

1. A bus is travelling at a uniform speed of 50 km/hr. Draw the distance - time graph and hence find.
- the constant of Variation
 - how far will it travel in 90 minutes?
 - the time required to cover a distance of 300 km from the graph.

Solution: -

Table:

Time taken x (in minutes)	60	120	180	240
Distance y (in km).	50	100	150	200

From the table, x increases, y also increases

The variation is a direct Variation.

$$\therefore y = kx$$

$$\Rightarrow k = \frac{y}{x}$$

$$k = \frac{50}{60} = \frac{100}{120} = \frac{150}{180} = \frac{200}{240}$$

$$k = \frac{5}{6}$$

$\therefore y = \frac{5}{6}x$ is a straight line.

Result: Plot the points (60, 50), (120, 100), (180, 150), (240, 200)

(i) From the graph, Direct Variation.

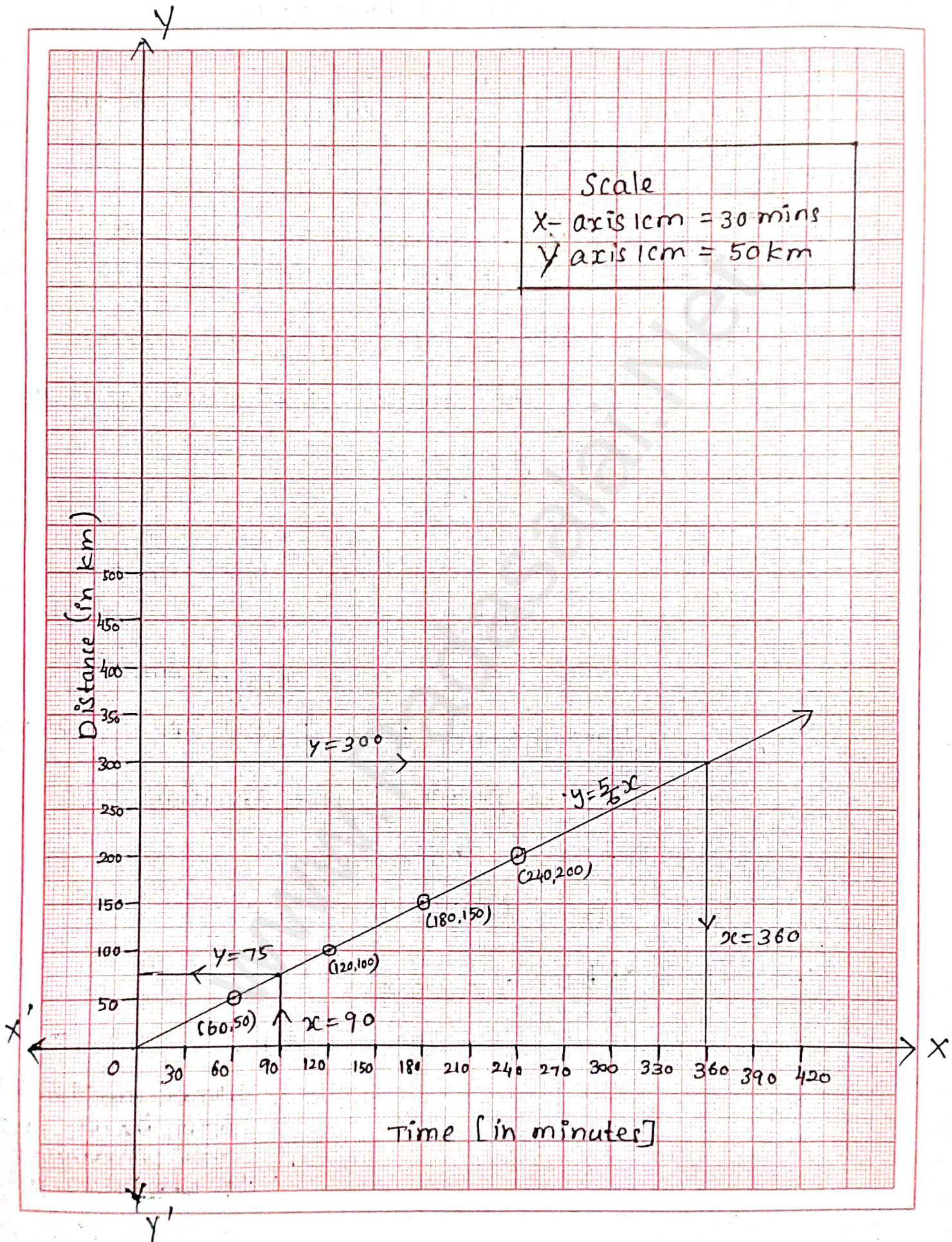
(ii) When $x = 90$ minutes.

Then $y = 75$ km

(iii) When $y = 300$ km

$x = 360$ minutes

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2. 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
 (ii) the discount when the marked price is ₹. 2500.

Solution:-

Table:

Marked price x	500	1000	1500	2000	2500
Discount y	250	500	750	1000	1250

From, the table, x - increases

y also increases

This type of Variation direct Variation.

$$\therefore y = kx$$

$$\Rightarrow k = \frac{y}{x}$$

$$k = \frac{250}{500} = \frac{500}{1000} = \frac{750}{1500} = \frac{1000}{2000} = \frac{1250}{2500}$$

$$k = \frac{1}{2}$$

$\therefore \boxed{y = \frac{1}{2}x}$ is a straightline.

Plot the points (500, 250), (1000, 500), (1500, 750), (2000, 1000) and (2500, 1250).

Result:

From the Graph.

(i) When $y = ₹. 3250$

Then, $x = ₹. 6500$

(ii) when $x = ₹. 2500$

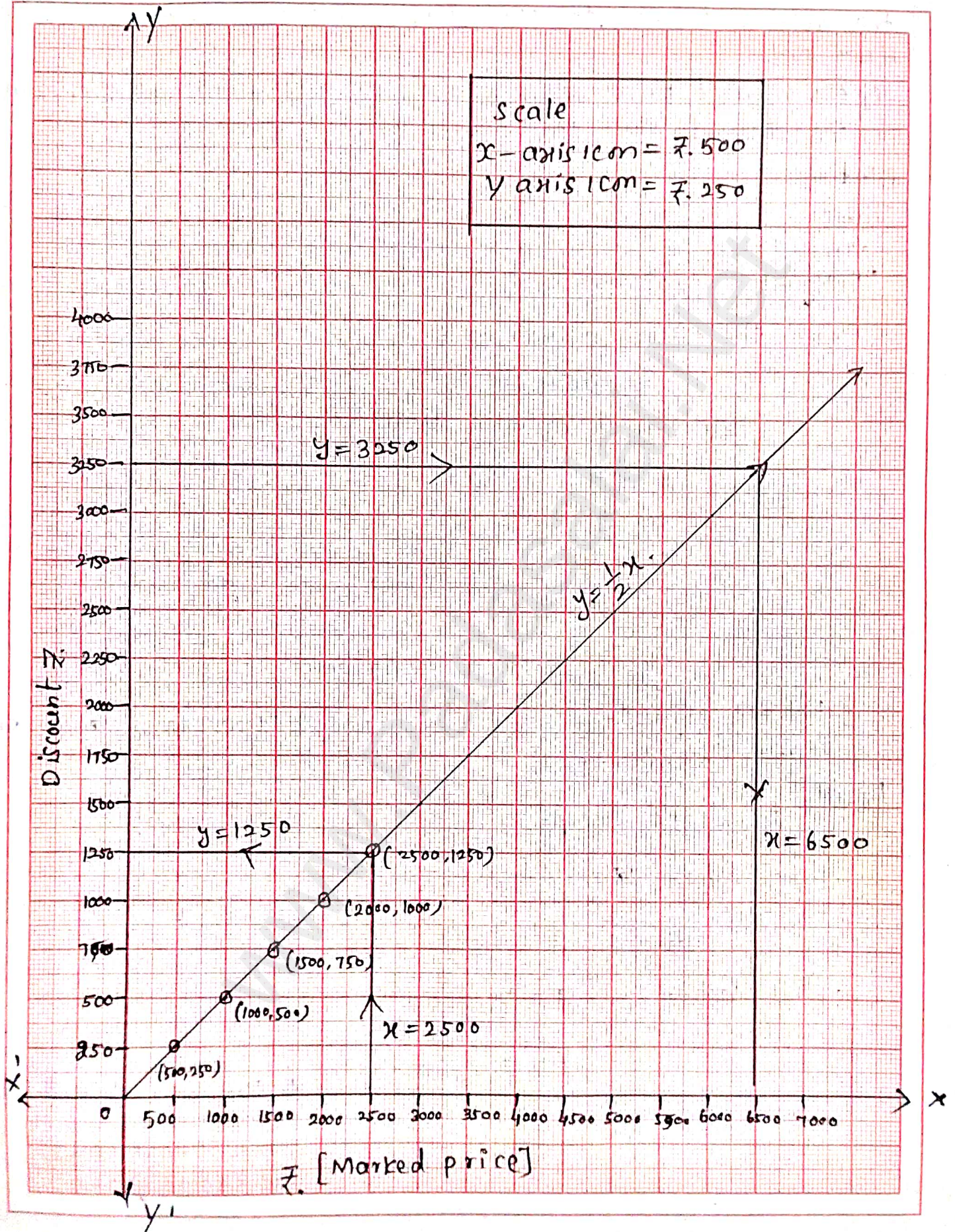
$y = ₹. 1250$

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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 $y = 7.5$

Solution:

Table:

x	1	2	3	4	5	6
y	0.5	1	1.5	2	2.5	3

From the table

x -increases, y also increases

This type of variation is called direct variation.

$$\therefore y = kx$$

$$k = \frac{y}{x} = \frac{0.5}{1} = \frac{1}{2} = \frac{1.5}{3} = \frac{2}{4} = \frac{2.5}{5} = \frac{3}{6}$$

$$k = \frac{1}{2}$$

$y = \frac{1}{2}x$ is a straight line.

Plot the points $(1, 0.5)$, $(2, 1)$, $(3, 1.5)$, $(4, 2)$, $(5, 2.5)$ and $(6, 3)$.

Result:

From the graph.

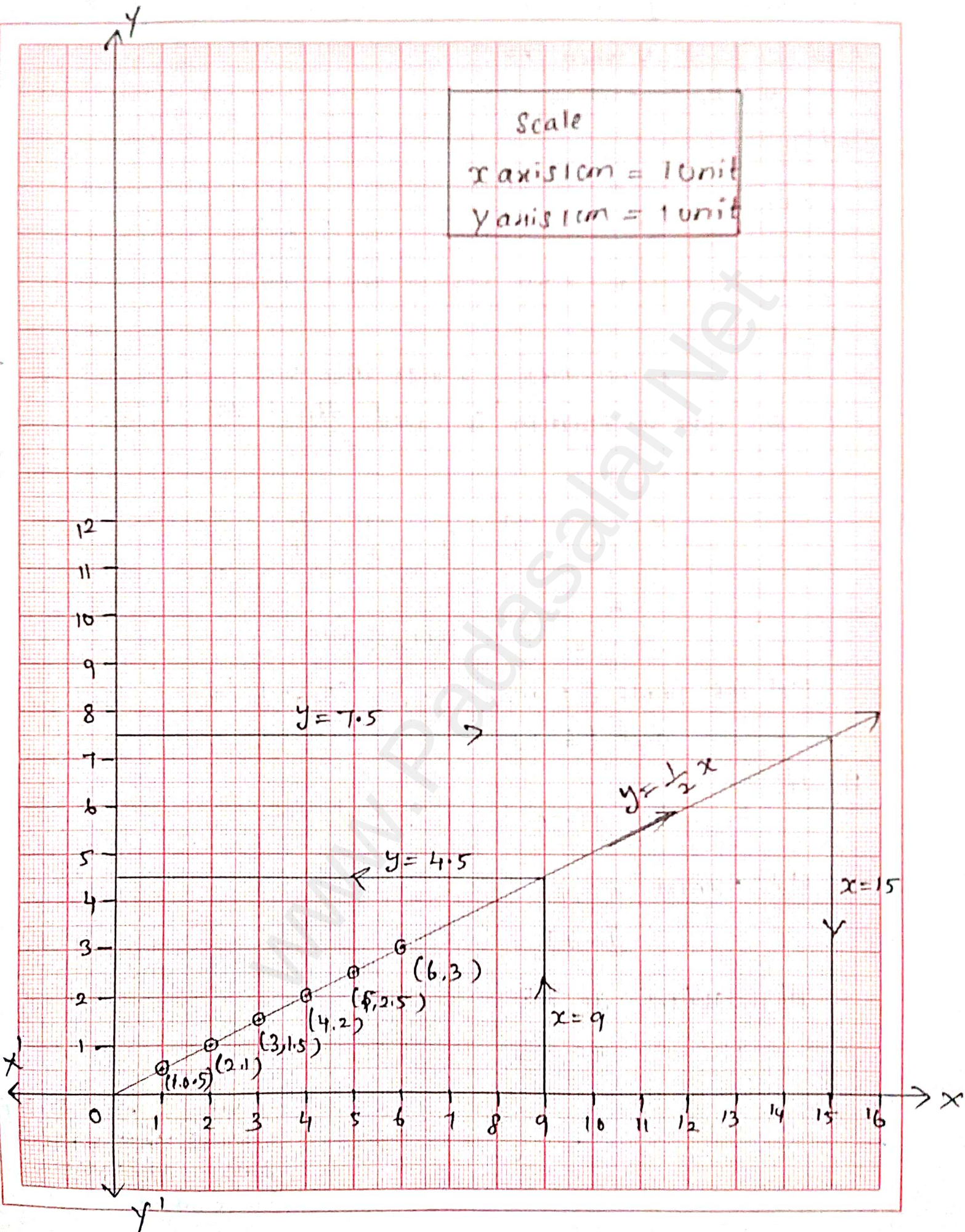
(i) When $x = 9$

$$y = 4.5$$

(ii) When $y = 7.5$

$$x = 15$$

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4. Varshika draw 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 6 cm.

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

Solution:-

Table	Diameter - x cm	1	2	3	4	5
	Circumference - y cm	3.1	6.2	9.3	12.4	15.5

From the table, x-increases and y also increase

This type of variation direct variation.

$$\therefore y = kx$$

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

$$k = \frac{3.1}{1} = \frac{6.2}{2} = \frac{9.3}{3} = \frac{12.4}{4} = \frac{15.5}{5}$$

$$k = 3.1$$

$y = (3.1)x$ is a straight line.

Plot the points (1, 3.1), (2, 6.2), (3, 9.3), (4, 12.4), (5, 15.5)

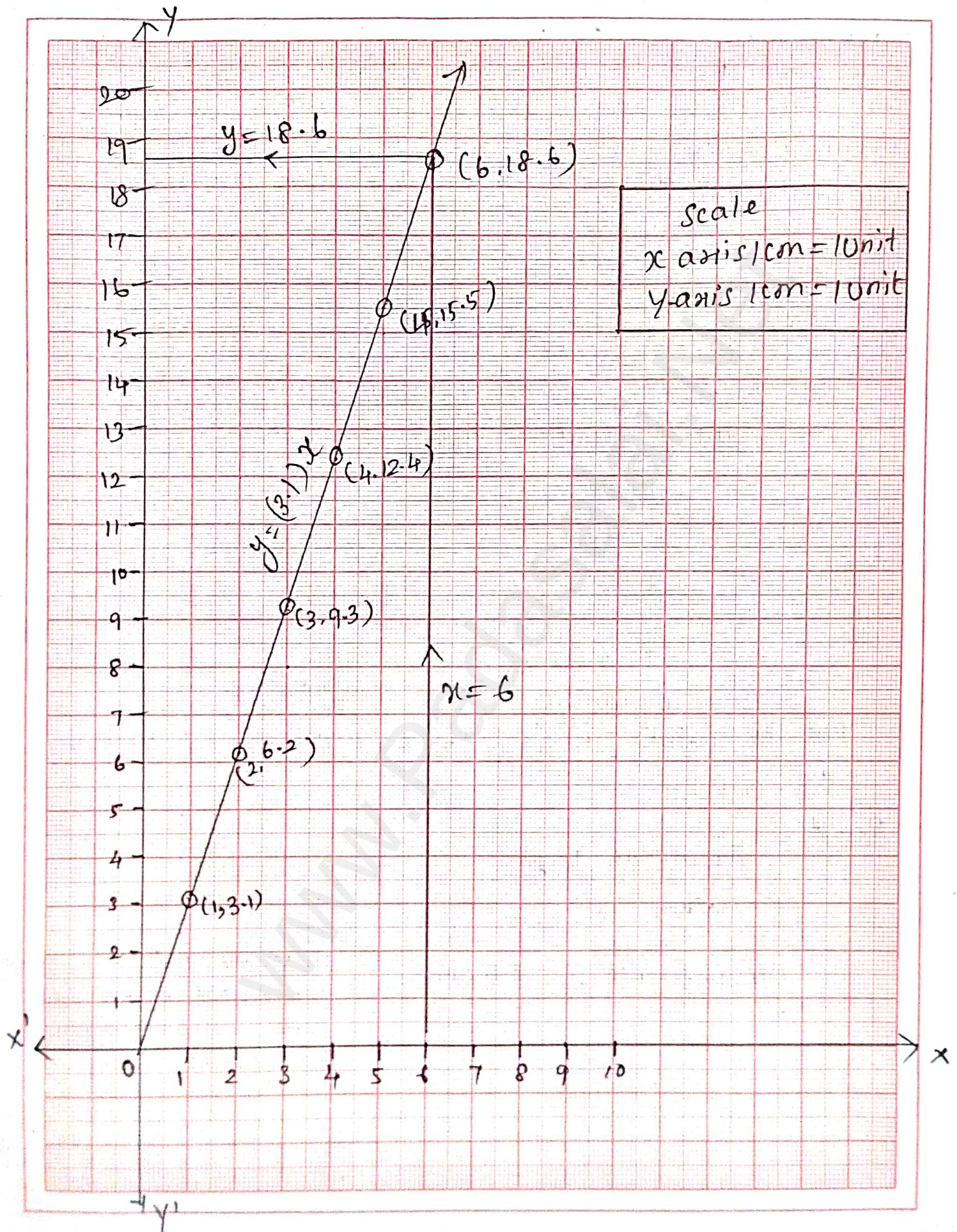
Result:-

From the graph.

When $x = 6$ cm

Circumference $y = 18.6$ cm.

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5.

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 inverse variation to the parking time. Graph the data. Also (i) find the amount to be paid when parking time 6 hr (ii) find the parking duration when the amount paid is ₹. 150.

Solution:

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

From the table, x-increases, y also increase

This type of variation direct variation.

$$\therefore y = kx$$

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

$$k = \frac{60}{4} = \frac{120}{8} = \frac{180}{12} = \frac{360}{24}$$

$$k = 15$$

$y = 15x$ form a straight line

Plot the points (4, 60), (8, 120), (12, 180) and (24, 360)

Result:

From the graph

(i) when $x = 6$ hr

$$y = ₹. 90$$

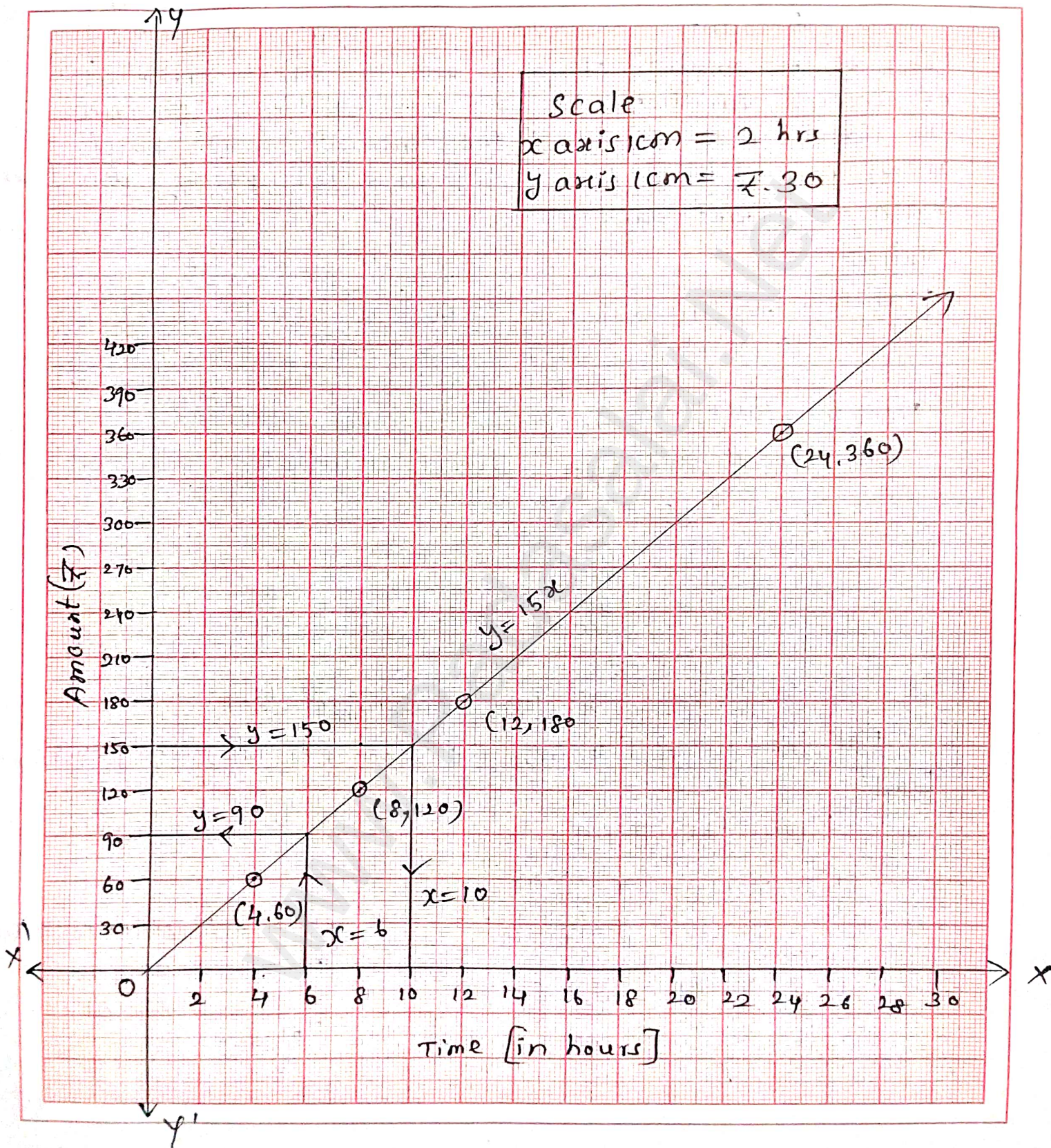
(ii) when $y = ₹. 150$

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

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

Solution:-

Table

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

From the table, x -increases and y -decreases

This type of variation is called inverse variation.

$$\therefore y = \frac{k}{x}$$

$$\Rightarrow k = xy$$

$$k = 1 \times 24 = 2 \times 12 = 3 \times 8 = \dots 24 \times 1 = 24$$

$$k = 24$$

$xy = 24$ is a smooth curve.

Plot the points $(1, 24)$, $(2, 12)$, $(3, 8)$, $(4, 6)$
 $(6, 4)$, $(8, 3)$, $(12, 2)$ and $(24, 1)$.

Result:

From the graph

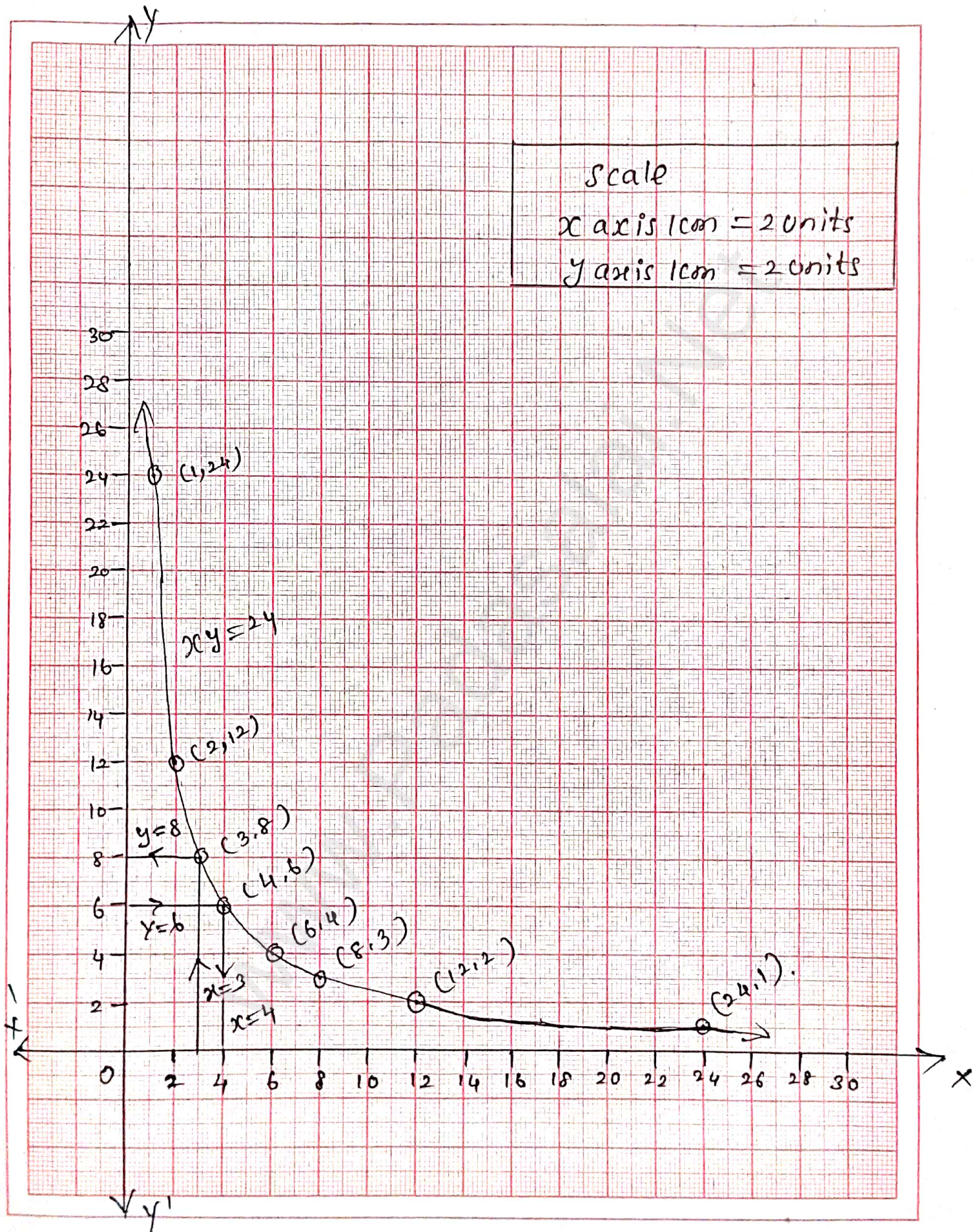
(i) when $x = 3$

$$y = 8$$

(ii) when $y = 6$

$$x = 4$$

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7. Nishanth is the winner in Marathon race of 12km distance. He ran at the uniform speed of 12 km/hr and reached the destination in 1 hour. He was followed by Aradhana, Jayanth, Sathya and Swetha with their respective speed of 6 km/hr, 4 km/hr, 3 km/hr and 2 km/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 2.4 km/hr.

Solution:-

Table

speed x (km/hr)	12	6	4	3	2
Time y (hours)	1	2	3	4	6

From the table, x -decreases and y -increases

This type of variation is called inverse variation.

$$\therefore y = \frac{k}{x}$$

$$\Rightarrow k = xy$$

$$k = 12 \times 1 = 6 \times 2 = 4 \times 3 = 3 \times 4 = 2 \times 6 = 12$$

$$k = 12$$

$\therefore xy = 12$ is form a smooth curve.

Plot the points (12,1), (6,2), (4,3), (3,4) and (2,6).

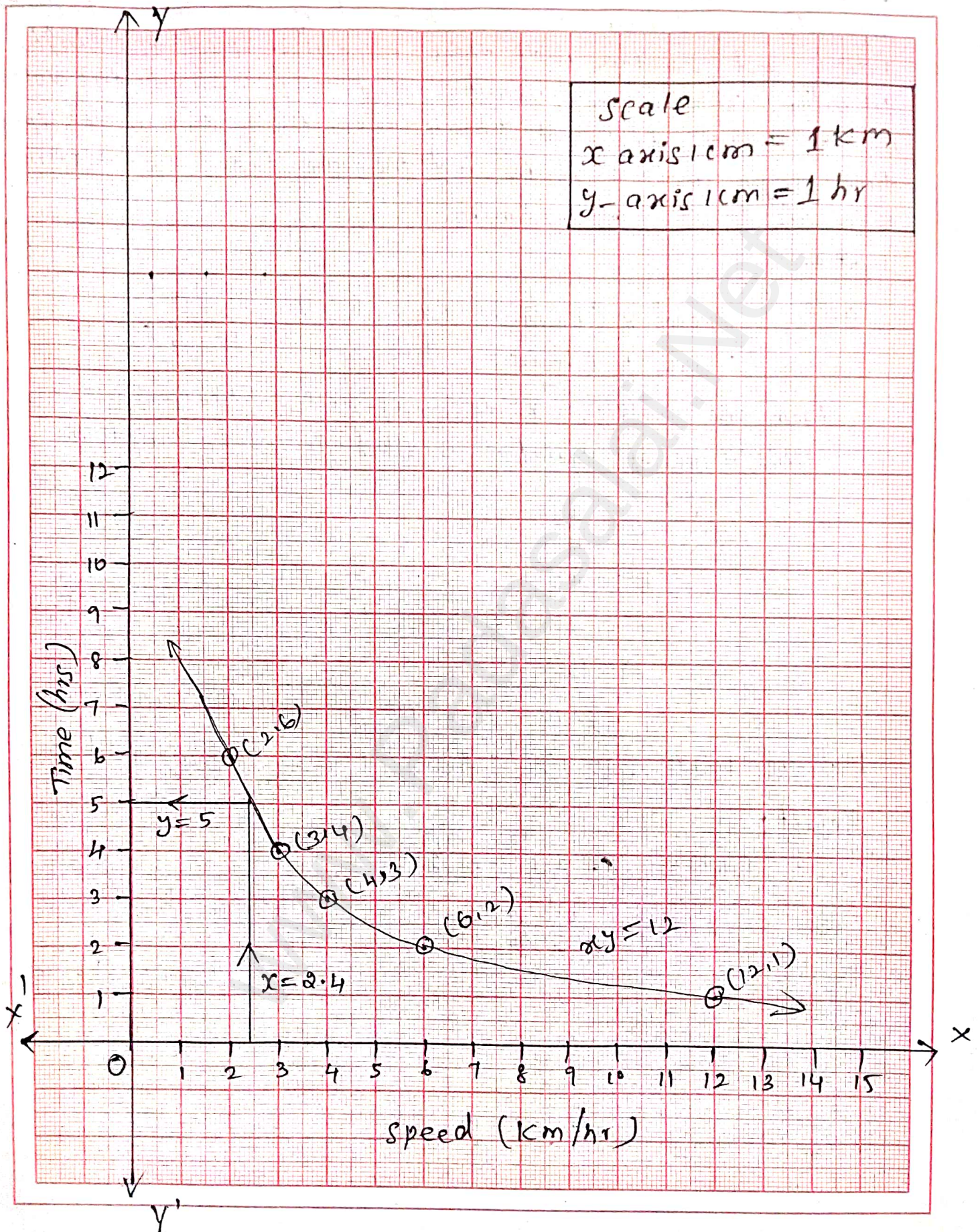
Result:

when $x = 2.4$ km/hr

Time $y = 5$ hrs.

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8.

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?

Solution:

Table

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

From the table, x -increases, y decreases
 This variation is called an inverse variation.

$$\therefore y = \frac{k}{x}$$

$$\Rightarrow xy = k$$

$$k = 40 \times 150 = 50 \times 120 = 60 \times 100 = 75 \times 80$$

$$k = 6000$$

$xy = 6000$ is form a smooth curve.

plot the points (40, 150), (50, 120), (60, 100) and (75, 80)

Results : From the graph

(i) Type of Variation: Inverse variation

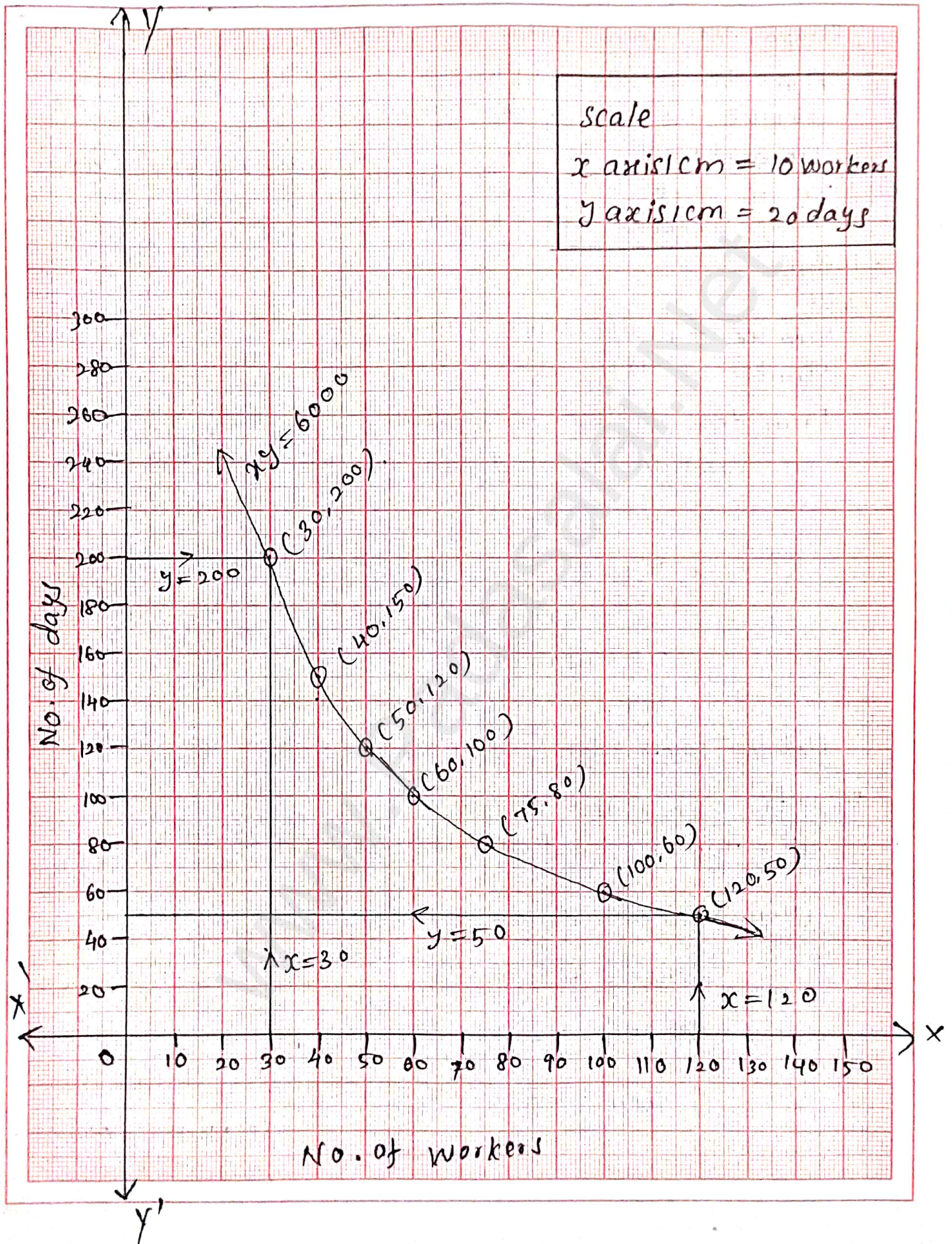
(ii) when $x = 120$ workers

Then $y = 50$ days

(iii) when $y = 200$ days

Then workers $x = 30$ workers.

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9.

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.

Solution:

Table:

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

From the table x -increases and y -decreases

This variation is called inverse variation.

$$\therefore y = \frac{k}{x}$$

$$xy = k$$

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

$$k = 90$$

$xy = 90$ is form a smooth curve.

Plot the points, $(2, 45)$, $(3, 30)$, $(6, 15)$ and $(9, 10)$.

Result:

From the graph,

(i) When $x = 5$ pipes

Then $y = 18$ mins

(ii) When $y = 9$ mins

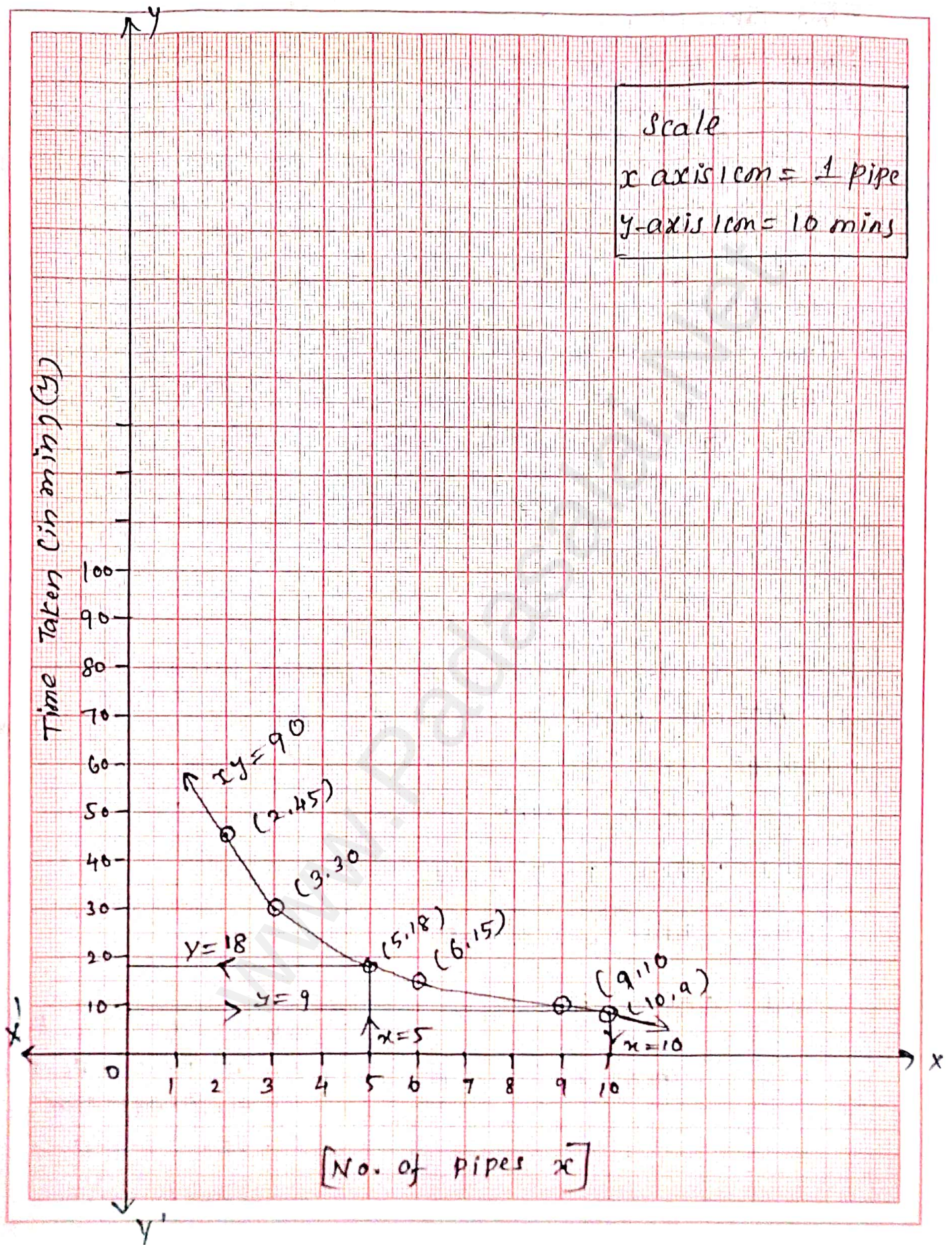
Then $x = 10$ pipes.

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10.

No. of participants (x)	2	4	6	8	10
Amount for each participant ₹(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 participant are 12.

Solution: -

Table:

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

From the table, x -increases, y -decreases

This type of variation is called Inverse variation.

$$\therefore y = \frac{k}{x}$$

$$\Rightarrow xy = k$$

$$k = xy$$

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

$$k = 360$$

 $\therefore xy = 360$ is form a smooth curve.

Plot the points (2, 180), (4, 90), (6, 60), (8, 45) and (10, 36).

Result:From the graph.(i) Constant of variation $k = 360$ (ii) when $x = 12$ participant

$$y = ₹ 30.$$

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