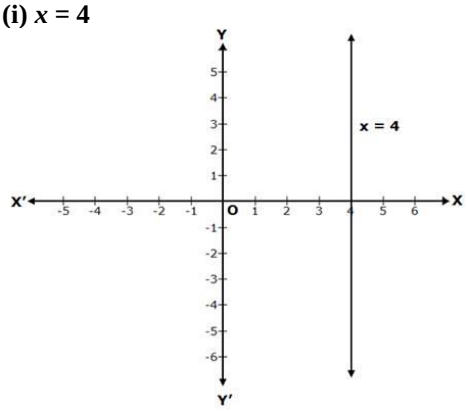
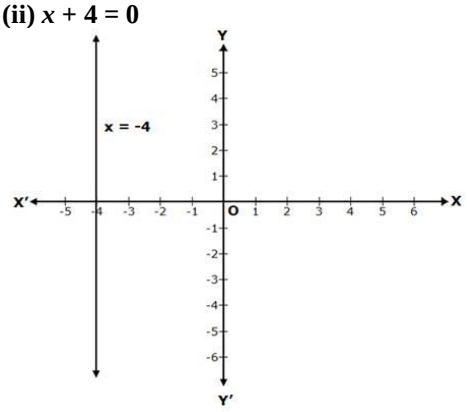
EXERCISE – 4B

Answer.1.

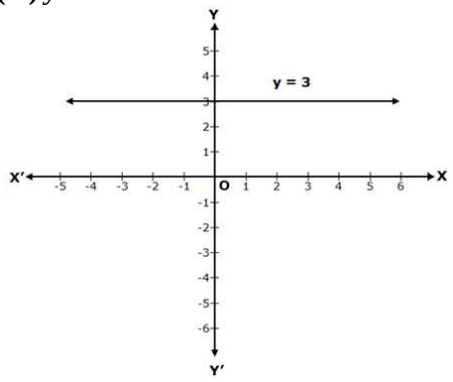
(i) $x = 4$



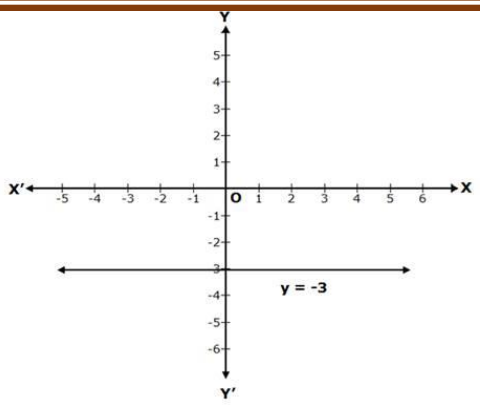
(ii) $x + 4 = 0$



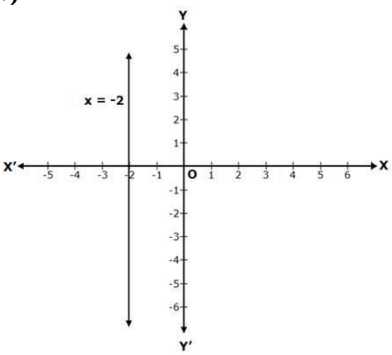
(iii) $y = 3$



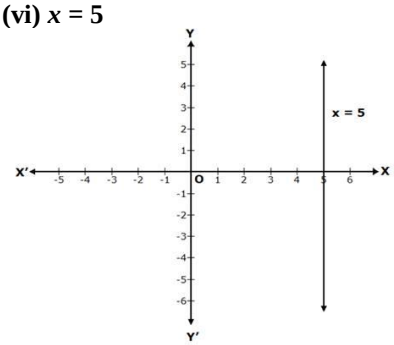
(iv) $y = -3$



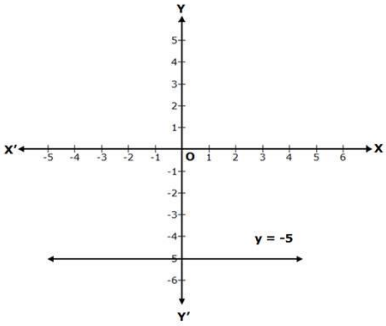
(v) $x = -2$



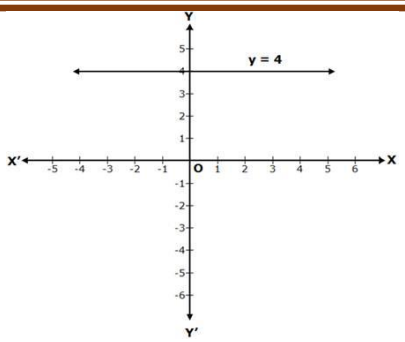
(vi) $x = 5$



(vii) $y + 5 = 0$



(viii) $y = 4$



Answer.2. Given equation: $y = 3x$.

Putting $x = -2, y = 3 \times -2 = -6$

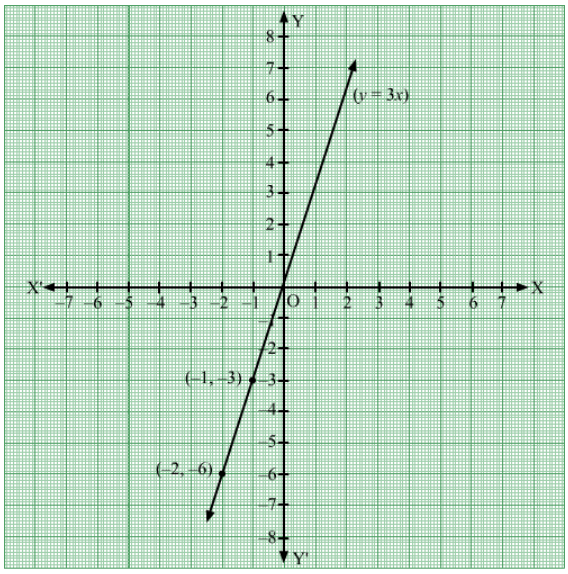
Putting $x = -1, y = 3 \times -1 = -3$

Thus, we have the following table:

x	-2	-1
y	-6	-3

Now plot the points $(-2, -6), (-1, -3)$ on a graph paper.

Join the points and extend the line in both the directions.



(i) From the graph we can see that when $x = 2$, $y = 6$

(ii) Also, from the graph we can see that when $x = -2$, $y = -6$

Answer.3. Given equation: $x + 2y - 3 = 0$

$or,\ x + 2y = 3$

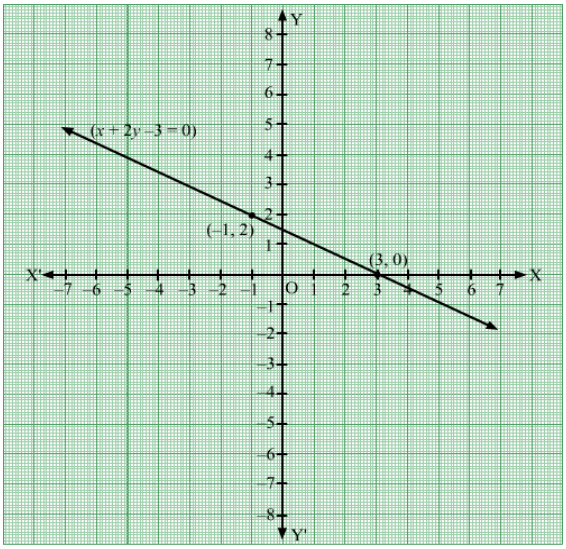
When $y = 0, x + 0 = 3 \Rightarrow x = 3$

When $y = 1, x + 2 = 3 \Rightarrow x = 3 - 2 = 1$

When $y = 2, x + 4 = 3 \Rightarrow x = 3 - 4 = -1$

Thus, we have the following table:

x	3	1	-1
y	0	1	2



(i) From the graph we can see that when $x = 5$, $y = -1$

(ii) Also, from the graph we can see that when $x = -5$, $y = 4$

Answer.4. Given equation: $2x - 3y = 5$

$\Rightarrow 2x = 3y + 5$

$\Rightarrow x = \dfrac{(3y + 5)}{2}$

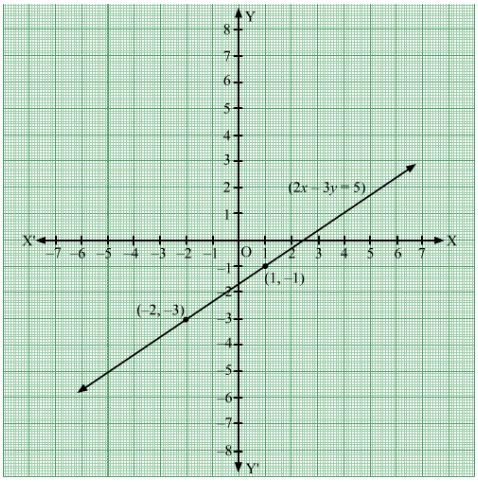
When, $y = -1$, $x = \dfrac{(-3+5)}{2} = \dfrac{2}{2} = 1$

When, $y = -3$, $x = \dfrac{(-9+5)}{2} = -\dfrac{4}{2} = -2$

Thus, we have the following table:

x	1	-2
y	-1	-3

Plot the points $(-2, -3)$, $(1,-1)(-2, -3)$, $(1,-1)$ on the graph paper and extend the line in both directions.



(i) From the graph we can see that when $x = 4$, $y = 1$

(ii) Also, from the graph we can see that when $y = 3$, $x = 7$

Answer.5. Given equation: $2x + y = 6$

$\Rightarrow y = 6 - 2x$

When, $x = 0, y = 6 - 0 = 6$

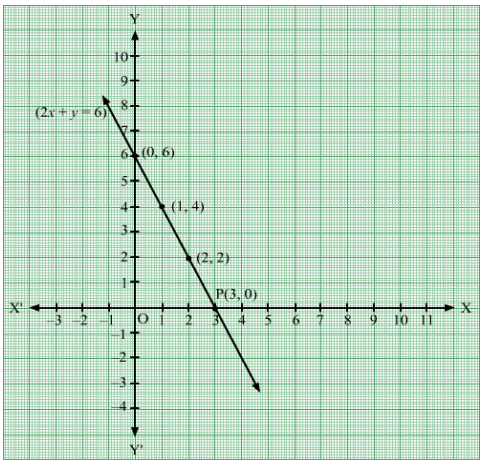
When, $x = 1, y = 6 - 2 = 4$

When, $x = 2, y = 6 - 4 = 2$

Thus, we have the following table:

x	0	1	2
y	6	4	2

Plot the points $(0,6)$, $(1,4)$ and $(2,2)$ on the graph paper. Join these points and extend the line.



Clearly, the graph cuts the x −axis at $P(3,0)$.

Answer.6. Given equation: $3x + 2y = 6$

$2y = 6 - 3x \Rightarrow y = \frac{(6-3x)}{2}$

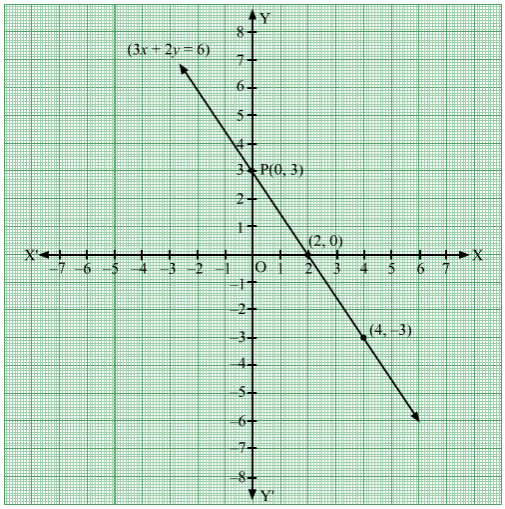
When $x = 2, y = \frac{(6-6)}{2} = 0$

When $x = 4, y = \frac{(6-12)}{2} = -3$

Thus, we get the following table:

x	2	4
y	0	-3

Plot the points $(2,0)$, $(4,-3)$ on the graph paper. Join the points and extend the graph in both the directions.



Clearly, the graph cuts the y −axis at $P(0,3)$.

Answer.7. $3x - 2y = 4$

$\Rightarrow 2y = 3x - 4$

$\Rightarrow y = \dfrac{3x-4}{2}$

When $x = 0$, $y = \dfrac{3\times 0-4}{2} = \dfrac{0-4}{2} = -\dfrac{4}{2} = -2$

When $x = 2$, $y = \dfrac{3\times 2-4}{2} = \dfrac{6-4}{2} = \dfrac{2}{2} = 1$

When $x = -2$, $y = \dfrac{3\times(-2)-4}{2} = \dfrac{-6-4}{2} = -\dfrac{10}{2} = -5$

Thus, the points on the line $3x - 2y = 4$ are as given in the following table:

x	0	2	–2
y	–2	1	–5

Plotting the points $(0, -2)$, $(2, 1)$ *and* $(-2, -5)$ and drawing a line passing through these points, we obtain the graph of the line $3x - 2y = 4$.

$x + y - 3 = 0$

$\Rightarrow y = -x + 3$

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

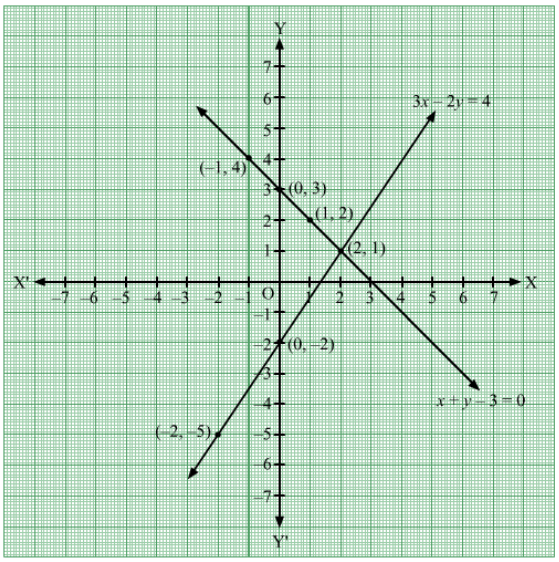
When $x = 1$, $y = -1 + 3 = 2$

When $x = -1$, $y = -(-1) + 3 = 1 + 3 = 4$

Thus, the points on the line $x + y - 3 = 0$ are as given in the following table:

x	0	1	–1
y	3	2	4

Plotting the points $(0, 3)$, $(1, 2)$ *and* $(-1, 4)$ and drawing a line passing through these points, we obtain the graph of the line $x + y - 3 = 0$.



It can be seen that the lines $3x - 2y = 4$ and $x + y - 3 = 0$ intersect at the point $(2, 1)$.

Answer.8. $4x + 3y = 24$

$\Rightarrow 3y = -4x + 24$

$\Rightarrow y = \dfrac{(-4x + 24)}{3}$

When $x = 0$, $y = \dfrac{-4 \times 0 + 24}{3} = \dfrac{0 + 24}{3} = \dfrac{24}{3} = 8$

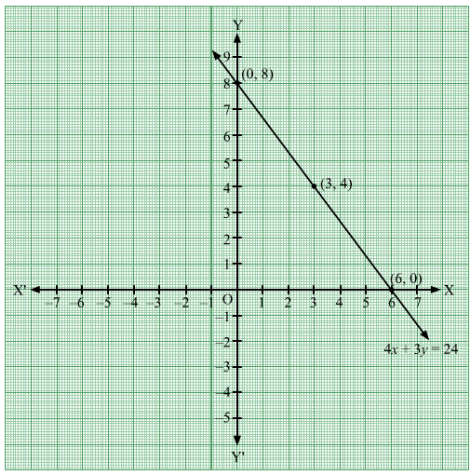
When $x = 3$, $y = \dfrac{-4 \times 3 + 24}{3} = \dfrac{-12 + 24}{3} = \dfrac{12}{3} = 4$

When $x = 6$, $y = \dfrac{-4 \times 6 + 24}{3} = \dfrac{-24 + 24}{3} = 0$

Thus, the points on the line $4x + 3y = 24$ are as given in the following table:

X	0	3	6
Y	8	4	0

Plotting the points $(0, 8)$, $(3, 4)$ *and* $(6, 0)$ and drawing a line passing through these points, we obtain the graph of the line $4x + 3y = 24$.



(i) It can be seen that the line $4x + 3y = 24$ intersects the *x*-axis at $(6, 0)$ and *y*-axis at $(0, 8)$.

(ii) The triangle formed by the line and the coordinate axes is a right triangle right angled at the origin.

$\therefore$ Area of the triangle $= \frac{1}{2} \times 6 \times 8$

$= 24\ sq\ units$

Answer.9. $2x + y = 6$

$\Rightarrow y = -2x + 6$

When $x = 0$, $y = -2 \times 0 + 6 = 0 + 6 = 6$

When $x = 1$, $y = -2 \times 1 + 6 = -2 + 6 = 4$

When $x = 2$, $y = -2 \times 2 + 6 = -4 + 6 = 2$

Thus, the points on the line $2x + y = 6$ are as given in the following table:

x	0	1	2
y	6	4	2

Plotting the points $(0, 6)$, $(1, 4)$ *and* $(2, 2)$ and drawing a line passing through these points, we obtain the graph of the line $2x + y = 6$.

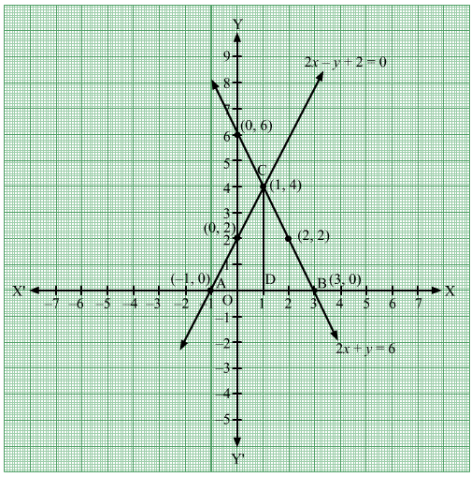
$2x - y + 2 = 0$

$\Rightarrow y = 2x + 2$
When $x = 0$, $y = 2 \times 0 + 2 = 0 + 2 = 2$
When $x = 1$, $y = 2 \times 1 + 2 = 2 + 2 = 4$
When $x = -1$, $y = 2 \times (-1) + 2 = -2 + 2 = 0$

Thus, the points on the line $2x - y + 2 = 0$ are as given in the following table:

x	0	1	–1
y	2	4	0

Plotting the points $(0, 2)$, $(1, 4)$ *and* $(-1, 0)$ and drawing a line passing through these points, we obtain the graph of the line $2x - y + 2 = 0$.



The shaded region represents the area bounded by the lines $2x + y = 6, 2x - y + 2 = 0$ and the x-axis. This represents a triangle.
It can be seen that the lines intersect at the point $C(1, 4)$. Draw CD perpendicular from C on the x-axis.
Height = CD = 4 units
Base = AB = 4 units

∴ Area of the shaded region = Area of ΔABC

$$= \frac{1}{2} \times AB \times CD$$
$$= \frac{1}{2} \times 4 \times 4$$
$$= 8 \; sq \; units$$

Answer.10. $x - y = 1$
$\Rightarrow y = x - 1$
When $x = 0$, $y = 0 - 1 = -1$
When $x = 1$, $y = 1 - 1 = 0$
When $x = 2$, $y = 2 - 1 = 1$
Thus, the points on the line $x - y = 1$ are as given in the following table:

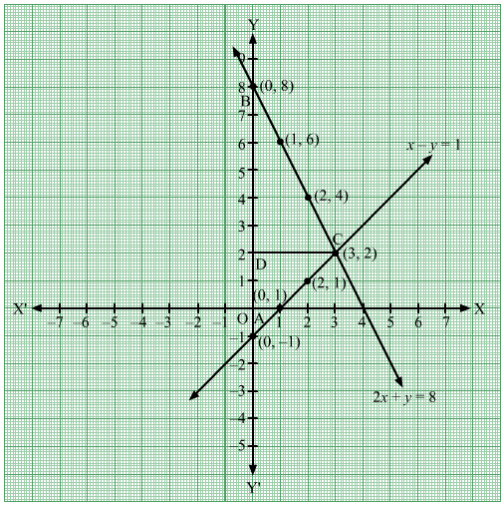
X	0	1	2
Y	–1	0	1

Plotting the points $(0, -1)$, $(1, 0)$ *and* $(2, 1)$ and drawing a line passing through these points, we obtain the graph of the line $x - y = 1$.

$2x + y = 8$
$\Rightarrow y = -2x + 8$
When $x = 1$, $y = -2 \times 1 + 8 = -2 + 8 = 6$
When $x = 2$, $y = -2 \times 2 + 8 = -4 + 8 = 4$
When $x = 3$, $y = -2 \times 3 + 8 = -6 + 8 = 2$
Thus, the points on the line $2x + y = 8$ are as given in the following table:

X	1	2	3
Y	6	4	2

Plotting the points $(1, 6)$, $(2, 4)$ *and* $(3, 2)$ and drawing a line passing through these points, we obtain the graph of the line $2x + y = 8$.



The shaded region represents the area bounded by the lines $x - y = 1, 2x + y = 8$ and the *y*-axis. This represents a triangle.
It can be seen that the lines intersect at the point $C(3, 2)$. Draw CD perpendicular from C on the *y*-axis.
Height = CD = 3 units
Base = AB = 9 units

∴ Area of the shaded region = Area of ΔABC

$$= \frac{1}{2} \times AB \times CD$$
$$= \frac{1}{2} \times 9 \times 3$$
$$= \frac{27}{2}\ sq\ units$$
$$= 13.5\ sq\ units$$

Answer.11. $x + y = 6$
$\Rightarrow y = -x + 6$
When $x = 0$, $y = -0 + 6 = 6$
When $x = 1$, $y = -1 + 6 = 5$
When $x = 3$, $y = -3 + 6 = 3$
Thus, the points on the line $x + y = 6$ are as given in the following table:

x	0	1	3
y	6	5	3

Plotting the points $(0, 6)$, $(1, 5)$ and $(3, 3)$ and drawing a line passing through these points, we obtain the graph of the line $x + y = 6$.

$x - y = 2$

$\Rightarrow y = x - 2$

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

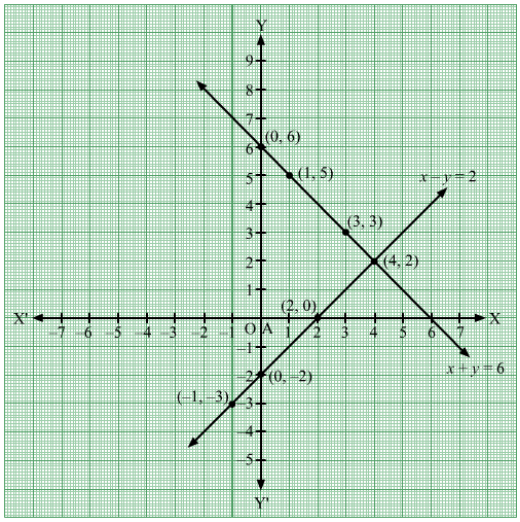
When $x = 2$, $y = 2 - 2 = 0$

When $x = -1$, $y = -1 - 2 = -3y = -1 - 2 = -3$

Thus, the points on the line $x - y = 2$ are as given in the following table:

x	0	2	–1
y	–2	0	–3

Plotting the points $(0, -2)$, $(2, 0)$ *and* $(-1, -3)$ and drawing a line passing through these points, we obtain the graph of the line $x - y = 2$.



It can be seen that the lines $x + y = 6$ and $x - y = 2$ intersect at the point (4, 2).

Answer.12. Let the contribution of A and B be ₹ x and ₹ y, respectively.

Total contribution of A and B = ₹ x + ₹ y = ₹ $(x + y)$

It is given that the total contribution of A and B is ₹ 100.

$\therefore x + y = 100$

This is the linear equation satisfying the the given data.

$x + y = 100$

$\Rightarrow y = 100 - x$

When $x = 10$, $y = 100 - 10 = 90$

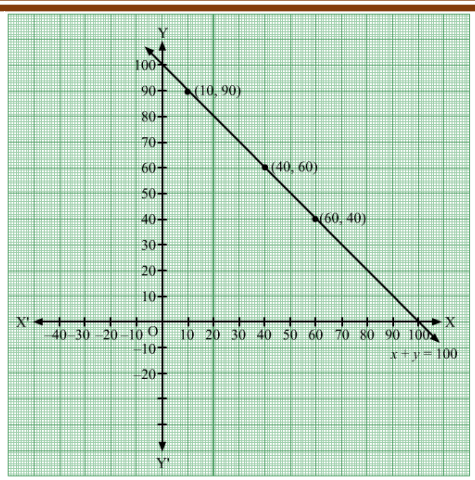
When $x = 40$, $y = 100 - 40 = 60$

When $x = 60$, $y = 100 - 60 = 40$

Thus, the points on the line $x + y = 100$ are as given in the following table:

x	10	40	60
y	90	60	40

Plotting the points (10, 90), (40, 60) and (60, 40) and drawing a line passing through these points, we obtain the graph of the line $x + y = 100$.


Y
100
90
80
70
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50
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X'
–40 –30 –20 –10 O 10 20 30 40 50 60 70 80 90 100
X
–10
–20
Y'
(10, 90)
(40, 60)
(60, 40)
x + y = 100