

Way to Success - 10th Maths - 8 Mark Questions - Graph

PART IV - 8 Mark Questions - Graph

Exercise 3.15

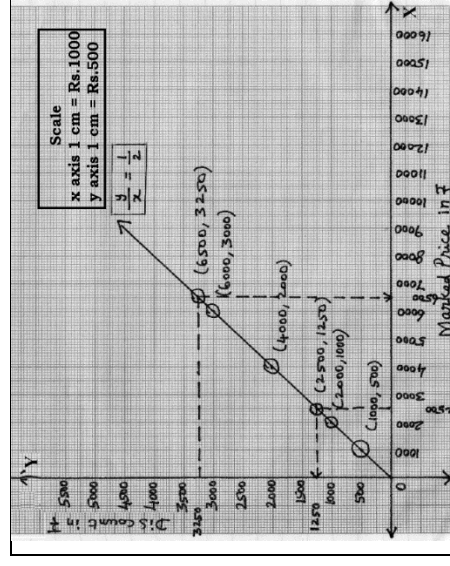
Types of Variation	Equation	Graph
Direct Variation	$\frac{y}{x} = k$	straight line
Indirect Variation	$xy = k$	smooth curve known as a Rectangular Hyperbola

1. A garment shop announces a flat 50% discount on every purchase of items for their customers. Draw the graph for the relation between the Marked Price and the Discount. Hence find (i) the marked price when a customer gets a discount of ₹ 3250 (from graph) (ii) the discount when the marked price is ₹ 2500

X axis → Marked Price, Y axis → Discount, Given: Discount 50%

$$\frac{50}{100} = \frac{1}{2} \Rightarrow k = \frac{1}{2} \text{ Direct Variation: } \frac{y}{x} = k$$

Marked Price (X)	1000	2000	2500	4000	6000	6500
Discount (Y)	500	1000	1250	2000	3000	3250
$\frac{y}{x} = \frac{500}{1000} = \frac{1000}{2000} = \frac{1250}{2500} = \frac{2000}{4000} = \frac{3000}{6000} = \frac{3250}{6500}$						



Similar Problems Solve Your Self

Fig.3.47: Varshika drew 6 circles with different sizes. Draw a graph for the relationship between the diameter and circumference (approximately related) of each circle as shown in the table and use it to find the circumference of a circle when its diameter is 6cm. (APR-23)

Diameter (x) cm	1	2	3	4	5
Circumference (y) cm	3.1	6.2	9.3	12.4	15.5

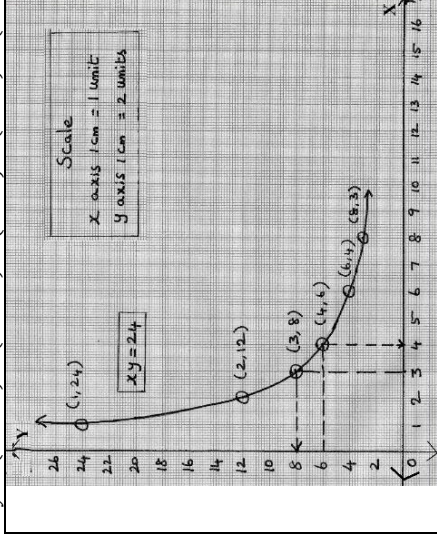
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2. Draw the graph of $xy = 24$, $x, y > 0$. Using the graph find (i) y when $x = 3$ (ii) x when $y = 6$.

$$xy = 24 \Rightarrow y = \frac{24}{x}, \text{ Inverse Variation: } xy = k$$

x	1	2	3	4	6	8
y	24	12	8	6	4	3

$$xy = (1 \times 24) = (2 \times 12) = (3 \times 8) = (4 \times 6) = (6 \times 4) = (8 \times 3) = 24 \Rightarrow k = 24$$

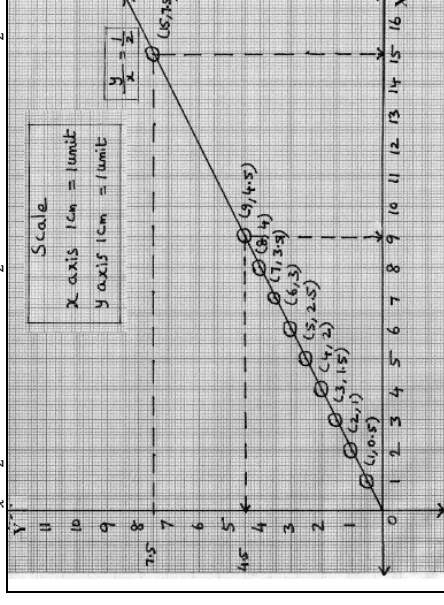


3. Graph the following linear function $y = \frac{1}{2}x$. Identify the constant of variation and verify it with the graph. Also (i) find y when $x = 9$ (ii) find x when $y = 7.5$ JUN-23

Given: Linear function $y = \frac{1}{2}x$ Constant of variation: $\frac{y}{x} = \frac{1}{2} \Rightarrow k = \frac{1}{2}$ or 0.5

Direct Variation

x	1	2	3	4	5	6	7	8	9	15
y	0.5	1	1.5	2	2.5	3	3.5	4	4.5	7.5
$\frac{y}{x} = \frac{0.5}{1} = \frac{1}{2} = \frac{2}{4} = \frac{2.5}{5} = \frac{3}{6} = \frac{4}{8} = \frac{4.5}{9} = \frac{7.5}{15} = \frac{1}{2}$										
$\frac{y}{x} = \frac{1}{2} \Rightarrow 2y = x \Rightarrow y = \frac{x}{2}$										
If $x = 1 \Rightarrow y = \frac{1}{2}$ (or) 0.5										



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4. The following table shows the data about the number of pipes and the time taken to fill the same tank

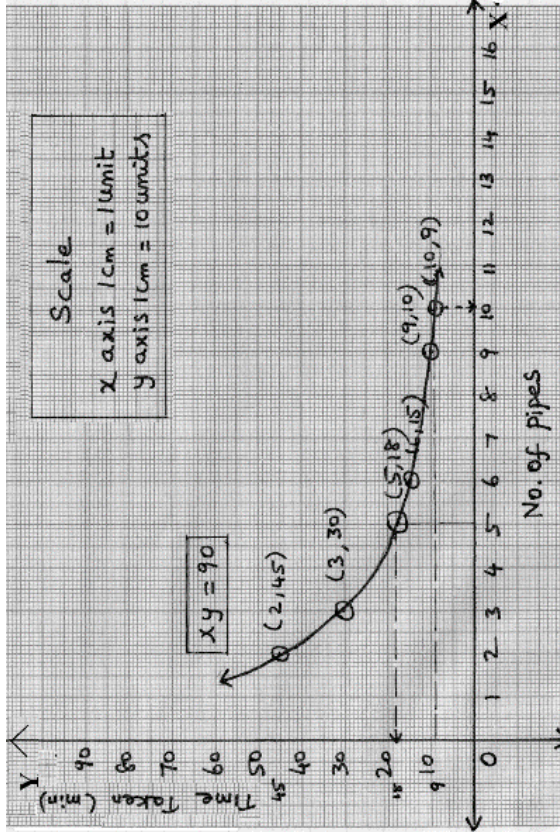
No. of pipes (x)	2	3	6	9
Time Taken (in min) (y)	45	30	15	10

Draw the graph for the above data and hence

- (i) find the time taken to fill the tank when five pipes are used
(ii) Find the number of pipes when the time is 9 minutes

Inverse Variation: $xy = k$

$$(2 \times 45) = (3 \times 30) = (6 \times 15) = (9 \times 10) \Rightarrow k = 90 \Rightarrow xy = 90$$



Solution:

- i) If $x = 5, y = ?$

$$5(y) = 90$$

$$y = \frac{90}{5} = 18 \text{ min.}$$

- ii) if $y = 9, x = ?$

$$x(9) = 90$$

$$x = \frac{90}{9} = 10 \text{ Pipes} \quad (10, 9)$$

Similar Problems

Solve Your Self

Eg.3.49: A company initially started with 40 workers to complete the work by 150 days. Later, it decided to fasten up the work increasing the number of workers as shown below.

Number of workers (x)	40	50	60	75
Number of days (y)	150	120	100	80

- (i) Graph the above data and identify the type of variation.
(ii) From the graph, find the number of days required to complete the work if the company decides to opt for 120 workers?
(iii) If the work has to be completed by 200 days, how many workers are required?

5. A school announces that for a certain competitions, the cash prize will be distributed for all the participants equally as show below.

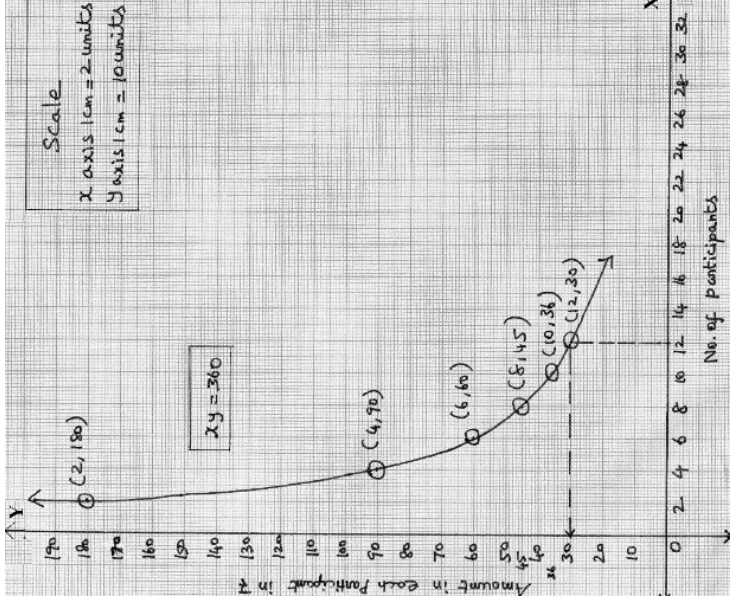
No. of participants (x)	2	4	6	8	10
Amount for each participant in ₹ (y)	180	90	60	45	36

(i) Find the constant of variation.

(ii) Graph the above data and hence, find how much will each participant get if the number of participants are 12.

Inverse Variation: $xy = k$

$$(2 \times 180) = (4 \times 90) = (6 \times 60) = (8 \times 45) = (10 \times 36) = 360 \Rightarrow k = 360$$



Solution:

- (i) Constant of Variation
 $k = 360$

- (ii) If $x = 12, y = ?$

$$12(y) = 360$$

$$y = \frac{360}{12} = 30$$

$$(12, 30)$$

Similar Problems

Solve Your Self

Eg.3.50: Nishanth is the winner in a Marathon race of 12 km distance. He ran at the uniform speed of 12km/hr and reached the destination in 1 hour. He was followed by Aradhana, Jeyanth, Sathya and Swetha with their respective speed of 6 km/hr, 4 km/hr, 3 km/hr and 2km/hr. And, they covered the distance in 2 hrs, 3 hrs, 4 hrs and 6 hours respectively.

Draw the speed-time graph and use it to find the time taken to Kaushik with his speed of 2.4km/hr.

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6. A two wheeler parking zone near bus stand charges as below

Time (in hours) (x)	4	8	12	24
Amount ₹ (y)	60	120	180	360

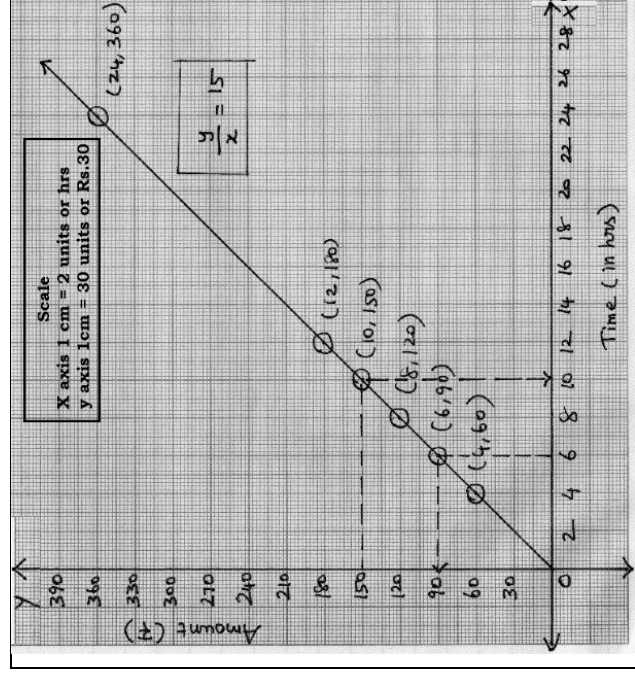
Check if the amount charged are in direct variation or in inverse variation to the parking time. Graph the data. Also (i) find the amount to be paid when parking time is 6 hr (ii) find the parking duration when the amount paid is ₹ 150.

It is Direct Variation: $\frac{y}{x} = k$,

$$\frac{y}{x} = \frac{60}{4}$$

$$\frac{120}{8} = \frac{180}{12} = \frac{360}{24} = 15$$

$$k = 15$$



Solution:

i) if $x = 6$,

$$y = ?$$

$$\frac{y}{x} = 15$$

$$\frac{y}{6} = 15$$

$$y = 15 \times 6$$

$$y = 90$$

$$(6, 90)$$

ii) If $y = 150$,

$$x = ?$$

$$\frac{150}{x} = 15$$

$$150 = 15x$$

$$x = \frac{150}{15}$$

$$x = 10 \text{ hrs}$$

$$(10, 150)$$

Similar Problems

Solve Your Self

Eg.3.48: A bus is travelling at a uniform speed of 50 km/hr. Draw the distance-time graph and hence find (i) the constant of variation (ii) how far will it travel in 90 mins (iii) the time required to cover a distance of 300 km from the graph.

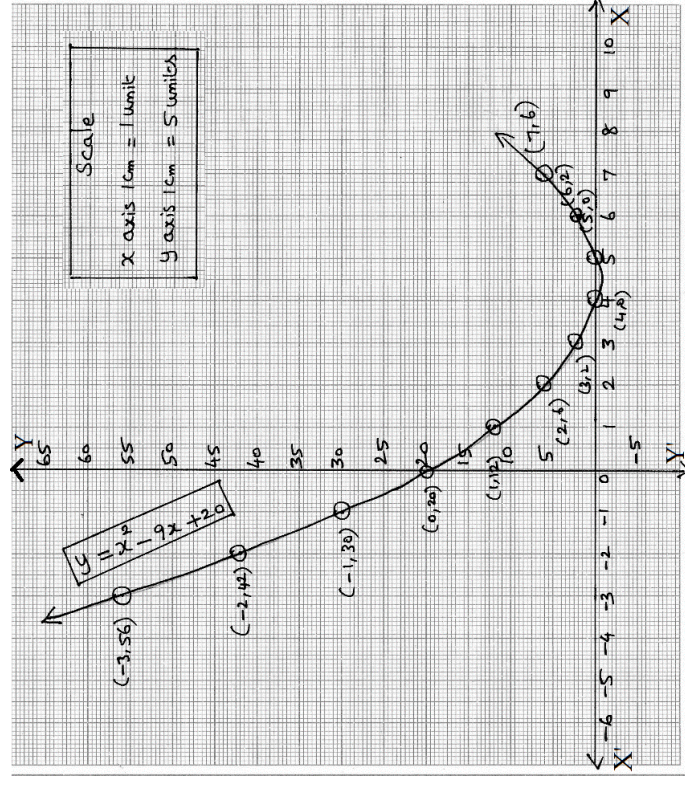
Exercise 3.16

1. Graph the following quadratic equations and state their nature of solutions.

(i) $x^2 - 9x + 20 = 0$

x	-3	-2	-1	0	1	2	3	4	5	6
x^2	9	4	1	0	1	4	9	16	25	36
$-9x$	27	18	9	0	-9	-18	-27	-36	-45	-54
20	20	20	20	20	20	20	20	20	20	20
$y = x^2 - 9x + 20$	56	42	30	20	12	6	2	0	0	2

Points: $(-3, 56)$, $(-2, 42)$, $(-1, 30)$, $(0, 20)$, $(1, 12)$, $(2, 6)$, $(3, 2)$, $(4, 0)$, $(5, 0)$, $(6, 2)$



Solution $x = \{4, 5\}$ Real and unequal roots.

Similar Problems

Solve Your Self

1. Graph the following quadratic equations and state their nature of solutions.

(iv) $x^2 - 9 = 0$

(vi) $(2x - 3)(x + 2) = 0$

Eg.3.51(i): Discuss the nature of solutions of the following quadratic equations. $x^2 + x - 12 = 0$ (SEP-20, 21)

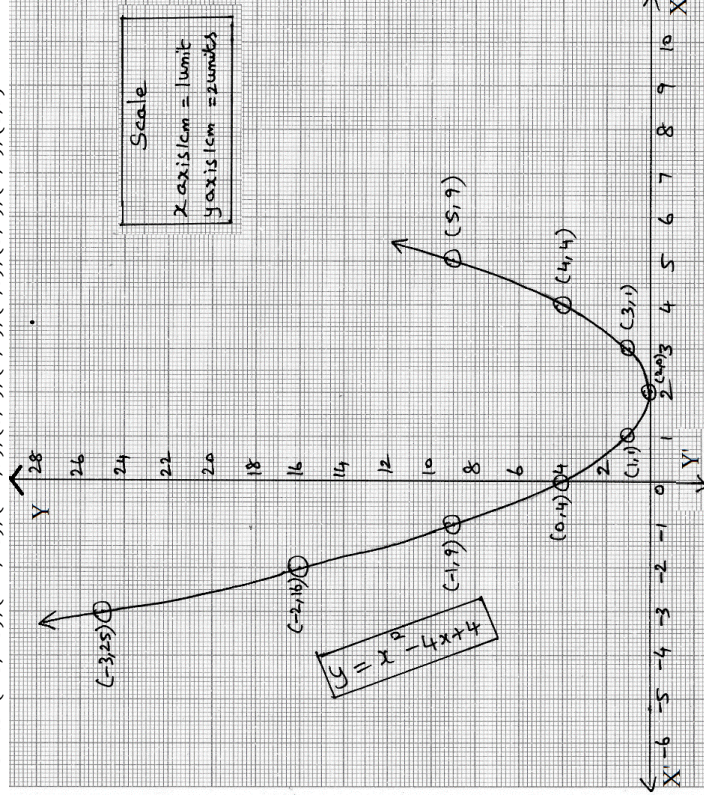
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(ii) $x^2 - 4x + 4 = 0$

MAY-22

$y = x^2 - 4x + 4$									
x	-3	-2	-1	0	1	2	3	4	5
x^2	9	4	1	0	1	4	9	16	25
$-4x$	12	8	4	0	-4	-8	-12	-16	-20
4	4	4	4	4	4	4	4	4	4
$y = x^2 - 4x + 4$	25	16	9	4	1	0	1	4	9

Points: $(-3, 25), (-2, 16), (-1, 9), (0, 4), (1, 1), (2, 0), (3, 1), (4, 4), (5, 9)$



Solution: $x = \{2, 0\}$ Real and equal roots

Similar Problems Solve Your Self

1. Graph the following quadratic equations and state their nature of solutions.

(v) $x^2 - 6x + 9 = 0$

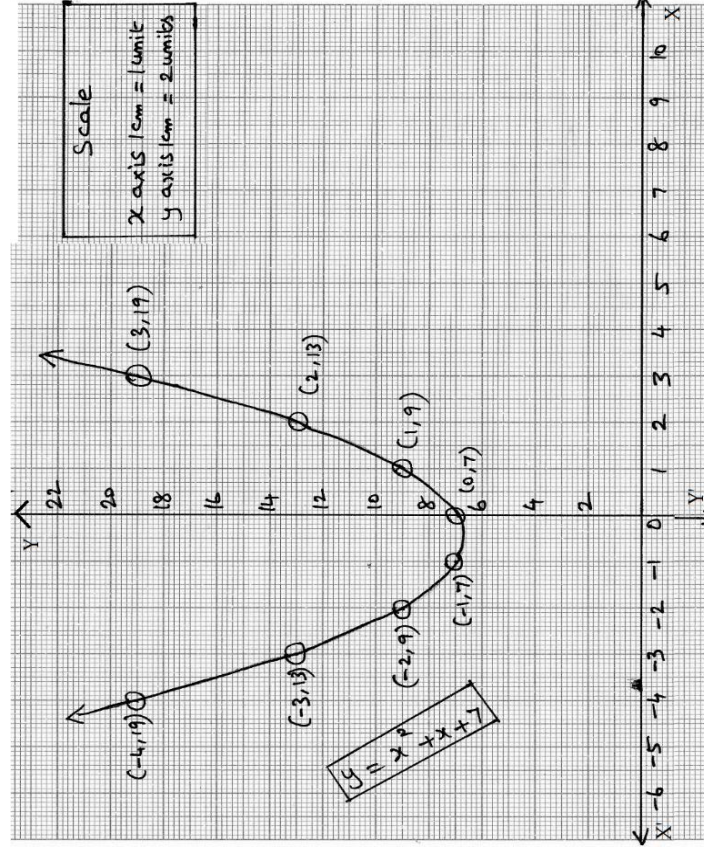
Eg.3.51(ii): Discuss the nature of solutions of the following quadratic equations. $x^2 - 8x + 16 = 0$

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(iii) $x^2 + x + 7 = 0$

$y = x^2 + x + 7$									
x	-4	-3	-2	-1	0	1	2	3	
x^2	16	9	4	1	0	1	4	9	
x	-4	-3	-2	-1	0	1	2	3	
7	7	7	7	7	7	7	7	7	
$y = x^2 + x + 7$	19	13	9	7	7	9	13	19	

Points: $(-4, 19), (-3, 13), (-2, 9), (-1, 7), (0, 7), (1, 9), (2, 13), (3, 19)$



Solution: No real roots

Similar Problems Solve Your Self

Eg.3.51(iii): Discuss the nature of solutions of the following quadratic equations. $x^2 + 2x + 5 = 0$

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3. Draw the graph of $y = x^2 + x$ and hence solve $x^2 + 1 = 0$

$y = x^2 + x$										
x	-3	-2	-1	0	1	2	3			
x^2	9	4	1	0	1	4	9			
x	-3	-2	-1	0	1	2	3			
$y = x^2 + x$	6	2	0	0	2	6	12			

Points: $(-3,6), (-2,2), (-1,0), (0,0), (1,2), (2,6), (3,12)$

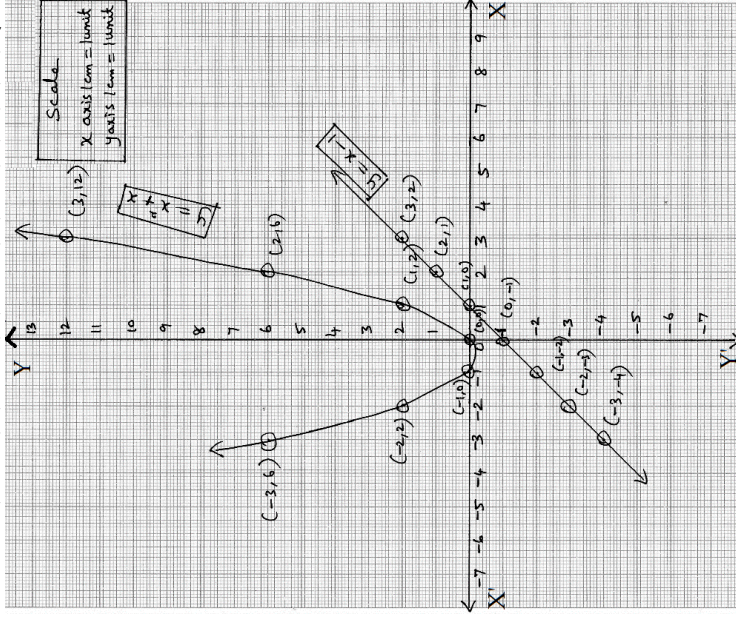
$$y = x^2 + x + 0$$

$$0 = x^2 + 0x + 1$$

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

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

Points: $(-3,-4), (-2,-3), (-1,-2), (0,-1), (1,0), (2,1), (3,2)$



Solution:
No real roots.

Similar Problems
Solve Your Self

Eg.3.53: Draw the graph of $y = x^2 + 4x + 3$ and hence find the roots of $x^2 + x + 1 = 0$

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4. Draw the graph of $y = x^2 + 3x + 2$ and use it to solve $x^2 + 2x + 1 = 0$

$y = x^2 + 3x + 2$										
x	-4	-3	-2	-1	0	1	2	3		
x^2	16	9	4	1	0	1	4	9		
$3x$	-12	-9	-6	-3	0	3	6	9		
2	2	2	2	2	2	2	2	2		
$y = x^2 + 3x + 2$	6	2	0	0	2	6	12	20		

Points: $(-4,6), (-3,2), (-2,0), (-1,0), (0,2), (1,6), (2,12), (3,20)$

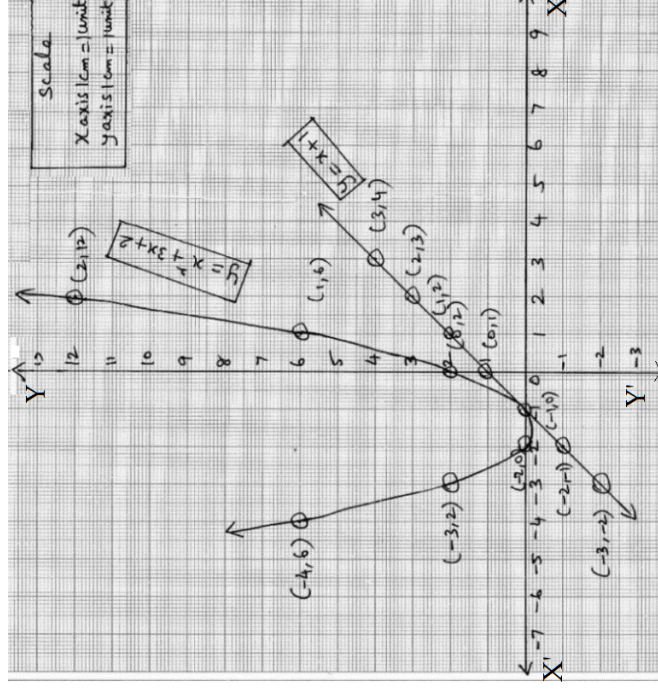
$$y = x^2 + 3x + 2$$

$$0 = x^2 + 2x + 1$$

$$\frac{(-) \quad (-)}{y = x + 1}$$

$y = x + 1$						
x	-3	-2	-1	0	1	2
y	-2	-1	0	1	2	3

Points: $(-3,-2), (-2,-1), (-1,0), (0,1), (1,2), (2,3), (3,4)$



Solution:
 $\{-1, 0\}$

Similar Problems
Solve Your Self

Eg.3.55: Draw the graph of $y = x^2 - 4x + 3$ and use it to solve $x^2 - 6x + 9 = 0$ (MAY-22, JUL-22)

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5. Draw the graph of $y = x^2 + 3x - 4$ and use it to solve $x^2 + 3x - 4 = 0$ SEP-21

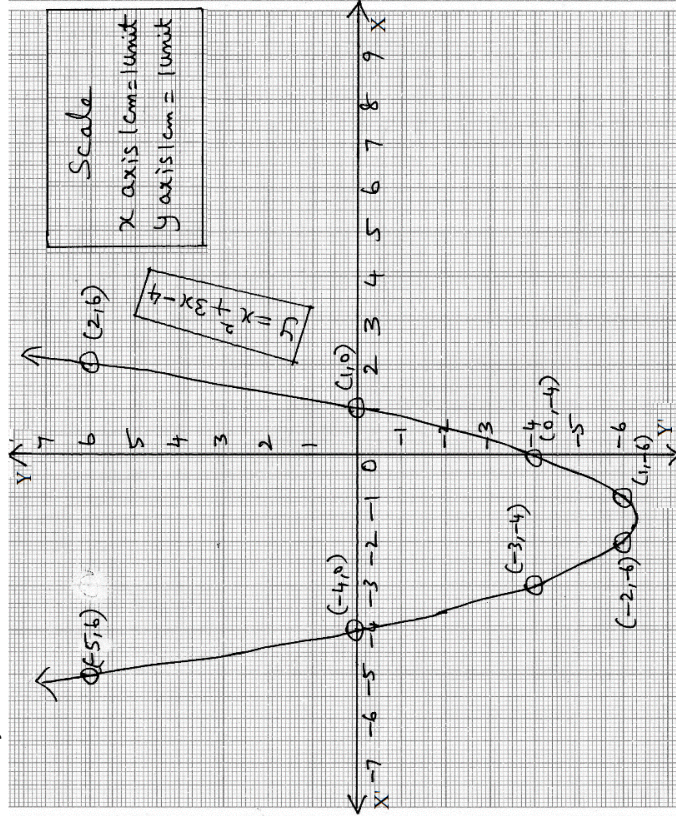
$y = x^2 + 3x - 4$									
x	-5	-4	-3	-2	-1	0	1	2	
x^2	25	16	9	4	1	0	1	4	
$-3x$	-15	-12	-9	-6	-3	0	3	6	
-4	-4	-4	-4	-4	-4	-4	-4	-4	
$y = x^2 + 3x - 4$	6	0	-4	-6	-4	0	4	6	

Points: $(-5, 6), (-4, 0), (-3, -4), (-2, -6), (-1, -4), (0, -4), (1, 0), (2, 6)$

$$y = x^2 + 3x - 4$$

$$0 = x^2 + 3x - 4$$

$$\frac{(-) \quad (-) \quad (+)}{y = 0}$$



Solution: $x = \{-4, 1\}$

Similar Problems

Solve Your Self

Eg.3.54: Draw the graph of $y = x^2 + x - 2$ and hence solve $x^2 + x - 2 = 0$. (PTA-1)

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7. Draw the graph of $y = 2x^2 - 3x - 5$ & hence solve $2x^2 - 4x - 6 = 0$ PTA-3, SEP-20

$y = 2x^2 - 3x - 5$									
x	-2	-1	0	1	2	3	4	5	
x^2	4	1	0	1	4	9	16	25	
$2x^2$	8	2	0	2	8	18	32	50	
$-3x$	6	3	0	-3	-6	-9	-12	-15	
-5	-5	-5	-5	-5	-5	-5	-5	-5	
$y = 2x^2 - 3x - 5$	9	0	-5	-6	-3	4	15	30	

Points: $(-2, 9), (-1, 0), (0, -5), (1, -6), (2, -3), (3, 4), (4, 15), (5, 30)$

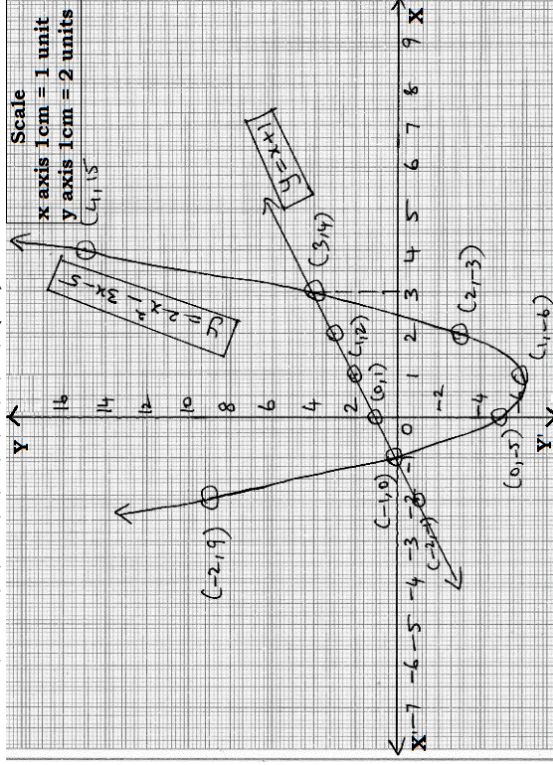
$$y = 2x^2 - 3x - 5$$

$$0 = 2x^2 - 4x - 6$$

$$\frac{(-) \quad (+) \quad (+)}{y = 0}$$

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

Points: $(-2, -1), (-1, 0), (0, 1), (1, 2), (2, 3), (3, 4)$



Solution: $\{-1, 3\}$

Similar Problems

Solve Your Self

2. Draw the graph of $y = x^2 - 4$ and hence solve $x^2 - x - 12 = 0$ (JUN-23)
6. Draw the graph of $y = x^2 - 5x - 6$ and hence solve $x^2 - 5x - 14 = 0$ (APR-23, PTA-2, 6)
8. Draw the graph of $y = (x - 1)(x + 3)$ and hence solve $x^2 - x - 6 = 0$

Eg.3.52: Draw the graph of $y = 2x^2 - x - 6 = 0$ (PTA-4)