x$
And the number of 100 rupee notes be $y$
$\therefore$ We have $50x + 100y = 1500$

$\Rightarrow \quad x + 2y = 30$ ...(*i*)

(dividing each term by 50)

$\Rightarrow \quad 2y = 30 - x$

$\Rightarrow \quad y = \dfrac{30-x}{2}$ ...(*ii*)

Put $x = 8$ in (*ii*)

$\Rightarrow y = \dfrac{30-8}{2} = \dfrac{22}{2} = 11$

Put $x = 10$ in (*ii*)

$\Rightarrow \quad y = \dfrac{30-10}{2} = \dfrac{20}{2} = 10$

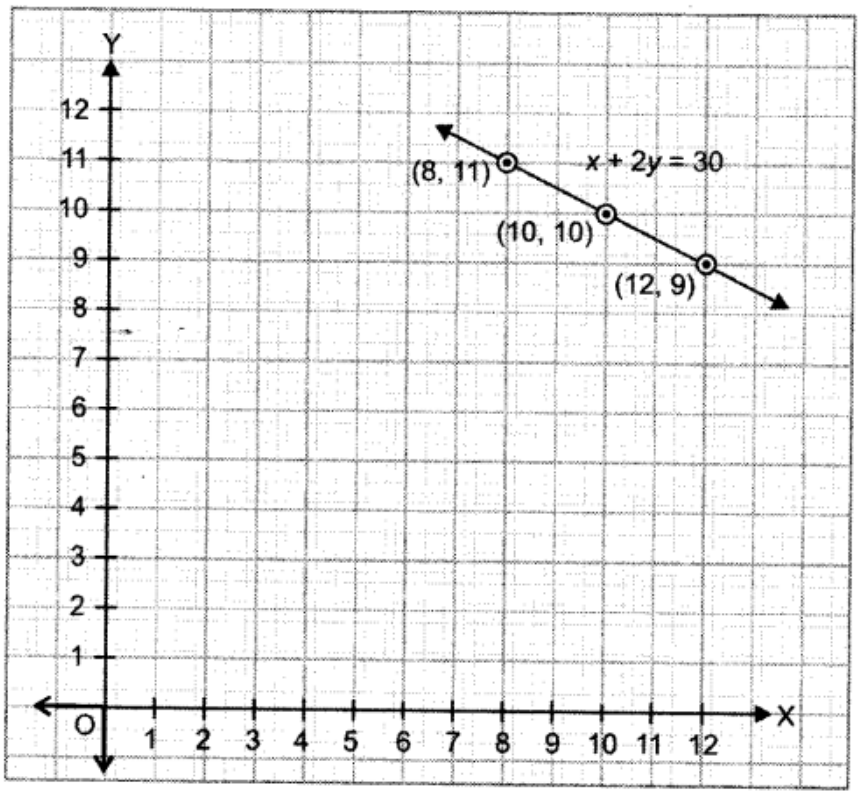
When $x = 12$ in (*ii*)

$\Rightarrow \quad y = \dfrac{30-12}{2} = \dfrac{18}{2} = 9$

We have the following table :

| $x$ | 8 | 10 | 12 |
|---|---|---|---|
| $y$ | 11 | 10 | 9 |

By plotting the points (8, 11), (10, 10) and (12, 9) on the graph and by joining them, we obtain the straight line represented by equation (*i*) as shown in graph.




(*ii*) We should be always honest to feel good.

**Question.4 In an election, a good candidate may lose because 40% of voters do not cast their votes due to various reasons. Form an equation and draw the graph with data. From the graph, find:**

**(i) The total number of voters, if 720 voters cast their votes.**
**(ii)The number of votes cast, if the total number of voters are 1000.**
**(iii) What message did you get from above information?**

**Solution.**

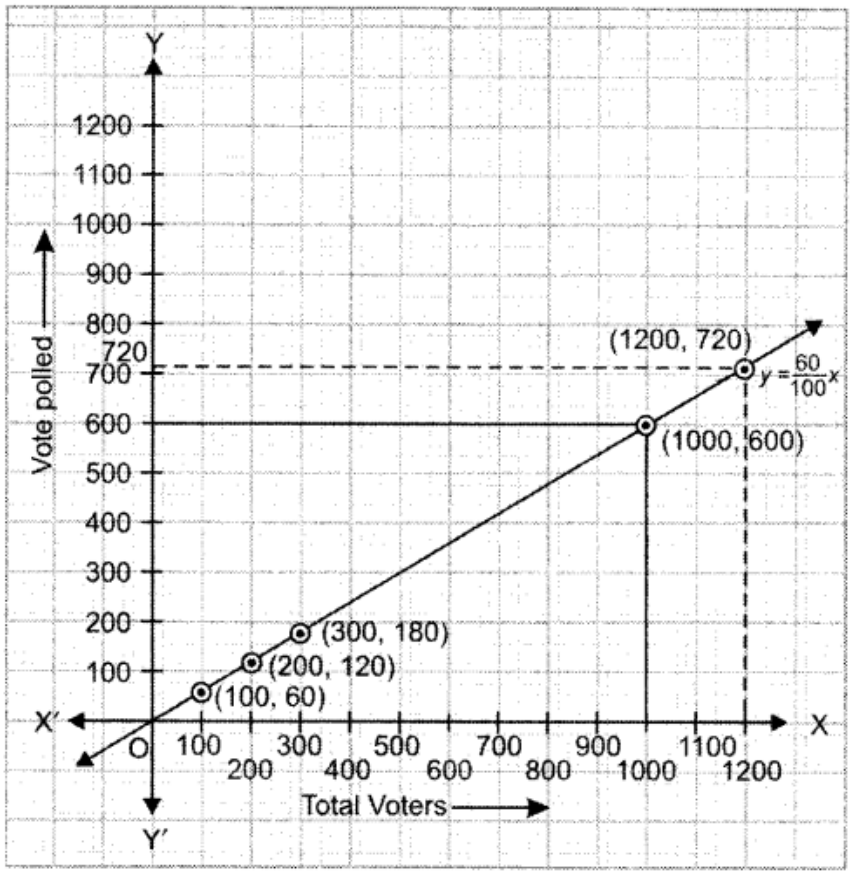
(*i*) We have, total number of voters who do not cast their votes = 40%
⇒ Total number of voters who cast their votes = 60%
Let the total number of voters be $x$ and number of voters cast their votes be $y$

$\therefore$ We have $\frac{60x}{100} = y \Rightarrow y = \frac{60}{100}x$ ...(*i*)

Put $x = 100$ in $(i) \Rightarrow y = \frac{60}{100} \times 100 = 60$

Put $x = 200$ in $(i) \Rightarrow y = \frac{60}{100} \times 200 = 120$

Put $x = 300$ in $(i) \Rightarrow y = \frac{60}{100} \times 300 = 180$




Thus, we have the following table :

| $x$ | 100 | 200 | 300 |
|---|---|---|---|
| $y$ | 60 | 120 | 180 |

By plotting the points (100, 60), (200, 120), (300, 180) on the graph and by joining them, we get the graph of equation (*i*) as shown in figure.

From the graph, we see that:
(i) When total votes polled = 720 i.e., y = 720, the total number of voters i.e., x = 1200 Hence, total number of voters = 1200.
(ii)When total number of voters x = 1000 Number of votes cast is 600.
(iii) Every voters should cast vote to elect an honest candidate.