10. Graphs

Exercise 10.1

1 A. Question

Draw the graph of the following function.

$y = 3x^2$

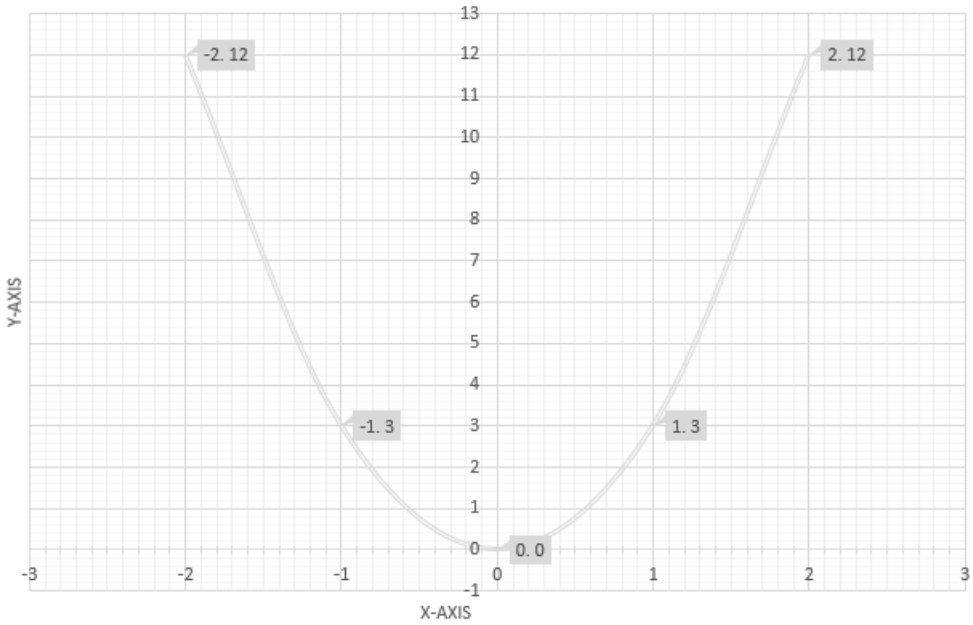
Answer

The given function is $y = 3x^2$

for various values of X we can write the values of Y

x	-2	-1	0	1	2
$y = 3x^2$	$3\times(-2)^2 = 12$	$3\times(-1)^2 = 3$	$3\times0^2 = 0$	$3\times1^2 = 3$	$3\times2^2 = 12$

The obtained data can be given in form of graph



1 B. Question

Draw the graph of the following function.

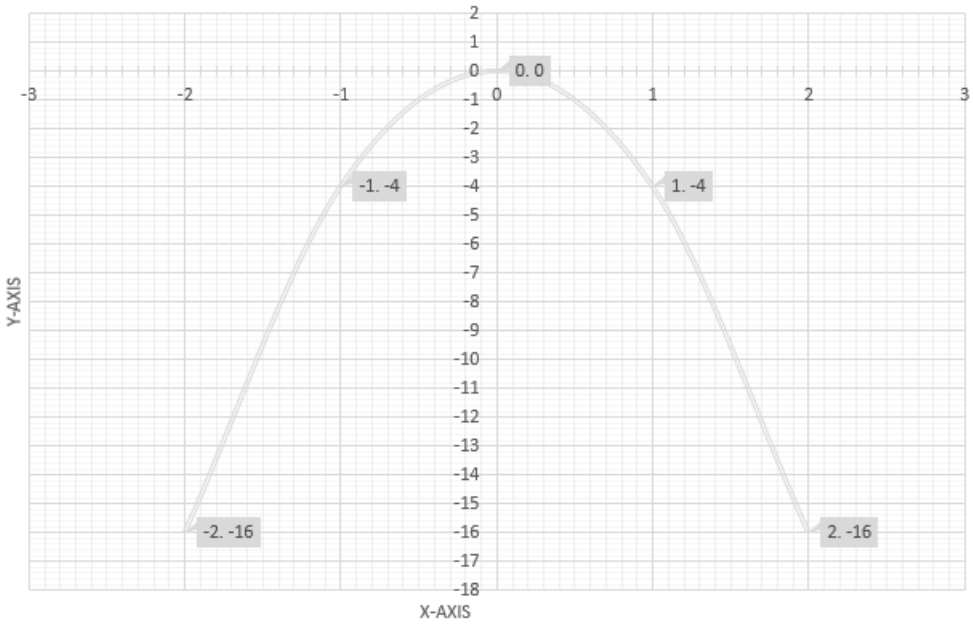
$y = -4x^2$

Answer

The given function is $y = -4x^2$

for various values of X we can write the values of Y

x	-2	-1	0	1	2
$y = -4x^2$	-16	-4	0	04	-16



1 C. Question

Draw the graph of the following function.

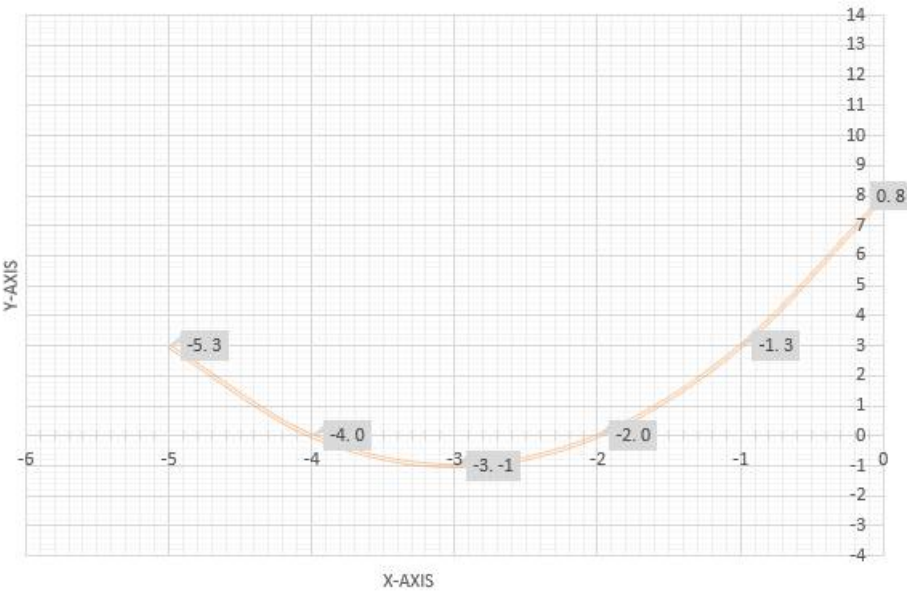
$y = (x + 2)(x + 4)$

Answer

The given function is $y = (x + 2)(x + 4)$

Lets assign values of X from –5 to 0 so we will find the values of Y as follows using the expression

x	-5	-4	-3	-2	-1	0
y = (x + 2) (x + 4)	3	0	-1	0	3	8



1 D. Question

Draw the graph of the following function.

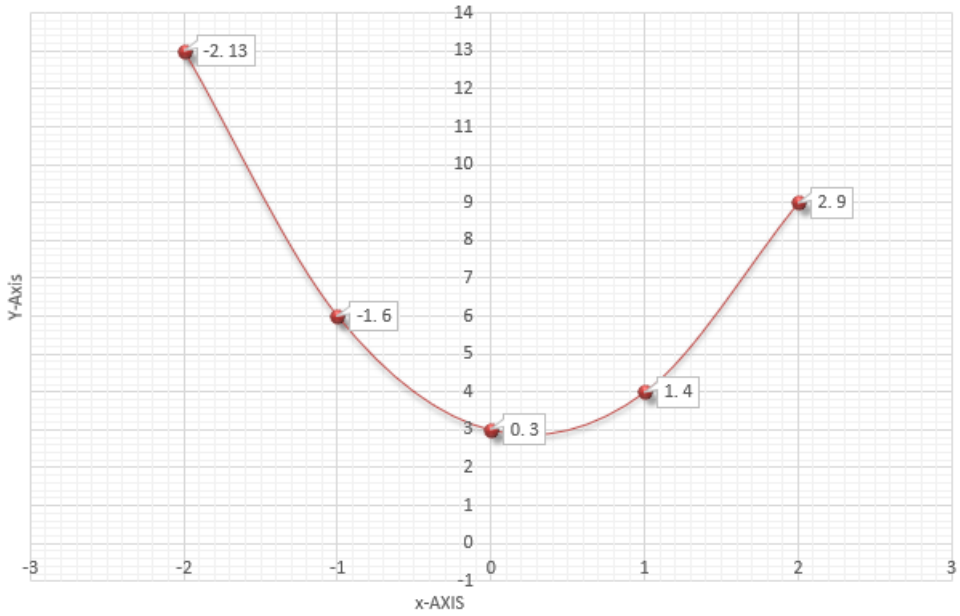
$y = 2x^2 – x + 3$

Answer

The given function is $y = 2x^2 – x + 3$

Lets assign values of X from –2 to 2 so we will find the values of Y as follows using the expression

x	-2	-1	0	1	2
y = (x + 2)(x + 4)	13	6	3	4	9



2 A. Question

Solve the following equation graphically

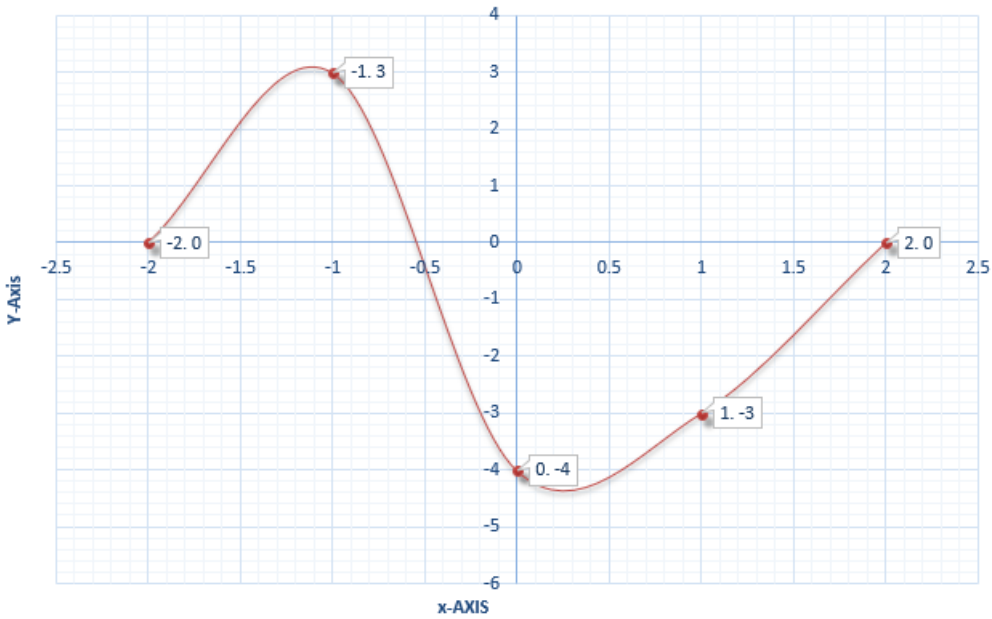
$x^2 - 4 = 0$

Answer

Here $y = x^2 - 4$

Taking the values of X from –2 to 2 we will find different values of Y which we can use to find the values of roots to the equation given.

x	-2	-1	0	1	2
$y = x^2 - 4$	0	-3	-4	-3	0



Here the curve touches the X- axis at (–2,0) and (2,0) so the two roots for the equation is (–2,2)

2 B. Question

Solve the following equation graphically

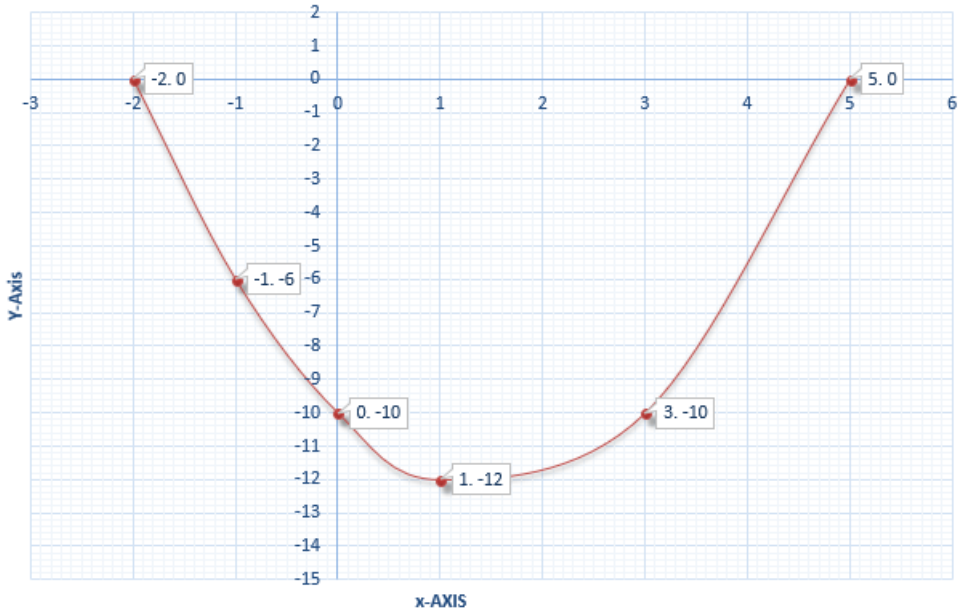
$x^2 - 3x - 10 = 0$

Answer

Here $y = x^2 - 3x - 10$

Taking the values of X between –2 to 5 we will find different values of Y which we can use to find the values of roots to the equation given.

x	-2	-1	0	1	3	5
x^2	4	1	0	1	4	25
$x^2 - 3x - 10$	0	-6	-10	-12	-10	0



Here the curve touches the X- axis at (–2,0) and (5,0) so the two roots for the equation is (–2,5)

2 C. Question

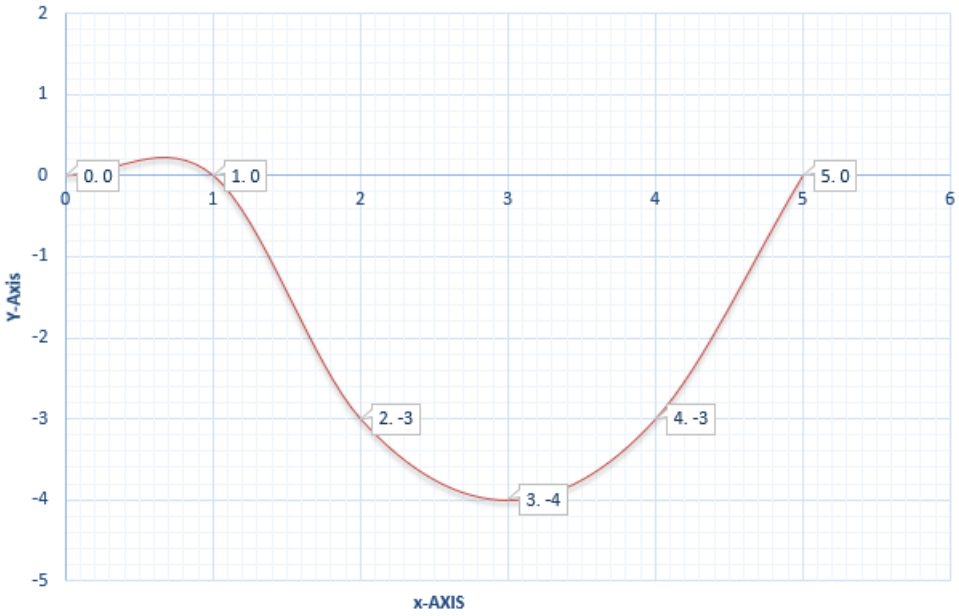
Solve the following equation graphically

$(x - 5)(x - 1) = 0$

Answer

Here $y = (x - 5)(x - 1)$ Taking the values of X from 0 to 5 we will find different values of Y which we can use to find the values of roots to the equation given.

x	0	1	2	3	4	5
$y = (x - 5)(x - 1)$	5	0	-3	-4	-3	0



Here the curve touches the X- axis at (0,0), (1,0) and (5,0) so the two roots for the equation is (1,5)

2 D. Question

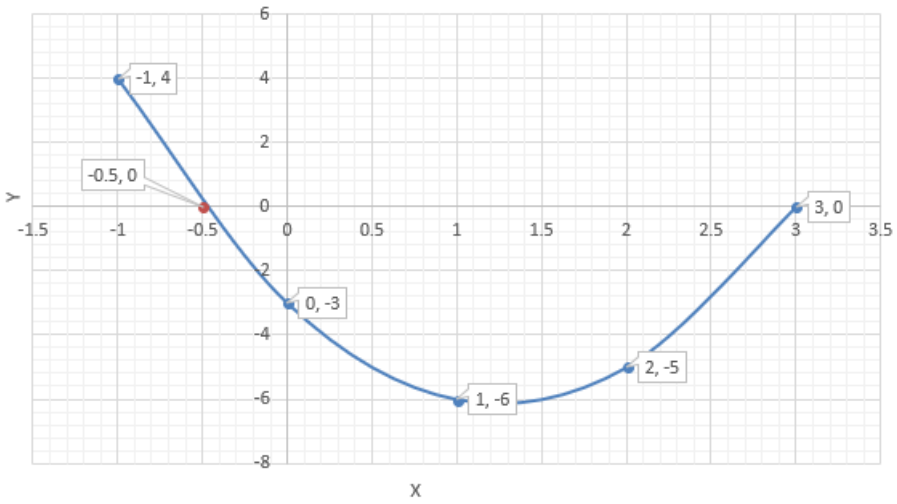
Solve the following equation graphically

(2x + 1) (x – 3) = 0

Answer

Here y = (2x + 1) (x – 3) Taking the values of X from –1 to 4 we will find different values of Y which we can use to find the values of roots to the equation given.

x	-1	0	1	2	3	4
y = (2x + 1) (x – 3)	4	-3	-6	-5	0	9



Here the curve touches the X- axis at (– 1\2, 0) and (3,0) so the two roots for the equation is (–1\2, 3)

3. Question

Draw the graph of $y = x^2$ and hence solve $x^2 – 4x – 5 = 0$.

Answer

We are given $y = x^2$

So taking the values of X in between –2 and 5 we can find various value of y and put them in graph.

x	-2	-1	0	1	2	3	4	5
$y = x^2$	4	1	0	1	4	9	16	25

Now in the eqution we are given that

$x^2 – 4x – 5 = 0$

we know from the first expression that $y = x^2$ so putting this value in the above equation we will find

$x^2 – 4x – 5 = 0$

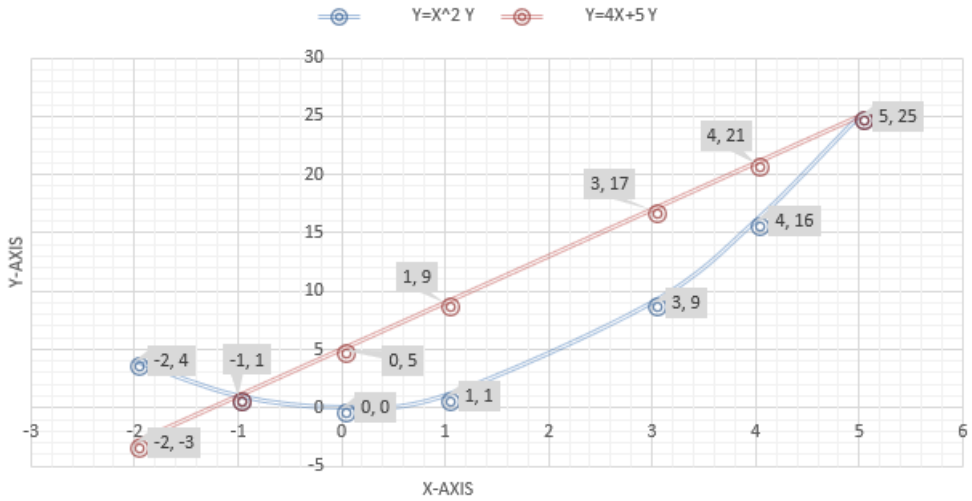
$\Rightarrow y–4x–5 = 0$

$\Rightarrow y = 4x + 5$

Now taking the values of X in between –1 and 3 we can find another set of values for y and can put them in the graph to find the solution for the eqution.

x	-2	-1	0	1	2	3	4	5
y = 4X + 5	3	1	5	9	13	17	21	25

Now we can draw the graph



Here the lines intersects each other at (–1, 1) and (5,25) so the two roots for the equation is (–1,5)

4. Question

Draw the graph of $y = x^2 + 2x – 3$ and hence find the roots of $x^2 – x – 6 = 0$.

Answer

We are given $y = x^2 + 2x – 3$

So taking the values of X in between –3 and 3 we can find various value of y and put them in graph

X	-3	-2	0	1	3
$y = x^2 + 2x – 3$	$x^2 + 2x – 3 = 0$	$x^2 + 2x – 3 = -3$	$x^2 + 2x – 3 = -3$	$x^2 + 2x – 3 = 0$	$x^2 + 2x – 3 = 12$

Again we are given

$x^2 – x – 6 = 0$

we can write the above expression as

$x^2 + (2x–2x)–x –3–3 = 0$

$\Rightarrow x^2 + 2x–3–2x–x–3 = 0$

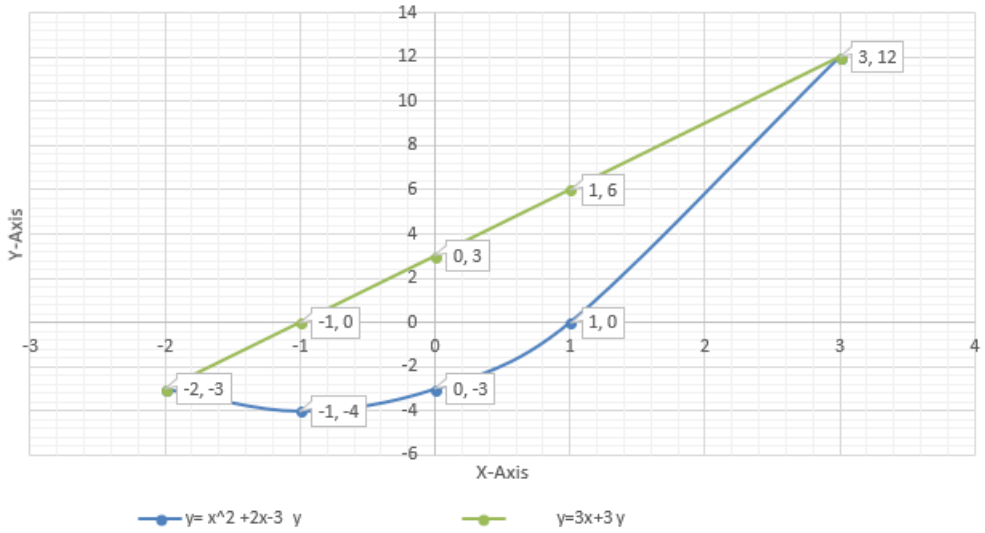
$\Rightarrow y–3x–3 = 0$ (as $x^2 – x – 6 = 0$)

$\Rightarrow y = 3x + 3$

Now we can draw another pair of value using the above data

X	-3	-2	0	1	3
Y = 3x + 3	-6	-3	3	6	12

Now we can draw the graph and the intersection of the two lines will give the roots for the equation.



So the lines intersects at {–2,3} and (3,12).

5. Question

Draw the graph of $y = 2x^2 + x – 6$ and hence solve $2x^2 + x – 10 = 0$.

Answer

We are given $y = 2x^2 + x – 6$

So taking the values of X in between –3 to 4 we can find various value of y and put them in graph

X	-3	-2.5	-2	1	2	2.5	4
$y = 2x^2 + x – 6$	$2x^2 + x – 6 = 9$	$2x^2 + x – 6 = 4$	$2x^2 + x – 6 = 0$	$2x^2 + x – 6 = -3$	$2x^2 + x – 6 = 0$	$2x^2 + x – 6 = 9$	$2x^2 + x – 6 = 30$

Again we are given

$2x^2 + x – 10 = 0$

we can write the above expression as

$\Rightarrow 2x^2 + x–6–4 = 0$

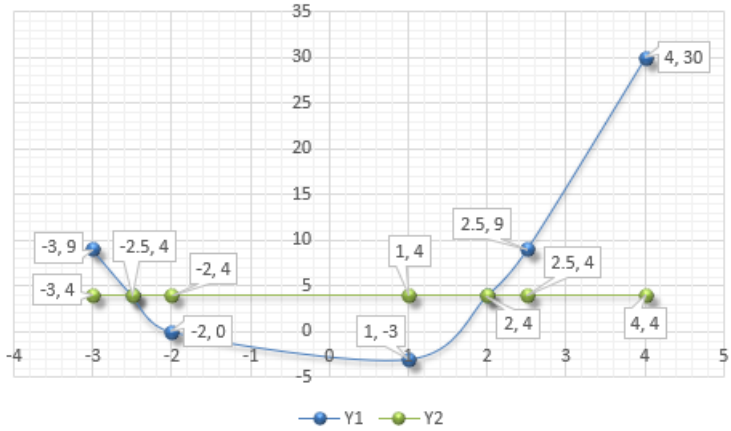
$\Rightarrow y–4 = 0$ (as $y = 2x^2 + x – 6$)

$\Rightarrow y = 4$

Now we can draw another pair of value using the above data

X	-3	-2.5	-2	1	2	2.5	4
Y = 4	4	4	4	4	4	4	4

Now we can draw the graph and the intersection of the two lines will give the roots for the equation. Where Y_1 and Y_2 are two lines showing $y = 2x^2 + x – 6$ and $y = 4$ respectively



here from the graph its clear that the point of intersection are (–2.5,4) and (2,4) so the roots are (–2.5,2)

6. Question

Draw the graph of $y = x^2 – x – 8$ and hence find the roots of $x^2 – 2x – 15 = 0$.

Answer

We are given $y = x^2 – x – 8$

So taking the values of X in between –3 and 5 we can find various value of y and put them in graph

X	-3	-2	-1	0	1	2	3	4	5
$y = x^2 – x – 8$	4	-2	-6	-8	-8	-6	-2	4	12

Again we are given

$x^2 – 2x – 15 = 0$

we can write the above expression as

$x^2 –x–x–8–7 = 0$

$\Rightarrow x^2–x–8–x–7 = 0$

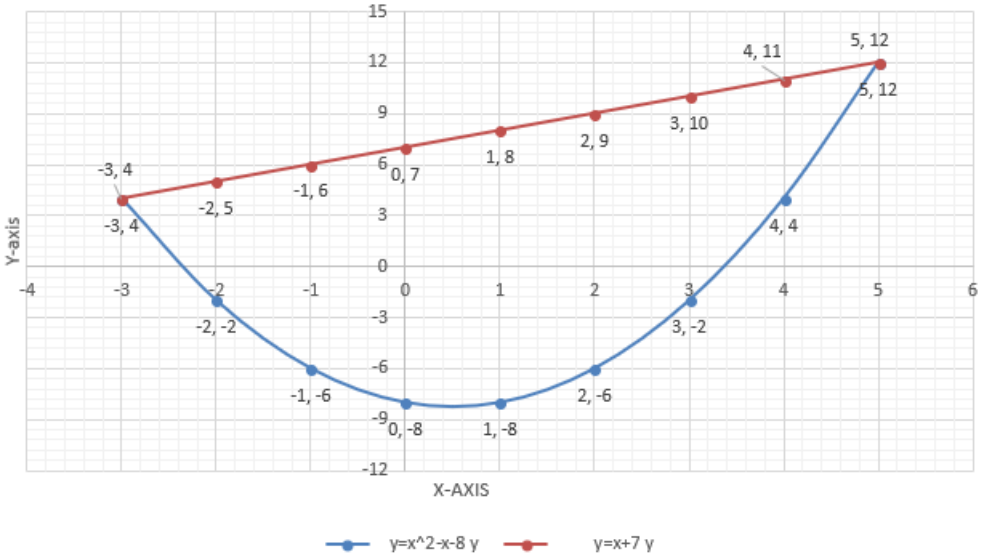
$\Rightarrow y–x–7 = 0$ (as $x^2–x–8 = y$)

$\Rightarrow y = x + 7$

Now we can draw another pair of value using the above data

X	-3	-2	-1	0	1	2	3	4	5
Y = x + 7	4	5	6	7	8	9	10	11	12

Now we can draw the graph and the intersection of the two lines will give the roots for the equation.



here from the graph its clear that the point of intersection are (–3,4) and (5,12) so the roots are (–3,5)

7. Question

Draw the graph of $y = x^2 + x – 12$ and hence solve $x^2 + 2x + 2 = 0$.

Answer

We are given $y = x^2 + x – 12$

So taking the values of X in between –3 and 3 we can find various value of y and put them in graph

X	-3	-2	-1	0	1	2	3
$y = x^2 + x - 12$	-6	-10	-12	-12	-10	-6	0

Again we are given

$x^2 + 2x + 2 = 0$

we can write the above expression as

$x^2 + x + x–14–12 = 0$

$\Rightarrow x^2 + x–12 + x + 14 = 0$

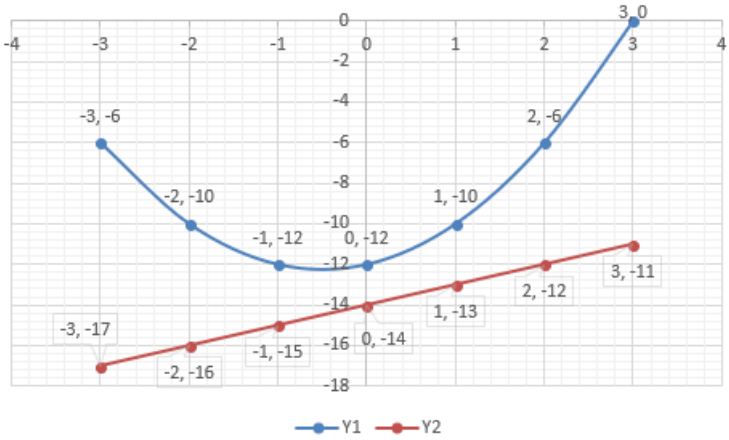
$\Rightarrow y + x + 14 = 0$ (as $x^2 – x – 6 = 0$)

$\Rightarrow y = –x–14$

Now we can draw another pair of value using the above data

X	-3	-2	-1	0	1	2	3
Y = -x-14	-17	-16	-15	-14	-13	-12	-11

Now we can draw the graph and the intersection of the two lines will give the roots for the equation.



From the above graph it's clear that the line doesn't intersect each other so there is no solution.

Exercise 10.2

1. Question

A bus travels at a speed of 40 km/hr. Write the distance-time formula and draw the graph of it. Hence, find the distance travelled in 3 hours.

Answer

Suppose a body X travels a at a speed of S km/h for T hours then the distance covered by him will be D and its given as

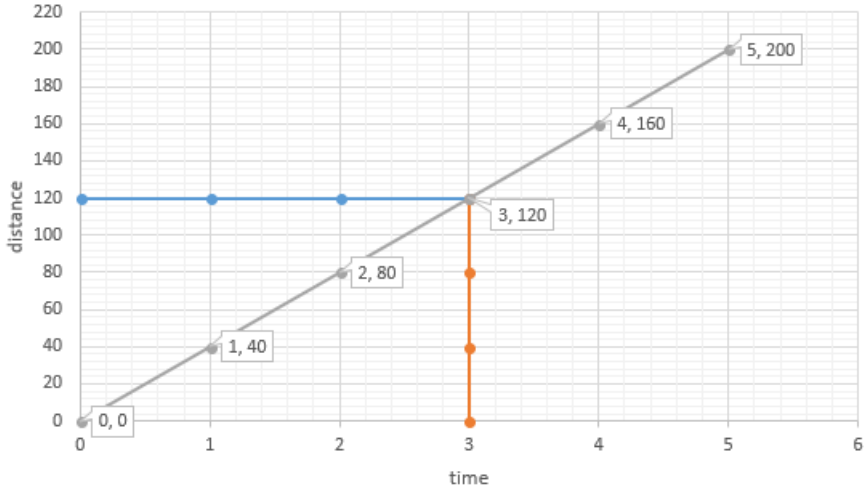
D = ST km

Here speed of bus, s = 40 km/hr

Travel time , t = 3hrs

So using this we can find a set of distance and put them in graph to find the exact distance travelled by the bus

Time, t	0	1	2	3	4	5
Distance d = st	0	40 × 1 = 40	40 × 2 = 80	40 × 3 = 120	40 × 4 = 160	40 × 5 = 200



to know the distance covered by the bus at three hours draw a line parallel to Y-axis from X = 3 to the curve and from the intersecting point of that line and the curve draw another line parallel to X-axis and the point at which the line intersect the Y-axis will give the distance coveredso from the graph it's clear that as the bus was running for 3 hrs. and it covered a distance of 120 km.

2. Question

The following table gives the cost and number of notebooks bought.

No of note books X	2	4	6	8	10	12
Cost ₹ y	30	60	90	120	150	180

Draw the graph and hence (i) find the cost of seven note books.

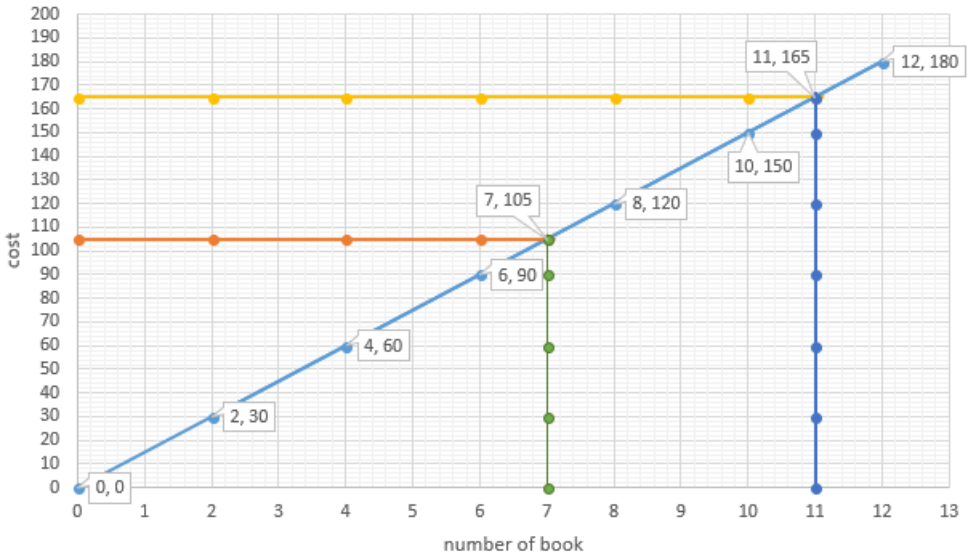
(ii) How many note books can be bought for ₹165.

Answer

No of note books X	2	4	6	8	10	12
Cost ₹ y	30	60	90	120	150	180

From the above it's clear that y = 15 × X

Putting the above value in graph we will find



(i) To find the cost of 7 books draw a line parallel to Y-axis from X = 7 to the curve and from the intersecting point of that line and the curve draw another line parallel to X-axis and the point at which the line intersect the Y-axis will give the cost of 7 books.so from the graph cost of 7 books is found to be ₹105

(ii) to find the number of book that can be purchased at a cost of 165 draw a line parallel to X-axis from Y = 165.from the point at which the line intersect the curve draw another line parallel to Y-axis and the point at which the line intersect x-axis will give the number of book.so we can buy 11 note books

3. Question

X	1	3	5	7	8
Y	2	6	10	14	16

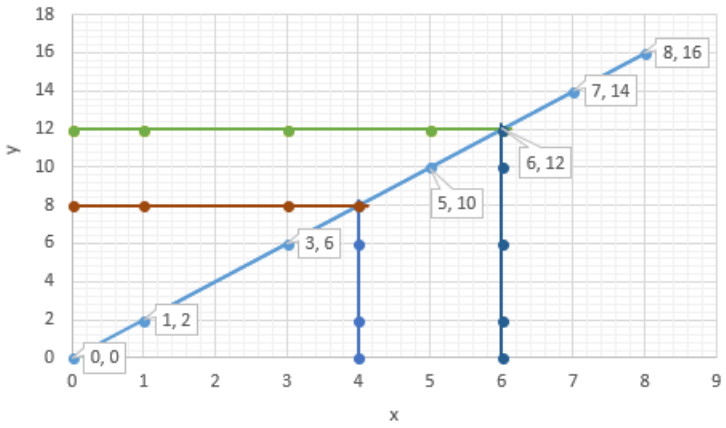
Draw the graph for the above table and hence find

(i) the value of y if x = 4

(ii) the value of x if y = 12

Answer

Using the data we can draw a graph



(I) TO FIND THE VALUE OF the value of y if x = 4, draw a line parallel to Y-axis from X = 4 to the curve and from the intersecting point of that line and the curve draw another line parallel to X-axis and the point at which the line intersect the Y-axis will give the value of Y ay X = 4.so from the graph at X = 4 Y is found to be 8

(II) to find the value of X at Y = 12 draw a line parallel to X-axis from Y = 12 and from the point at which the line intersect the curve draw another line parallel to Y-axis and the point at which the line intersect x-axis will give the value of X.so we find at Y = 12 Xis found to be 6

4. Question

The cost of the milk per liter is ₹15. Draw the graph for the relation between the quantity and cost. Hence find

(i) the proportionality constant.

(ii) the cost of 3 litres of milk.

Answer

(i) k = 15 (ii) ₹45

Let the cost of milk be Y and X be the quantity of milk in liter. As it's given that cost per one liter is 15rs so increase in quantity will increase the cost of milk. So it's a direct proportion

Mathematically,

Y = KX

Where K is the constant of proportionality

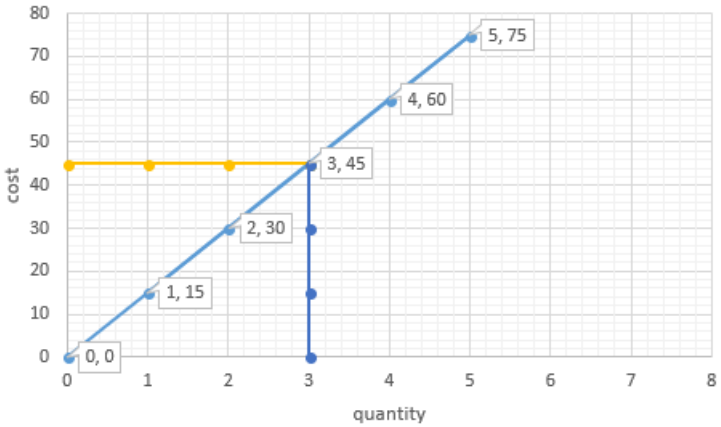
So we can draw a table

X (LIT.)	1	2	3	4	5
Y (Rs.)	15	30	45	60	75

so from the graph it's clear that y = kx = 15x

Proportionality, k = 15

We can draw a graph using the table given



To find the cost of 3 liter milk we have to draw a line parallel to Y-axis at X = 3 then from the intersection point of that parallel line and the curve draw another line parallel to X-axis so the point of intersection of that line and Y-axis will give the cost of 3 liter of milk.

From the graph its clear that cost of 3 liter is 45 RS.

5. Question

Draw the Graph of xy = 20, x, y > 0. Use the graph to find y when x = 5, and to find x when y = 10.

Answer

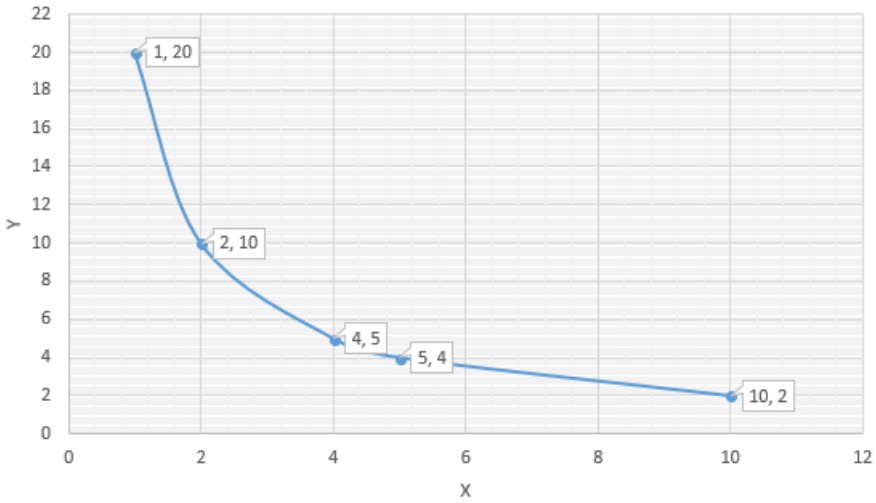
We are given that xy

= 20

⇒ y = (20/x)

We can find different value of Y by taking values of x between 1 and 10

x	1	2	4	5	10
y = (20/x)	20	10	5	4	2



From the graph we get that at x = 5, y = 4, and to find y = 10, x = 2

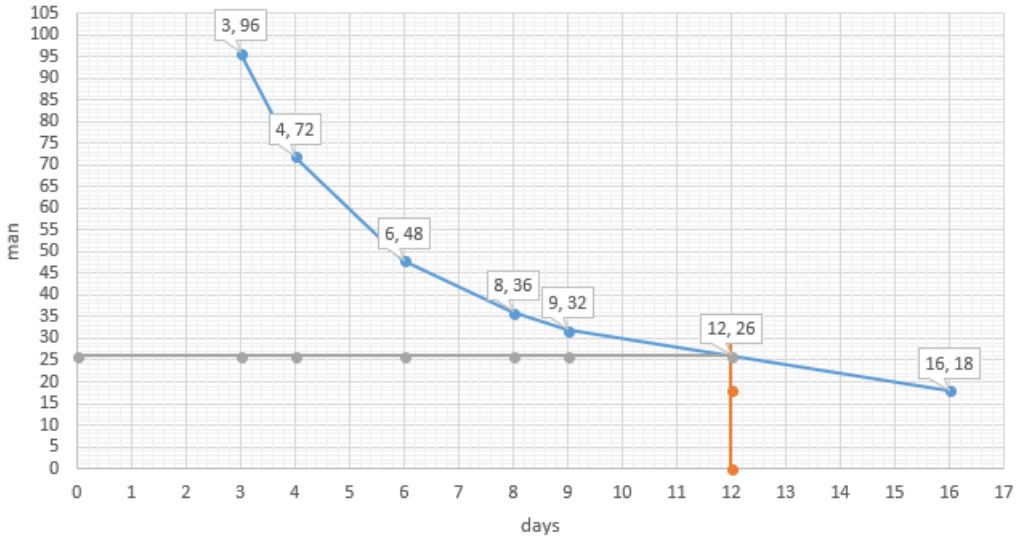
6. Question

No. of workers X	3	4	6	8	9	16
No of days y	96	72	48	36	32	18

Draw graph for the data given in the table. Hence find the number of days taken by 12 workers to complete the work.

Answer

We can construct a graph using the data given



To find the number of days taken by 12 worker to complete the work draw a line parallel to Y-axis from X = 12 to the curve and from the intersecting point of that line and the curve draw another line parallel to X-axis and the point at which the line intersect the Y-axis will give the value of Y at X = 12.so from the graph at X = 12 Y is found to be 26