Exercise 8.1

Q1. Determine the quadrant of the coordinate plane in which the following points lie: $P(-4, 3)$, $Q(-5, -2)$, $R(2, 2)$ and $S(2, -6)$.

$P(-4, 3)$	lies in Second quadrant.
$Q(-5, -2)$	lies in third quadrant.
$R(2, 2)$	lies in first quadrant.
$S(2, -6)$	lies in forth quadrant.

Q 2. Draw the graph of each of the following

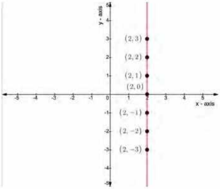
(i) $x=2$

Solution:

Table for the points of the equation x = 2 is as under:

x	2	2	2	2	2	2	2
y	-	-2	-1	0	1	2	-

Thus, the graph of the equation $x = 2$ is as shown below.



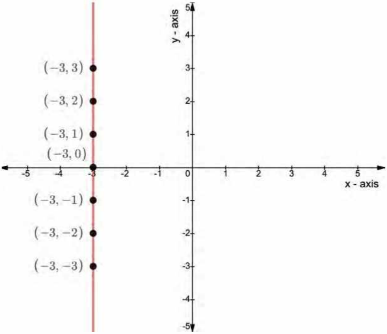
(ii) $x=-3$

Solution:

Table for the points of the equation $x=-3$ is as under:

x	-3	-3	-3	-3	-3	-3	-3
y	-	-2	-1	0	1	2	-

Thus, the graph of the equation $x=-3$ is as shown below.



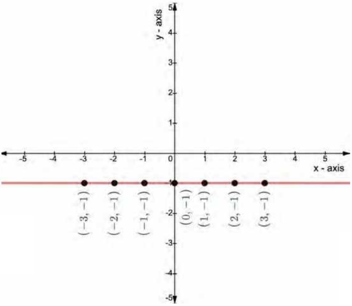
(iii) $y = -1$

Solution:

Table for the points of the equation $y = -1$ is as under:

x	-	-2	-1	0	1	2	-
y	-1	-1	-1	-1	-1	-1	-1

Plotting these points and joined them we get the graph of $y = -1$ as under:



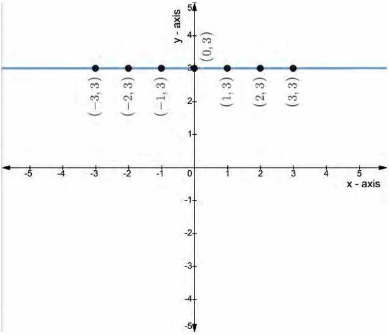
(iv) $y = 3$

Solution:

Table for the points of the equation $y = 3$ is as under:

x	-	-2	-1	0	1	2	-
y	3	3	3	3	3	3	3

Plotting these points and joined them we get the graph of $y = 3$ as under:



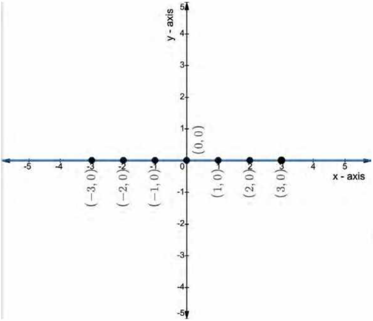
(v) $y = 0$

Solution:

Table for the points of the equation $y = 0$ is as under:

x	-	-2	-1	0	1	2	-
y	0	0	0	0	0	0	0

Plotting these points, we see that all the points are on x-axis. So, the graph of the equation $y=0$ is x-axis as shown below.



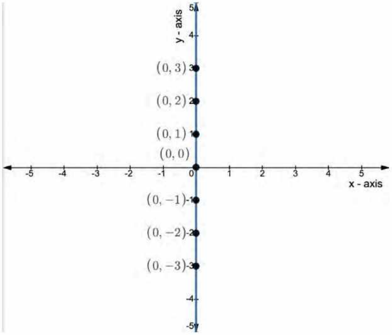
(vi) $x=0$

Solution:

Table for the points of the equation $x=0$ is as under:

x	0	0	0	0	0	0	0
y	-	-2	-1	0	1	2	-

Plotting these points, we see that all the points are on y-axis. So the graph of the equation $x=0$ is y-axis as shown below.



(vii) $y = 3x$

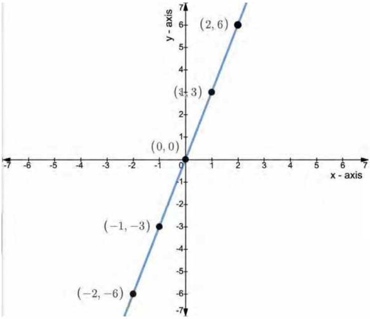
Solution:

Table for the points of the equation $y = 3x$ is as under:

x	-2	-1	0	1	2
y	-6	-3	0	3	6

The points (x,y) are plotted in the plane as shown below:

Joining them, we get the graph of the line $y = 3x$ as under:



(viii) $-y = 2x$ **or** $y = -2x$

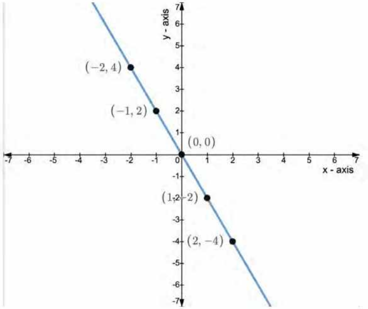
Solution:

Table for the points of the equation $-y = 2x$ or $y = -2x$ is as under:

x	-2	-1	0	1	2

y	4	2	0	-2	-4

The points are plotted in the plane as under. By Joining the potted points, we get the graph of the equation $-y = 2x$ as under:



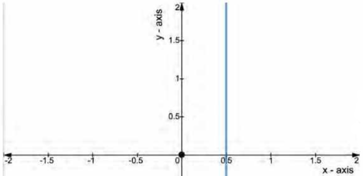
(ix) $x = \frac{1}{2}$ **or** $x = 0.5$

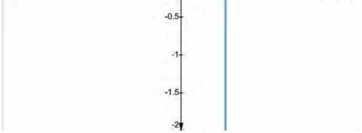
Solution:

Table for the points of the equation $x = \frac{1}{2} = 0.5$ is as under:

x	-0.5	-0.5	-0.5	-0.5	-0.5
y	-2	-1	0	1	2

The points are plotted in the plane as below. By Joining the potted points, we get the graph of the equation $x = \frac{1}{2}$ as under:





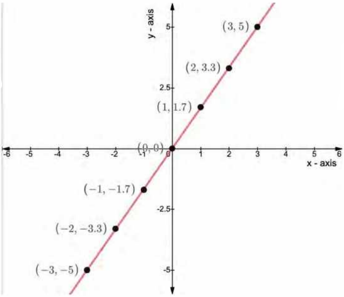
(x) $3y = 5x$ **or** $y = \frac{5}{3}x$

Solution:

Table for the points of the equation $3y = 5x$ or $y = \frac{5}{3}x$ is as under:

x	-3	-2	-1	0	1	2	3
y	-5	-3.3	-1.7	0	1.7	3.3	5

The points are plotted in the plane as below. By Joining the potted points, we get the graph of the equation $3y = 5x$ as under:



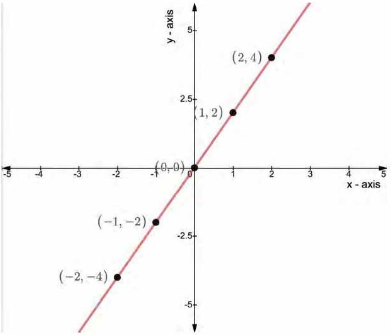
(xi) $2x - y = 0$ **or** $y = 2x$

Solution:

Table for the points is as under:

x	-2	-1	0	1	2
y	-4	-2	0	2	4

The points are plotted in the plane as under. By Joining the potted points, we get the graph of the equation as under:



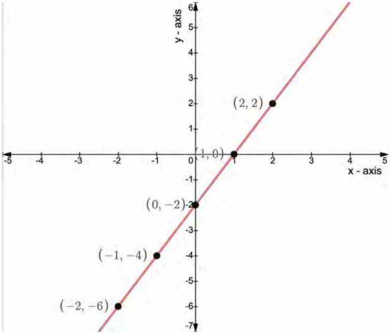
(xii) $2x - y = 2$ **or** $y = 2x - 2$

Solution:

Table for the points of the equation is as under:

x	-2	-1	0	1	2
y	-6	-4	-2	0	2

The points are plotted in the plane as under. By Joining the potted points, we get the graph of the equation as under:



(xiii) $x-3y+1=0$

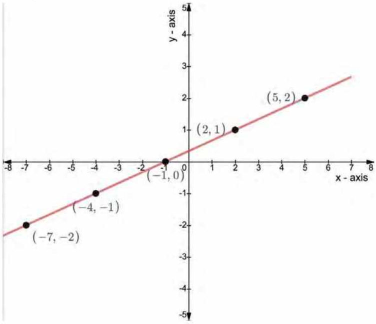
Solution:

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

Table for the points of the equation is as under:

x	-7	-4	-1	2	5
y	-2	-1	0	1	2

The points are plotted in the plane as under. By Joining the potted points, we get the graph of the equation as under:



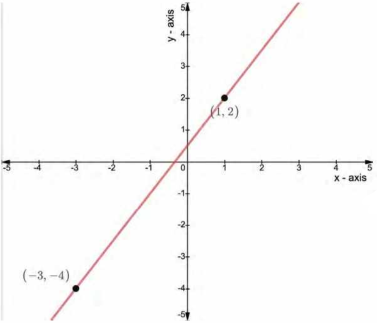
(xiv) $3x-2y+1=0$ **or** $y=\frac{3x+1}{2}$

Solution:

Table for the points of the equation is as under:

x	-3	-2	-1	0	1
y	-4	$-\frac{5}{2}$	-1	5	2

The points are plotted in the plane as under. By Joining the potted points, we get the graph of the equation as under:



3. Are the following lines (i) parallel to x-axis (ii) parallel to y-axis?

(i) $2x - 1 = 3$

(ii) $x + 2 = -1$

(iii) $2y + 3 = 2$

(iv) $x + y = 0$

(v) $2x - 2y = 0$

(i) $2x - 1 = 3$

Solution:

$2x = 3 + 1 = 4$ or $x = 2$

is a line parallel to y-axis.

(ii) $x + 2 = -1$

Solution:

$x = -1 - 2$ or $x = -3$

is a line parallel to y-axis.

(iii) $2y + 3 = 2$

Solution:

$2y = 2-3 = -1$ or $y = -\frac{1}{2}$

is a line parallel to x-axis.

(iv) $x + y = 0$

Solution:

$x = -y$ neither parallel to x-axis nor y-axis.

(v) $2x - 2y = 0$

Solution:

$2x = 2y$ or $x = y$

neither parallel to x-axis nor y-axis.

4. Find the value of m and c of the following lines by expressing them in the form y = mx + c.

(a) $2x + 3y - 1 = 0$ **(b)** $x - 2y = -2$ **(c)** $3x + y - 1 = 0$

(d) $2x - y = 7$ **(e)** $3 - 2x + y = 0$ **(f)** $2x = y + 3$

(a) $2x + 3y - 1 = 0$

Solution:

$3y = -2x + 1$ or $y = -+$

Since y = mx + c

So, $m = -\frac{2}{3}$ $c = \frac{1}{3}$

(b) $x - 2y = -2$

Solution:

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

Since $y = mx + c$

So, $m = \frac{1}{2}$ $c = 1$

(c) $3x + y - 1 = 0$

Solution:

$$y = -3x + 1$$

Since $y = mx + c$

So, $m = -3$ $c = 1$

(d) $2x - y = 7$

Solution:

$$-y = -2x + 7 \quad \text{or} \quad y = 2x - 7$$

Since $y = mx + c$

So, $m = 2$ $c = -7$

(e) $3 - 2x + y = 0$

Solution:

$$y = 2x - 3$$

Since $y = mx + c$

So, $m = 2$ $c = -3$

(f) $2x = y + 3$

Solution:

$$y = 2x - 3$$

Since $y = mx + c$

5. Verify whether the following point lies on the line $2x - y + 1 = 0$ or not.

(i) (2, 3) **(ii) (0, 0)** **(iii) (-1, 1)** **(iv) (2, 5)**

(v) (5, 3)

(i) (2, 3)

Solution:

The line is $2x - y + 1 = 0$ for the point (2, 3)

$$2(2) - 3 + 1 = 4 - 3 + 1 = 2 \neq 0$$

∴ Point does not lie on the line

(ii) (0, 0)

Solution:

The line is $2x - y + 1 = 0$ for the point (0, 0)

$$2(0) = -0 + 1 = 0 - 0 = 1 \neq 0$$

∴ Point does not lie on the line

(iii) (-1, 1)

Solution:

The line is $2x - y + 1 = 0$ for the point (-1, 1)

$2(-1) - 1 + 1 = -2 - 1 + 1 = -2 \neq 0$

∴ Point does not lie on the line

(iv) (2, 5)

Solution:

The line is $2x - y + 1 = 0$ for the point (-1, 1)

$2(2) - 5 + 1 = 4 - 5 + 1 = 0$

∴ Point lies on the line

(v) (5, 3)

Solution:

The line is $2x - y + 1 = 0$ for the point (5, 3)

$2(5) - 3 + 1 = 10 - 3 + 1 = 8 \neq 0$

∴ Point does not lie on the line

EXERCISE 8.2

Q1. **Draw the conversion graph between litres and gallons using the relation 9 litres = 2 gallons (approximately), and taking litres along horizontal axis and gallons along vertical axis. From the graph, read**

(i) **the number of gallons in 18 litres**

(ii) **the number of litres in 8 gallons**

Solution:

9 litres = 2 gallons

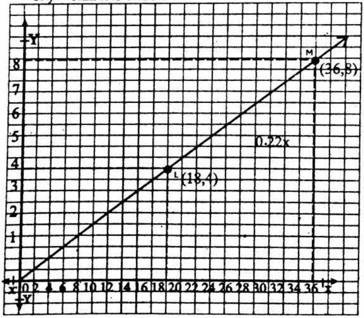
As liters are represented along horizontal axis and gallon along y-axis we have

$y = \frac{2}{9}x$ or $y = 0.22\,x$ (approx)

The table for values of x and y is

x	0	1	2	3	5
y	0	0.22	0.44	0.66	1.1

Plotting these points and joining them we get the graph of y = 0.22 x is under:



(i) To read the number of gallons in 18 litres. We draw the vertical line through point showing 18 litres. It meets the graph of y = 0.22 x at L. We read that L shows 4 gallons.

(ii) The number of litres in 8 gallons. We draw the horizontal line through the point showing 8 gallons. It meets the graph of y = 0.22 x at M. Against M we read 36 litres.

Q2. **On 15.03.2008 the exchange rate of Pakistani currency and Saudi Riyal was as under:**
1 S. Riyal = 16.70 Rupees

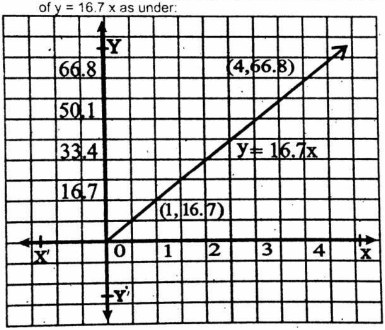
Solution:

$y = 16.70\,x$

The table for values of x and y is as under:

x	0	1	2	4
y	0	16.7	33.4	66.8

Plotting these points and joining them we get the graph of $y = 16.7\,x$ as under:



Q3. **Sketch the graph for following lines.**

(a) $x - 3y + 2 = 0$ **(b)** $3x - 2y - 1 = 0$
(c) $2y - x + 2 = 0$ **(d)** $y - 2x = 0$
(e) $3y - 1 = 0$ **(f)** $y + 3x = 0$
(g) $2x + 6 = 0$

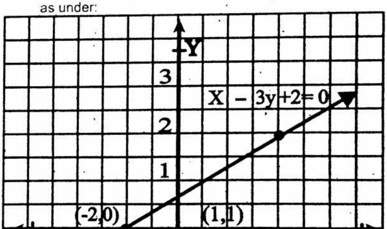
(a) $x - 3y + 2 = 0$

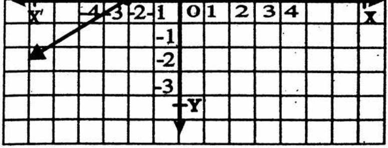
or $y = \frac{x+2}{3}$

We tabulate the values of (x, y) as under:

x	-2	-1	0	1	2	3	4
y	0	0.3	0.66	1	1.3	2.66	2

Plotting these points we get the graph of the equation as under:





(b) $3x - 2y - 1 = 0$

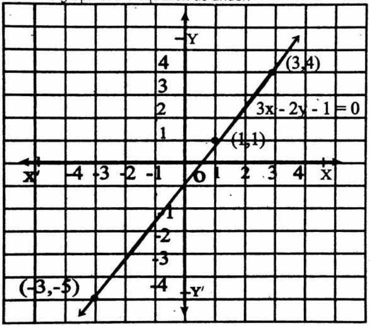
or $3x - 1 = 2y$

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

We tabulate the values of (x, y) as under:

x	-3	-2	-1	0	1	2	3
y	-5	-3.5	-2	-0.5	1	2.5	4

Plotting the values of x and y and joining these we get the graph of the equation as under:



(c) $2y - x + 2 = 0$

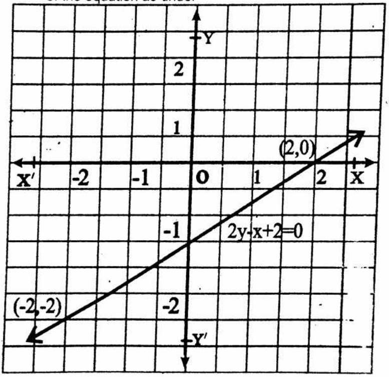
or $2y = x - 2$

or $y = \frac{x-2}{2}$

We calculate the values (x, y) as under:

x	-2	-1	0	1	2
y	-2	-1.5	-1	-0.5	0

Plotting these points and joining them we get the graph of the equation as under



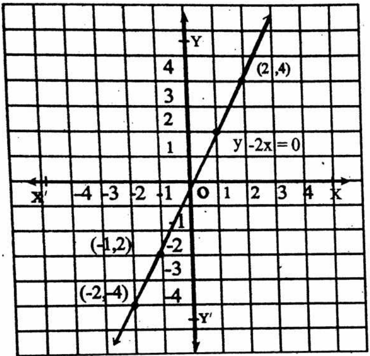
(d) **$y - 2x = 0$**

or $y = 2x$

We tabulate the values of (x, y) as under:

x	−2	−1	0	1	2
y	−4	−2	0	2	4

Plotting these points and joining them we get the graph of the equation as under:



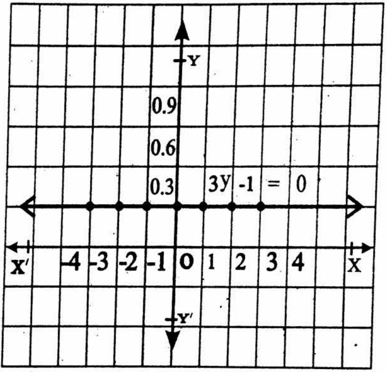
(e) **$3y - 1 = 0$**

or $y = \frac{1}{3} = 0.3$

We tabulate the values of y against x as under:

x	...	2	1	0	1	2
y	0.3	0.3	0.3	0.3	0.3	0.3

Plotting these points in the plane and joining them we get the graph of the equation $3y - 1 = 0$.



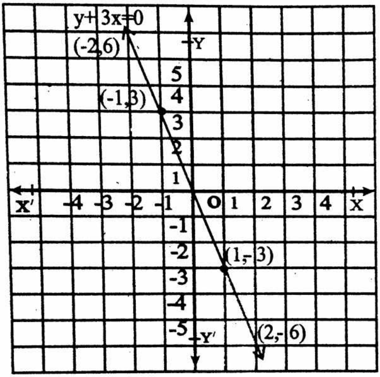
(f) **$y + 3x = 0$**

or $y = -3x$

We tabulate the points (x, y) as under:

x	-2	-1	0	1	2
y	6	3	0	-3	-6

Plotting these points and joining them we get the graph of the equation $y + 3x = 0$ is under:



(g) $2x + 6 = 0$

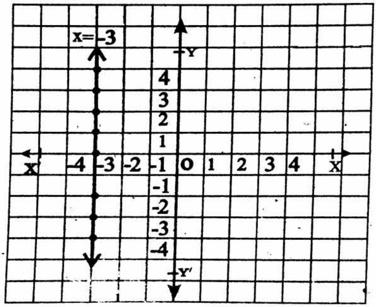
or $2x = -6$

or $x = -3$

We tabulate the points of the equation.

x	-3	-3	-3	-3	-3	-3
y	-2	-1	0	1	2	...

Plotting them joining them we get the graph of the equation as under.



Q4. **Draw the graph for following relations.**

(i) **One mile = 1.6 km**

(ii) **One Acre = 0.4 Hectare**

(iii) $F = \frac{9}{5}C + 32$

(iv) **One Rupee = $\frac{1}{86}$ \$**

Solution:

(i) **One mile = 1.6 km**

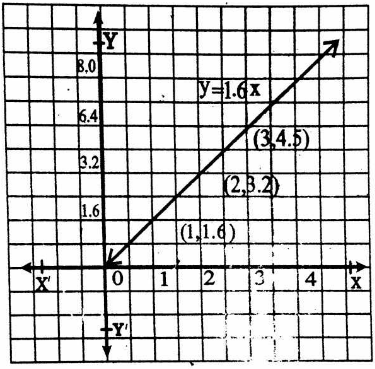
Let $y = 1.6x$

We tabulate value of x and y as under:

x	0	1	2	3	4
y	0	1.6	3.2	4.8	6.4

Mile is taken along x-axis and Km along y-axis.

We plot the point (x, y) and joining them we get the graph of y = 1.6 x i.e. conversion graph of miles and km.



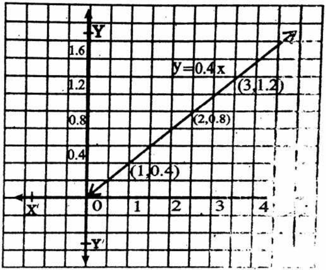
(ii) **On Acre = 0.4 Hectare**

If Acre is measured along x-axis and hectare along y-axis then $y = 0.4x$

The ordered pairs are tabulated in the following table.

x	0	1	2	4
y	0	0.4	0.8	1.2

The corresponding points (0, 0), (1, 1.4), (2, 0.8) etc, are plotted in the xy-plane. Join of which forms the graph of conversion of y = 0.4 x.

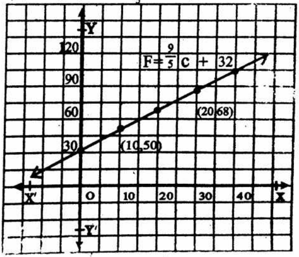


(iii) $F = \frac{9}{5}C + 32$

We tabulate the values of C and F

C	0°	10°	20°	30°	40°
F	32°	50°	68°	86°	104°

Plotting these points and joining them we get the required graph of $F = \frac{9}{5}C + 32$ as under:



(iv) **One Rupee = $\frac{1}{86}$ $**

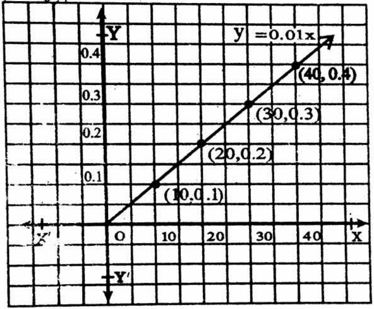
or One Rupee = 0.01$

If $ y is an expression of Rs. X, expressed under the rule y = 0.01 x

We tabulate the value of x and y as under:

x	0	10	20	30	40
y	0	0.1	0.2	0.3	0.4

Plotting the points corresponding to the ordered pairs (x, y) from the table and joining them we get the required graph.



EXERCISE 8.3

Solve the following pair of equations in x and y graphically.

Q1. $x + y = 0$ and $2x - y + 3 = 0$

Solution:

Let the system of the equations be

$x + y = 0$ (i)

(iv) **One Rupee = $\frac{1}{86}$ \$**

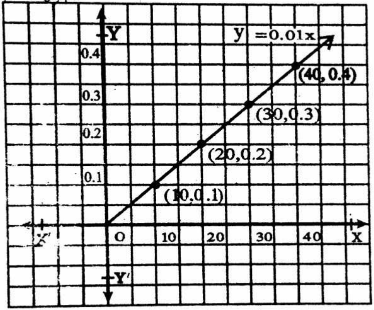
or One Rupee = 0.01\$

If \$ y is an expression of Rs. X, expressed under the rule y = 0.01 x

We tabulate the value of x and y as under:

x	0	10	20	30	40
y	0	0.1	0.2	0.3	0.4

Plotting the points corresponding to the ordered pairs (x, y) from the table and joining them we get the required graph.



EXERCISE 8.3

Solve the following pair of equations in x and y graphically.

Q1. **$x + y = 0$ and $2x - y + 3 = 0$**

Solution:

Let the system of the equations be

$x + y = 0$ (i)

$2x - y + 3 = 0$ (ii)

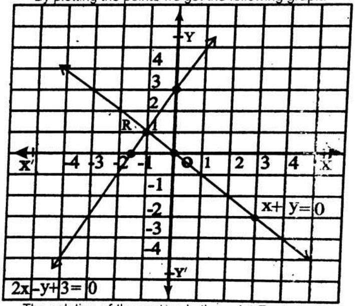
For (i) $y = -x$ the table of values is

x	0	-1	2
y	0	1	-2

For (ii) $y = 2x + 3$, the table of values is

x	0	-1.5	-1
y	3	0	1

By plotting the points we get the following graph.



The solution of the system is the point R where the two lines meet i.e. **R(-1, 1)** such that $x = -1$, $y = 1$.

Q2. $\mathbf{x - y + 1 = 0}$ **and** $\mathbf{x - 2y = -1}$

Solution:

Let the system of equations be

$x - y + 1 = 0$ (i)

$x - 2y = -1$ (ii)

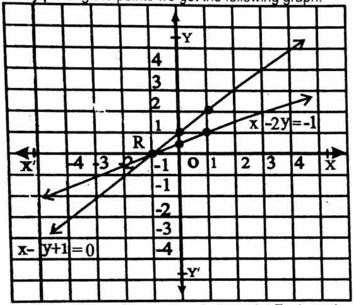
For (i) $y = x + 1$, the table of values is

x	0	-1	1
y	1	0	2

For (ii) $y = \frac{x+1}{2}$, the table of values is

x	0	-1	1
y	0.5	0	1

By plotting the points we get the following graph.



The solution of the system is the point R where the two lines meet i.e. **R(−1, 0)** $x = -1$, $y = 0$.

Q3. $2x + y = 0$ and $x + 2y = 2$

Solution:

Let the system of equations be

$2x + y = 0$ (i)

$x + 2y = 2$ (ii)

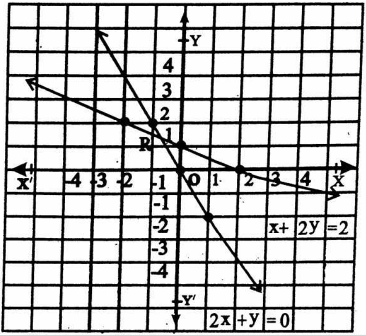
For (i) $y = -2x$, the table of values is

x	0	−1	1
y	0	2	−2

For (ii) $y = \frac{2-x}{2}$, the table of values is

x	0	2	−2
y	1	0	2

By plotting the points we get the following graph.



The solution of the system is the point R where the two lines meet i.e. **R** $\left(-\frac{2}{3}, \frac{4}{3}\right)$

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

Q4. $x + y - 1 = 0$ and $x - y + 1 = 0$

Solution:

Let the system of equations be

$x + y - 1 = 0$ (i)

$x - y + 1 = 0$ (ii)

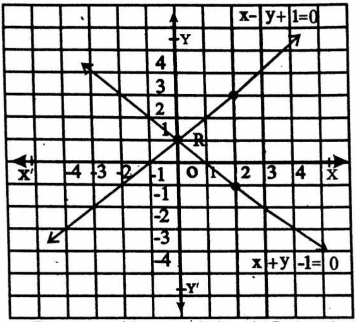
For (i) $y = 1 - x$, the table of values is

x	0	1	2
y	1	0	−1

For (ii) $y = x + 1$, the table of values is

x	0	−1	2
y	1	0	3

By plotting the points we get the following graph.



The solution of the system is the point R where the two lines meet i.e. **R(0, 1)**

or $x = 0, y = 1.$

Q5. $\mathbf{2x + y - 1 = 0}$ **and** $\mathbf{x = -y}$

Solution:

Let the system of equation be

$2x + y - 1 = 0$ **(i)**

$x = -y$ **(ii)**

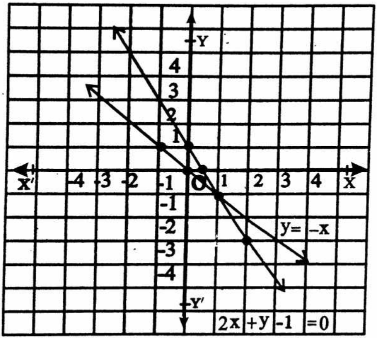
For (i) $y = 1 - 2x$, the table of values is

x	0	0.5	2
y	1	0	-3

For (ii) $y = -x$, the table of values is

x	0	1	-1
y	0	-1	1

By plotting the points we get the following graph:



The solution of the system is the point R where the two lines meet i.e. **R(1, -1)**

$x = 1, \quad y = -1$

REVIEW EXERCISE 8

Q1. Choose the correct answer.

(i) If $(x - 1, y + 1) = (0, 0)$, then (x, y) is

(a) $(1, -1)$ (b) $(-1, 1)$

(c) $(1, 1)$ (d) $(-1, -1)$

(ii) If $(x, 0) = (0, y)$, then (x, y) is

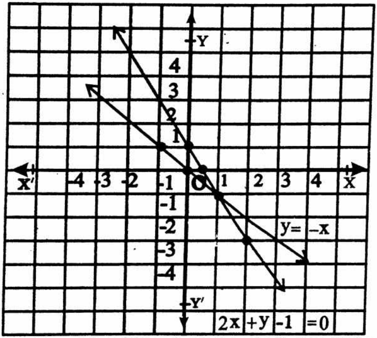
(a) $(0, 1)$ (b) $(1,0)$

(c) $(0, 0)$ (d) $(1, 1)$

(iii) Point $(2, -3)$ lies in quadrant

(a) I (b) II

(c) III (d) IV



The solution of the system is the point R where the two lines meet i.e. **R(1, -1)**

x = 1, y = -1

REVIEW EXERCISE 8

Q1. Choose the correct answer.

(i) If (x − 1, y + 1) = (0, 0), then (x, y) is

(a) (1, −1) (b) (−1, 1)

(c) (1, 1) (d) (−1, −1)

(ii) If (x, 0) = (0, y), then (x, y) is

(a) (0, 1) (b) (1,0)

(c) (0, 0) (d) (1, 1)

(iii) Point (2, −3) lies in quadrant

(a) I (b) II

(c) III (d) IV

(iv) Point (−3, −3) lies in quadrant

(a) I (b) II

(c) III (d) IV

(v) If y = 2x + 1, x = 2 then y is

(a) 2 (b) 3

(c) 4 (d) 5

(vi) Which ordered pair satisfy the equation y = 2x.

(a) (1, 2) (b) (2, 1)

(c) (2, 2) (d) (0, 1)

Answers:

(i) a	**(ii) c**	**(iii) d**	**(iv) c**	**(v) d**	**(vi) a**

Q2. Identify the following statements as True or False.

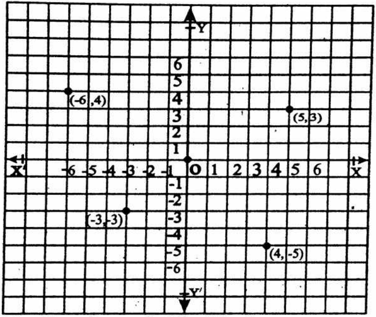
(i) The point $O(0, 0)$ is in quadrant II.
(ii) The point $P(2, 0)$ lies on x-axis.
(iii) The graph of $x = -2$ is a vertical line.
(iv) $3 - y = 0$ is a horizontal line.
(v) The point $Q(-1, 2)$ is in quadrant III.
(vi) The point $R(-1, -2)$ is in quadrant IV.
(vii) $y = x$ is a line on which origin lies.
(viii) The point $P(1, 1)$ lies on the line $x + y = 0$
(ix) The point $S(1, -3)$ lies in quadrant III.
(x) The point $R(0, 1)$ lies on the x-axis.

Answers:

(i) F	**(ii) T**	**(iii) T**	**(iv) T**	**(v) F**
(vi) F	**(vii) T**	**(viii) F**	**(ix) F**	**(x) F**

Q3. Draw the following points on the graph paper.
$(-3, -3)$, $(-6, 4)$, $(4, -5)$, $(5, 3)$

Solution:



Q4. Draw the graph of the following.

(i) $x = -6$ **(ii)** $y = 7$
(iii) $x = \frac{5}{2} = 2.5$ **(iv)** $y = -\frac{9}{2} = -4.5$
(v) $y = 4x$ **(vi)** $y = -2x + 1$

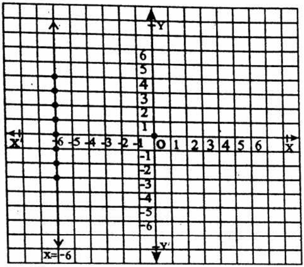
(i) $x = -6$

Solution:

We tabulate the values of x and y as

x	-6	-6	-6	-6	-6
y	-2	-1	0	1	2

Plotting these points and joining them we get the graph of the line $x = -6$ as under:



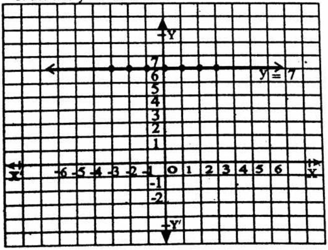
(ii) $y = 7$

Solution:

We tabulate the values of x and y as

x	-2	-1	0	0	2
y	-7	7	7	7	7

Plotting these points and joining them we get the graph of the line y = 7 as under:



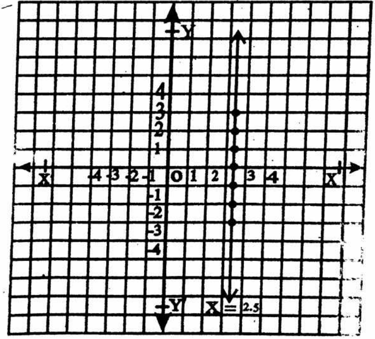
(iii) $x = \frac{5}{2} = 2.5$

Solution:

We tabulate the values of x and y as under:

x	2.5	2.5	2.5	2.5	2.5
y	-2	-1	0	1	2

Plotting these and joining them we get the graph **of the** line x = 2.5 as under:



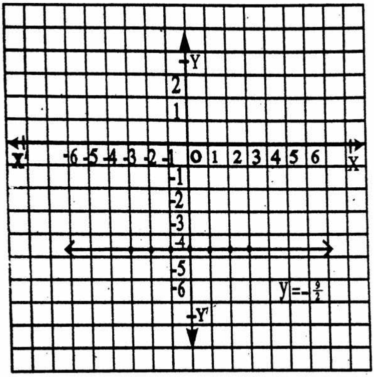
(iv) $y = -\frac{9}{2} = -4.5$

Solution:

We tabulate the value of x and y as under:

x	-2	-1	0	1	2
y	-4.5	-4.5	-4.5	-4.5	-4.5

Plotting these points and joining them we get the graph of the equation $x = -\frac{9}{2}$ as under:



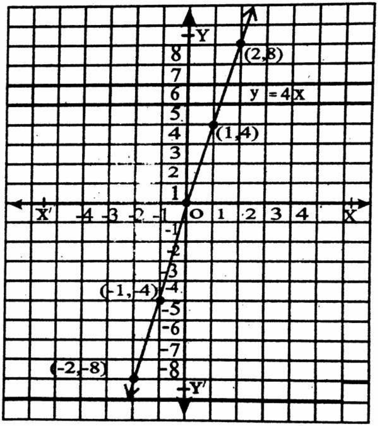
(v) $y = 4x$

Solution:

We tabulate the values of x and y as under:

x	-2	-1	0	1	2	3
y	-8	-4	0	4	8	12

Plotting these points and joining them we get the graph the equation $y = 4x$ as under:



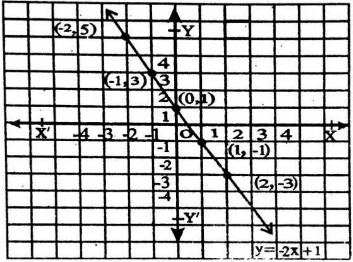
(vi) $y = -2x + 1$

Solution:

We tabulate the value of x and y as under:

x	-2	-1	0	1	2
y	5	3	1	-1	-3

Plotting these points and joining them we get the graph of the equation $y = -2x + 1$ as under:



Q5. Draw the following graph.

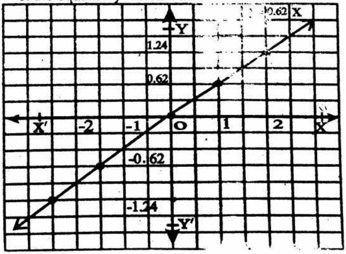
(i) $y = 0.62x$

Solution:

We tabulate the values of x ar ... der:

x	-2	-1	0	[illegible]	2
y	-1.24	-0.62	0	[illegible]	1.24

Plotting these points and join ... e get the graph of the equation $y = 0.62x$ as u



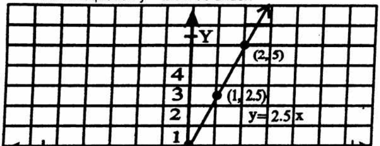
(ii) $y = 2.5x$

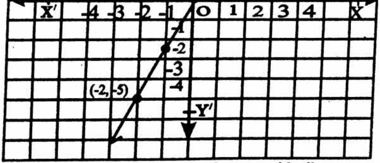
Solution:

We tabulate the values of x and y as under:

x	-2	-1	0	1	2
y	-5.0	-2.5	0	2.5	5.0

Plotting these points and joining them we get the graph of the equation $y = 2.5x$ as under:





Q6. **Solve the following equations graphically.**

(i) $x - y = 1,$ $x + y = \frac{1}{2}$

(ii) $x = 3y,$ $2x - 3y = -6$

(iii) $\frac{1}{3}(x + y) = 2\frac{1}{2},$ $(x - y) = -1$

(i) $x - y = 1,$ $x + y = \frac{1}{2}$

Solution:

Let the system of equations be

$x - y = 1$ (i)

$x + y = \frac{1}{2}$ (ii)

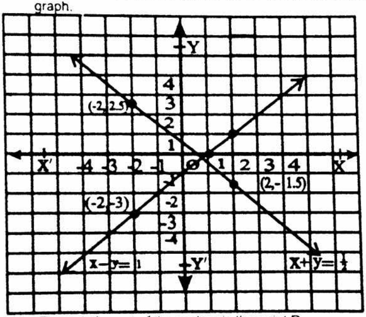
For (i) $y = x - 1$, the table values is

x	-2	-1	0	1	2
y	-3	-2	-1	0	1

For (ii) $y = \frac{1}{2} - x$, the table of values is

x	-2	-1	0	1	2
y	2.5	1.5	0.5	-0.5	-1.5

By plotting the points of (i) and (ii) we get the following graph.



The solution set of the system is the point R

i.e. $R\left(\frac{3}{4}, -\frac{1}{4}\right)$ or (0.75, -0.25)

(ii) $x = 3y,$ $2x - 3y = -6$

Solution:

Let the system of equations be

$x = 3y$ or $y = \frac{1}{3}x$ (i)

$2x - 3y = -6$ (ii)

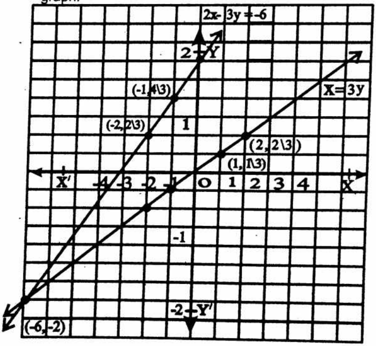
For (i) $y = \frac{1}{3}x$, the table of values is

x	-2	-1	0	1	2
y	$-\frac{2}{3}$	$-\frac{1}{3}$	0	$\frac{1}{3}$	$\frac{2}{3}$

For (ii), $y = \frac{2x+6}{3}$, the table of value is

x	-2	-1	0	1	2
y	$\frac{2}{3}$	$\frac{4}{3}$	2	$\frac{1}{8}$	$\frac{10}{3}$

By plotting the points of (i) and (ii) we get the following graph.



The solution set of the system is the point **R (−6, −2)**

i.e. x = −6, y = −2.

(iii) $\frac{1}{3}(x + y) = 2\frac{1}{2}$, **$(x-y) = -1$**

Solution:

The system of equations is

$\frac{1}{3}(x + y) = 2$ (i)

$\frac{1}{2}(x-y) = -1$ (ii)

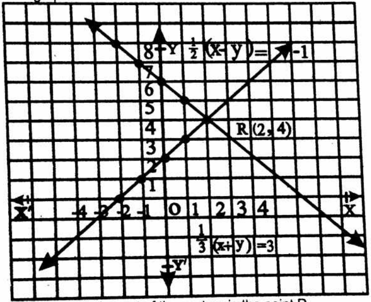
For (i) $y = 6 - x$, the table of values is

x	-2	-1	0	1	2
y	8	7	6	5	4

For (ii) $y = x + 2$, the table of values is

x	-2	-1	0	1	2
y	0	1	2	3	4

By plotting the points of (i) and (ii) we get the following graph.



The solution set of the system is the point R.
i.e. **R(2, 4)** or $x = 2$, $y = 4$