CHAPTER 13

VIII CLASS-NCERT (2024-25)
INTRODUCTION TO GRAPHS (Notes)

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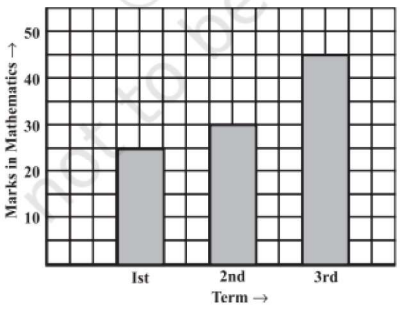
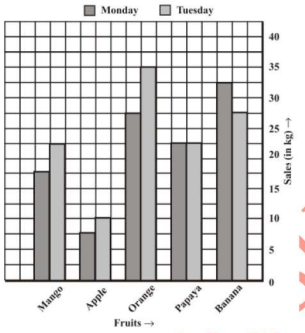
https://sureshmathsmaterial.com

1. A Bar graph:

A bar graph is used to show comparison among categories. It may consist of two or more parallel vertical (or horizontal) bars (rectangles).

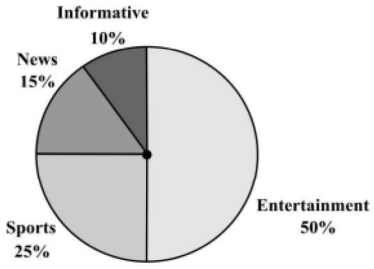




Bar graphs can also have double bars. This graph gives a comparative.

2. A Pie graph (or a circle-graph) :

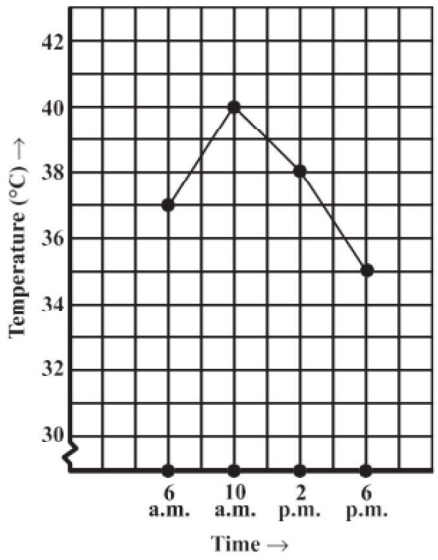
A pie-graph is used to compare parts of a whole. The circle represents the whole



3. A line graph:

A line graph displays data that changes continuously over periods of time.

Time	6 a.m.	10 a.m.	2 p.m.	6 p.m.
Temperature(°C)	37	40	38	35

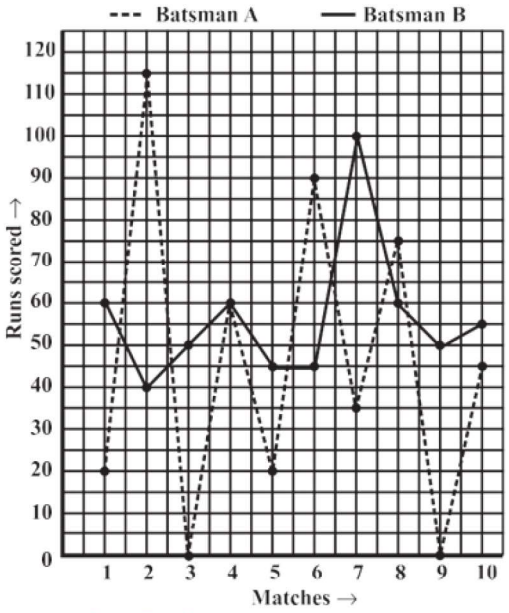


Example 1: (A graph on "performance") The given graph (Fig 15.7) represents the total runs scored by two batsmen A and B, during each of the ten different matches in the year 2007. Study the graph and answer the following questions.

(i) **What information is given on the two axes?**

Sol: On X-axis: The matches played during the year 2007

On Y-axis: The total runs scored in each match.



(ii) **Which line shows the runs scored by batsman A?**

Sol: The dotted line shows the runs scored by Batsman A.

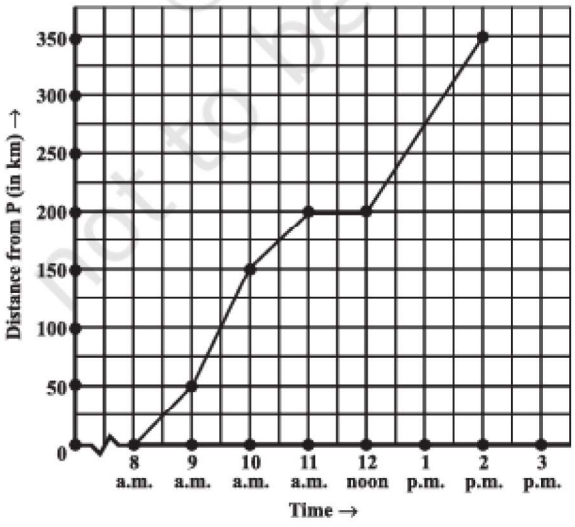
(iii) **Were the run scored by them same in any match in 2007? If so, in which match ?**

Sol: During the 4th match, both have scored the same number of 60 runs (Graphs intersecting point)

(iii) **Among the two batsmen, who is steadier? How do you judge it?**

Sol: Batsman A has one great "peak" but many deep "valleys". He does not appear to be consistent. B, on the other hand has never scored below a total of 40 runs, even though his highest score is only 100 in comparison to 115 of A. Also A has scored a zero in two matches and in a total of 5 matches he has scored less than 40 runs. Since A has a lot of ups and downs, B is a more consistent and reliable batsman.

Example 2: The given graph describes the distances of a car from a city P at different times when it is travelling from City P to City Q, which are 350 km apart. Study the graph and answer the following:



(i) **What information is given on the two axes?**

Sol: On X-axis: Time

On Y axis: The distance of the car from City P.

(ii) **From where and when did the car begin its journey?**

Sol: The car started from City P at 8 a.m

(iii) **How far did the car go in the first hour?**

Sol: The car travelled 50 km during the first hour.

(iv) **How far did the car go during**

(a) **The 2nd hour?**

Sol: $150 - 50 = 100km$

(ii) **The 3rd hour?**

Sol: $200 - 150 = 50km$

(v) **Was the speed same during the first three hours? How do you know it?**

Sol: Speed in 1st hour $= \frac{50}{1} = 50km/h$

Speed in 2nd hour $= \frac{100}{1} = 100km/h$

Speed in 3rd hour $= \frac{50}{1} = 50km/h$

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

We find that the speed of the car was not the same all the time.

(vi) Did the car stop for some duration at any place? Justify your answer.

Sol: No distance covered during the period 11a.m to 12 noon .

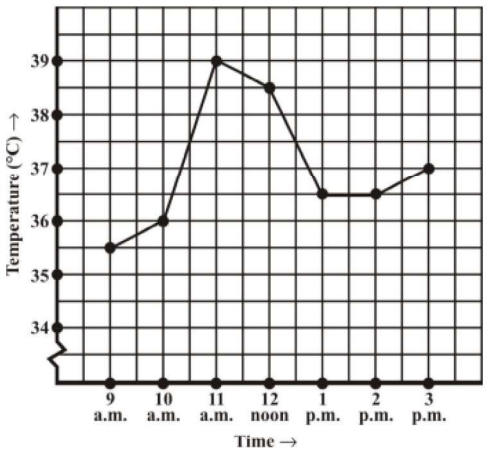
This shows that the car did not travel during the interval 11 a.m. to 12 noon.

(vii) When did the car reach City Q?

Sol: The car reached City Q at 2 p.m.

EXERCISE 13.1

1. The following graph shows the temperature of a patient in a hospital, recorded every hour.



(a) What was the patient's temperature at 1 p.m. ?

Sol: 36.5^{0}C

(b) When was the patient's temperature 38.5° C?

Sol: 12 noon.

(c) The patient's temperature was the same two times during the period given. What were these two times?

Sol: 1 pm and 2 pm (36.5^{0}C)

(d) What was the temperature at 1.30 p.m.? How did you arrive at your answer?

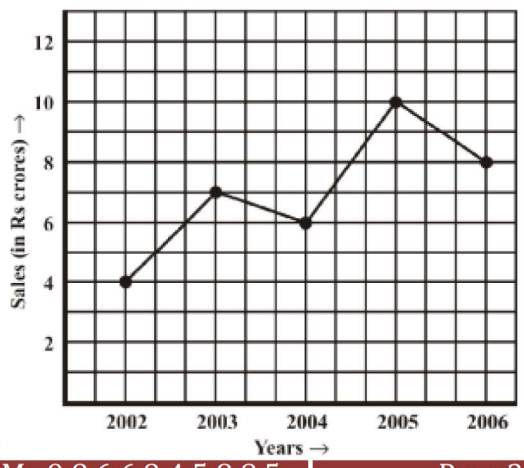
Sol: The temperature from 1 pm to 2 pm is 36.5^{0}C.

So, the temperature at 1:30 pm is 36.5^{0}C .

(e) During which periods did the patients' temperature showed an upward trend?

Sol: During 9 am to 10 am, 10 am to 11 am and 2 pm to 3 pm, the patient's temperature showed an upward trend.

2. The following line graph shows the yearly sales figures for a manufacturing company.



(a) What were the sales in (i) 2002 (ii) 2006?

Sol: (i) The sales in 2002 is Rs 4 crores

(ii) The sales in 2006 is Rs 8 crores

(b) What were the sales in (i) 2003 (ii) 2005?

Sol: (i) The sales in 2003 is Rs 7 crores

(ii) The sales in 2005 is Rs 10 crores

(c) Compute the difference between the sales in 2002 and 2006.

Sol: Difference between the sales in 2002 and 2006

=8 crores−4 crores= Rs 4 crores

(d) In which year was there the greatest difference between the sales as compared to its previous year?

Sol: Difference between the sales of the year

2002 and 2003 = Rs (7 − 4) crores= Rs 3 crores

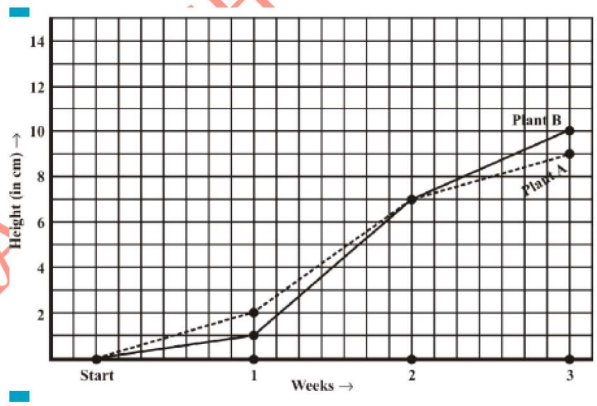
2003 and 2004 = Rs (7 − 6) crores= Rs 1 crore

2004 and 2005 = Rs (10 − 6) crores= Rs 4 crores

2005 and 2006 = Rs (10 − 8) crores= Rs 2 crores

The difference was the maximum in the year 2005 as compared to its previous year 2004 .

3. For an experiment in Botany, two different plants, plant A and plant B were grown under similar laboratory conditions. Their heights were measured at the end of each week for 3 weeks. The results are shown by the following graph.



(a) How high was Plant A after (i) 2 weeks (ii) 3 weeks?

Sol: (i) The height of Plant A after 2 weeks= 7cm

(ii) The height of Plant A after 3 weeks= 9cm

(b) How high was Plant B after (i) 2 weeks (ii) 3 weeks?

Sol: (i) The height of Plant B after 2 weeks= 7cm

(ii) The height of Plant B after 3 weeks= 10cm

(c) How much did Plant A grow during the 3rd week?

Sol: Growth of plant A during the third week=9cm−7cm=2cm.

(d) How much did Plant B grow from the end of the 2nd week to the end of the 3rd week?

Sol: Growth of plant B from the end of the 2nd week to the end of the 3rd week

= 10 cm − 7 cm = 3 cm

(e) During which week did Plant A grow most?

Sol: Growth of plant A during

1st week=2cm−0=2cm

2nd week=7cm−2cm=5cm

3rd week=9cm−7cm=2cm

Therefore, plant A grew the most is 5 cm, during the 2nd week.

(f) During which week did Plant B grow least?

Sol: Growth of plant B during

1st week=1cm−0=1cm

2^{nd} week=7cm−1cm=6cm

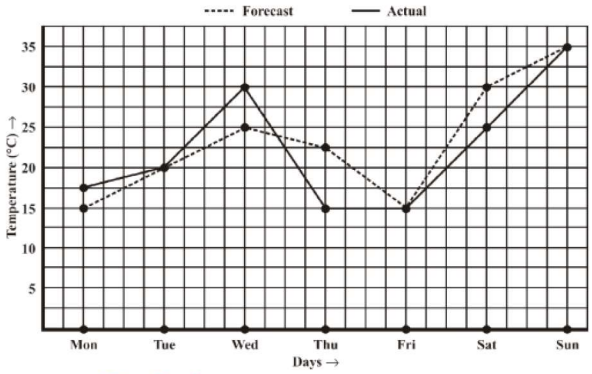
3^{rd} week=10cm−7cm=3cm

Therefore, plant B grew the least is 1 cm, during the 1^{st} week

(g) **Were the two plants of the same height during any week shown here? Specify**

Sol: At the end of the 2nd week, the heights of both plants were same i.e. 7 cm.

4. **The following graph shows the temperature forecast and the actual temperature for each day of a week.**



(a) **On which days was the forecast temperature the same as the actual temperature?**

Sol: Tuesday, Friday and Sunday.

(b) **What was the maximum forecast temperature during the week?**

Sol: 35^0C

(c) **What was the minimum actual temperature during the week?**

Sol: 15^0C

(d) **On which day did the actual temperature differ the most from the forecast temperature?**

Sol: On Thursday.

5. **Use the tables below to draw linear graphs.**

(a) **The number of days a hill side city received snow in different years.**

Year	2003	2004	2005	2006
Days	8	10	5	12

Sol:

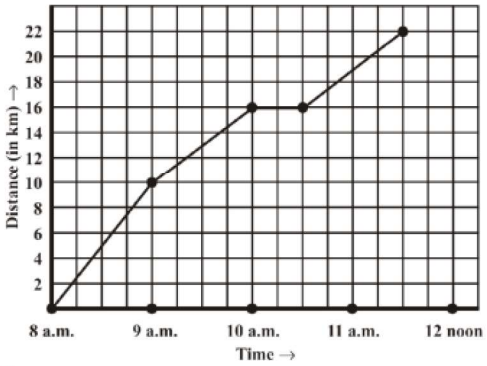
(b) **Population (in thousands) of men and women in a village in different years.**

Year	2003	2004	2005	2006	2007
Number of Men	12	12.5	13	13.2	13.5
Number of Women	11.3	11.9	13	13.6	12.8

6. **A courier-person cycles from a town to a neighbouring suburban area to deliver a parcel to a merchant. His distance from the town at different times is shown by the following graph.**

(a) **What is the scale taken for the time axis?**

Sol: On time axis(X-axis) : 4Units=1 hour.



(b) **How much time did the person take for the travel?**

Sol: 8 a.m to 11.30 a.m=$11.30 - 8 = 3.30 = 3\frac{1}{2}$ *hours*

(c) **How far is the place of the merchant from the town?**

Sol: 22 km

(d) **Did the person stop on his way? Explain.**

Sol: Yes, the person stopped on his way from 10 a.m. to 10: 30 a.m

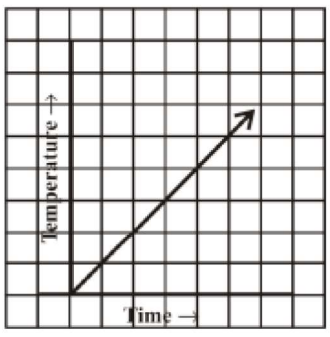
(e) **During which period did he ride fastest?**

Sol: The person maximum distance travelled in time period 8 a.m to 9 a.m.

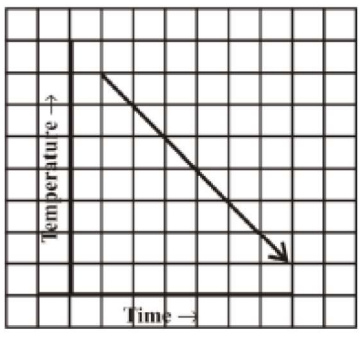
Thus, the person's ride was the fastest between 8 a.m. and 9 a.m.

7. **Can there be a time-temperature graph as follows? Justify your answer**

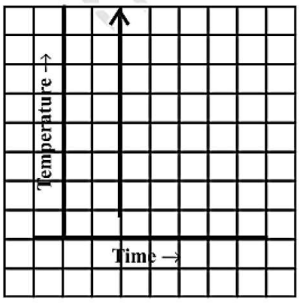
(i)



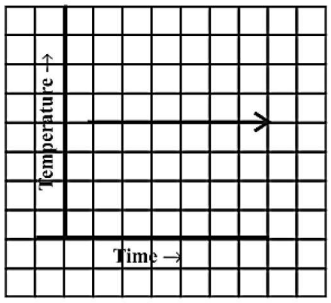
(ii)



(iii)



(iv)



(i) The temperature can increase with the increase in time. (Direct proportional)

(ii) The temperature can decrease with the decrease in time. (Direct proportional)

(iii) Temperature changes at the same time. The graph is not possible.

(iv) Same temperature in different times. (Temperature is constant)

THINK, DISCUSS AND WRITE:

The number of litres of petrol you buy to fill a car's petrol tank will decide the amount you have to pay. Which is the independent variable here? Think about it

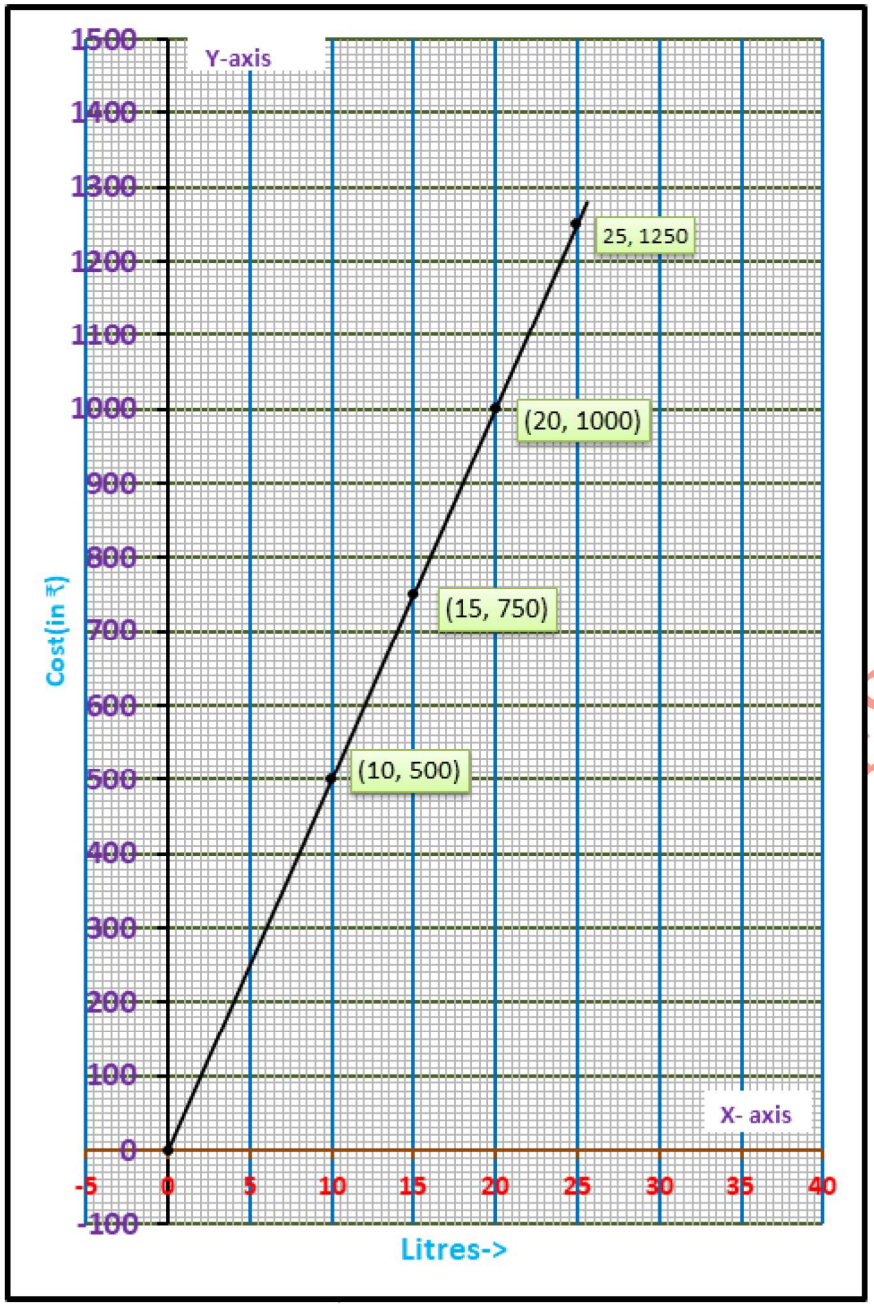
Sol: The amount money linked with the quantity of petrol.

So, the number of litres of petrol is independent variable.

Example 3: (Quantity and Cost) The following table gives the quantity of petrol and its cost.

No. of Litres of petrol	10	15	20	25
Cost of petrol in `	500	750	1000	1250

Plot a graph to show the data.



TRY THESE

In the above example, use the graph to find how much petrol can be purchased for ₹800.

Sol: 16 litres

Example 4: (Principal and Simple Interest)

A bank gives 10% Simple Interest (S.I.) on deposits by senior citizens. Draw a graph to illustrate the relation between the sum deposited and simple interest earned. Find from your graph

(a) The annual interest obtainable for an investment of ₹ 250.

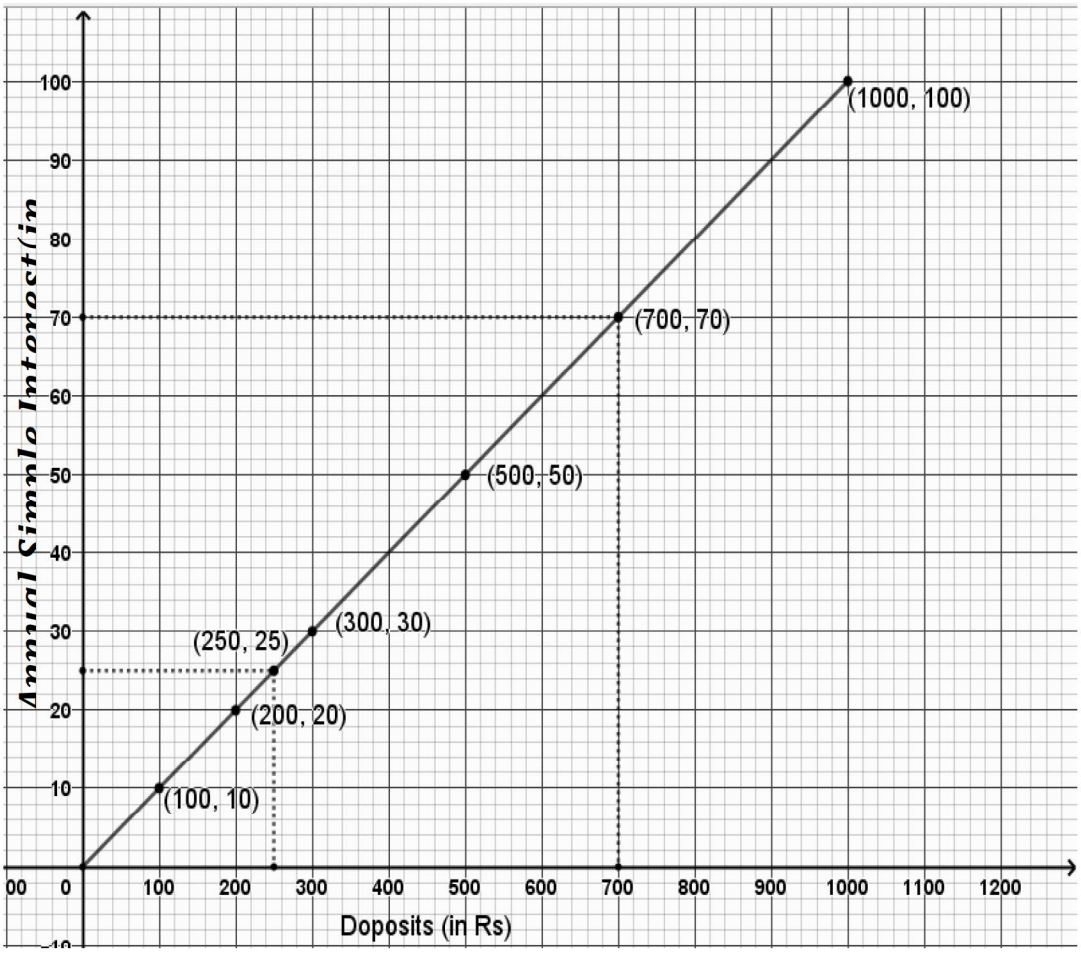
(b) The investment one has to make to get an annual simple interest of ₹70.

Sol:

Sum deposited(P)	Simple interest for a year($I = \frac{P \times T \times R}{100}$)	Point (P, I)(In ₹)

₹100	$\frac{100 \times 1 \times 10}{100} = 10$	(100,10)
₹ 200	$\frac{200 \times 1 \times 10}{100} = 20$	(200,20)
₹ 300	$\frac{300 \times 1 \times 10}{100} = 30$	(300,30)
₹ 500	$\frac{500 \times 1 \times 10}{100} = 50$	(500,50)
₹ 1000	$\frac{1000 \times 1 \times 10}{100} = 100$	(1000,100)

Scale : 1 unit = ₹ 100 on horizontal axis; 1 unit = ₹ 10 on vertical axis.



(a) Corresponding to₹ 250 on horizontal axis, we get the interest to be ₹ 25 on vertical axis.

(b) Corresponding to ₹ 70 on the vertical axis, we get the sum to be ₹700 on the horizontal axis

Example 5: (Time and Distance) Ajit can ride a scooter constantly at a speed of 30 kms/hour. Draw a time-distance graph for this situation. Use it to find (i) the time taken by Ajit to ride 75 km. (ii) the distance covered by Ajit in $3\frac{1}{2}$hours.

Sol:

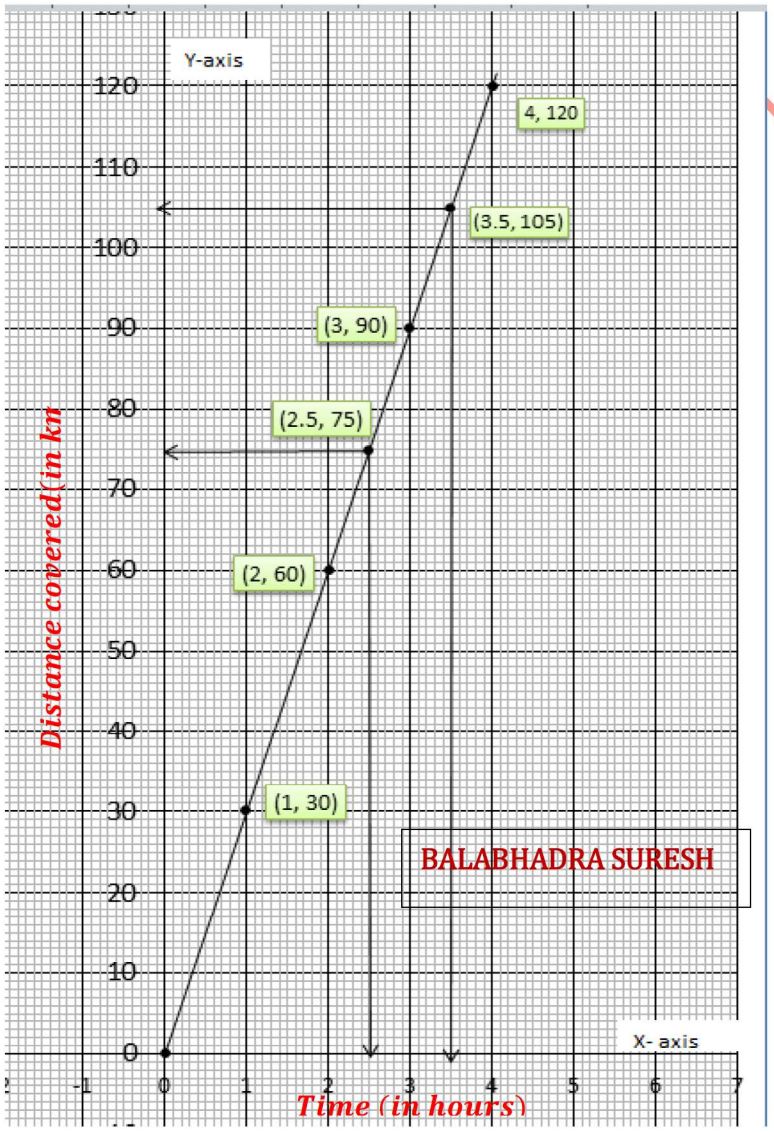
Hours of ride	Distance covered (d=t×s)	Point(t,d)
1 hour	30 km	(1,30)
2 hour	2×30 km=60 km	(2,60)
3 hour	3×30 km=90 km	(3,90)
4 hour	4×30 km=120 km	(4,120)

Scale: On X-axis (Horizontal): 2 units=1 hour

On Y-axis (Vertical): 1 unit=10 km

(a) Corresponding to 75 km on the vertical axis, we get the time to be 2.5 hours on the horizontal axis. Thus 2.5 hours are needed to cover 75 km.

(b) Corresponding to $3\frac{1}{2}$ hours on the horizontal axis, the distance covered is 105 km on the vertical axis.



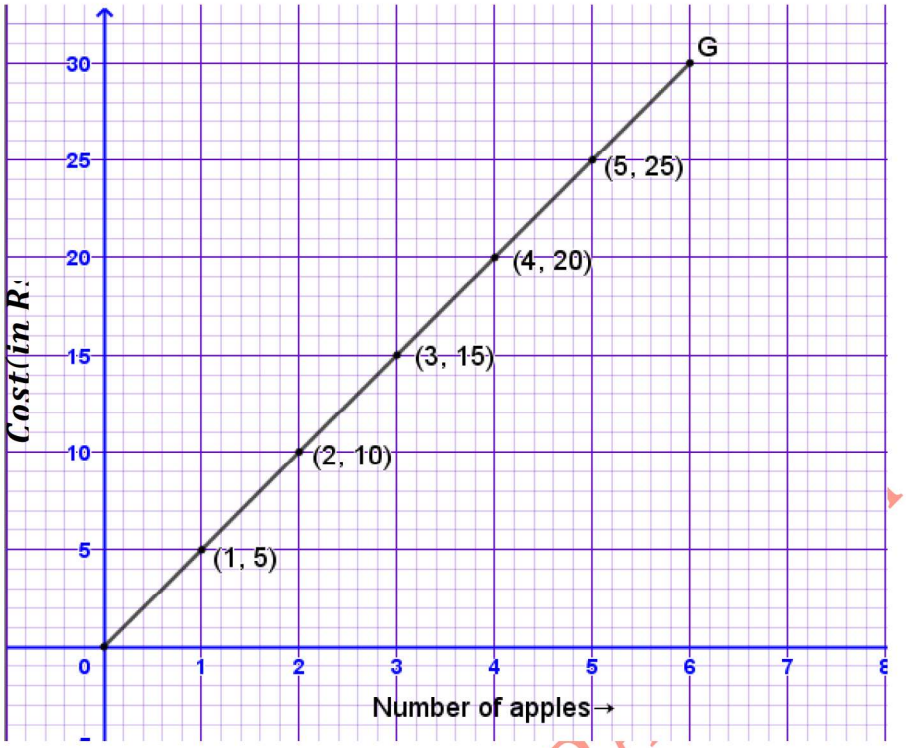
EXERCISE 13.2

1. Draw the graphs for the following tables of values, with suitable scales on the axes

(a) Cost of apples

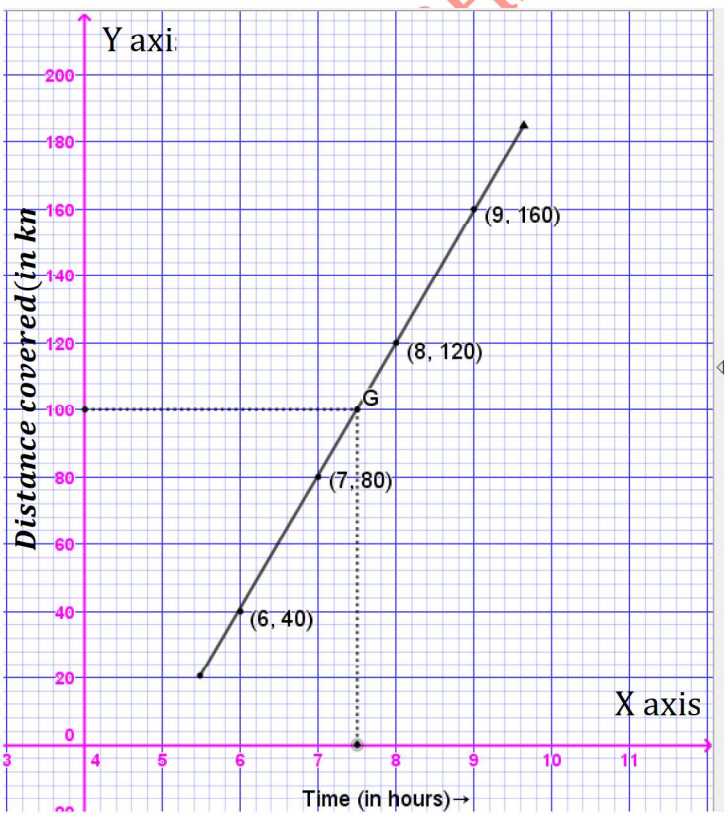
Number of apples	1	2	3	4	5
Cost (in ₹)	5	10	15	20	25

Scale: On X-axis 1 cm=1 apple and on Y-axis 1 cm=₹5



(b) **Distance travelled by a car**

Time (in hours)	6 a.m	7 a.m	8 a.m	9 a.m
Distances (in km)	40	80	120	160



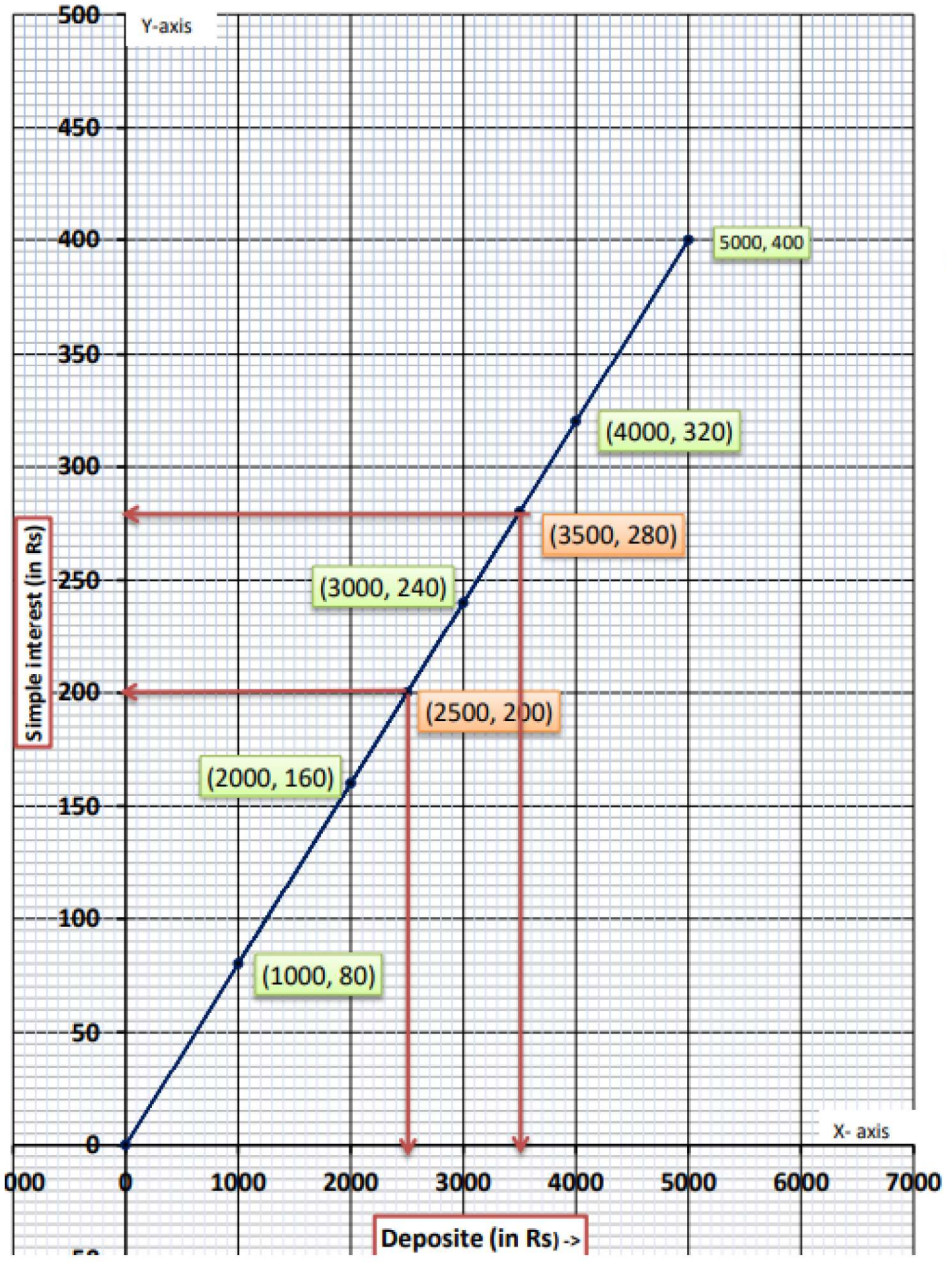
Scale: (In regular graph 1 unit=1 cm)
On X-axis (Horizontal): 1 units=1 hour
On Y-axis (Vertical): 1 unit=20 km

(a) During the period 7:30 am to 8 am, the car covered a distance of 20 km.(120-100)

(b) Corresponding to 100 km on the vertical axis 7.30 am hours on the horizontal axis .
So, the car covered a distance of 100 km at 7:30 am since its start.

(c) **Interest on deposits for a year**

Deposit (in `)	1000	2000	3000	4000	5000
Simple Interest (in `)	80	160	240	320	400



(i) **Does the graph pass through the origin?**

Sol: Yes

(ii) **Use the graph to find the interest on ₹ 2500 for a year.**

Sol: From the graph the interest on ₹ 2500 for a year is 200

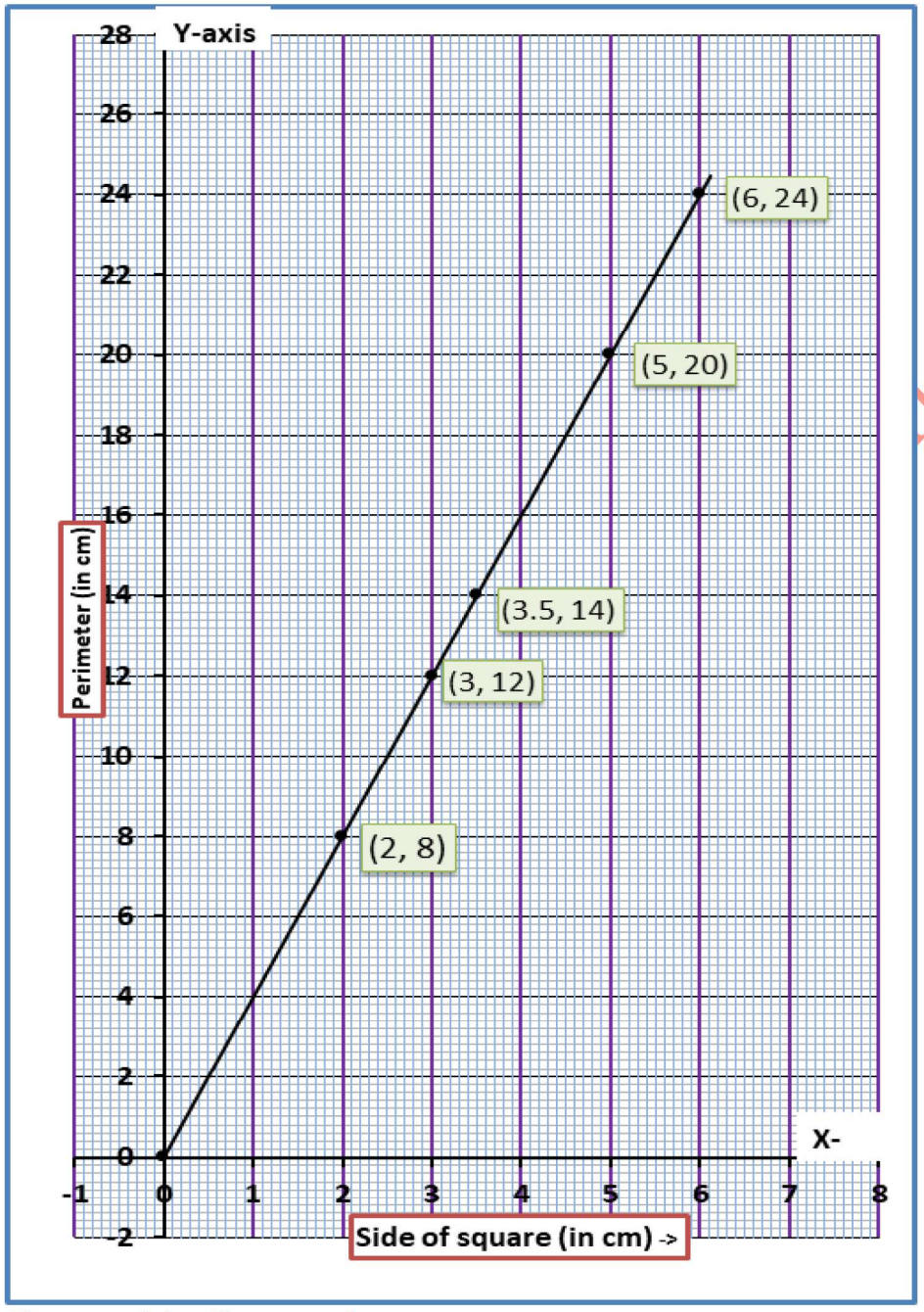
(iii) **To get an interest of ₹280 per year, how much money should be deposited?**

Sol: To get an interest of ₹ 280 per year, ₹ 3500 should be deposited.

2. **Draw a graph for the following**

(i)

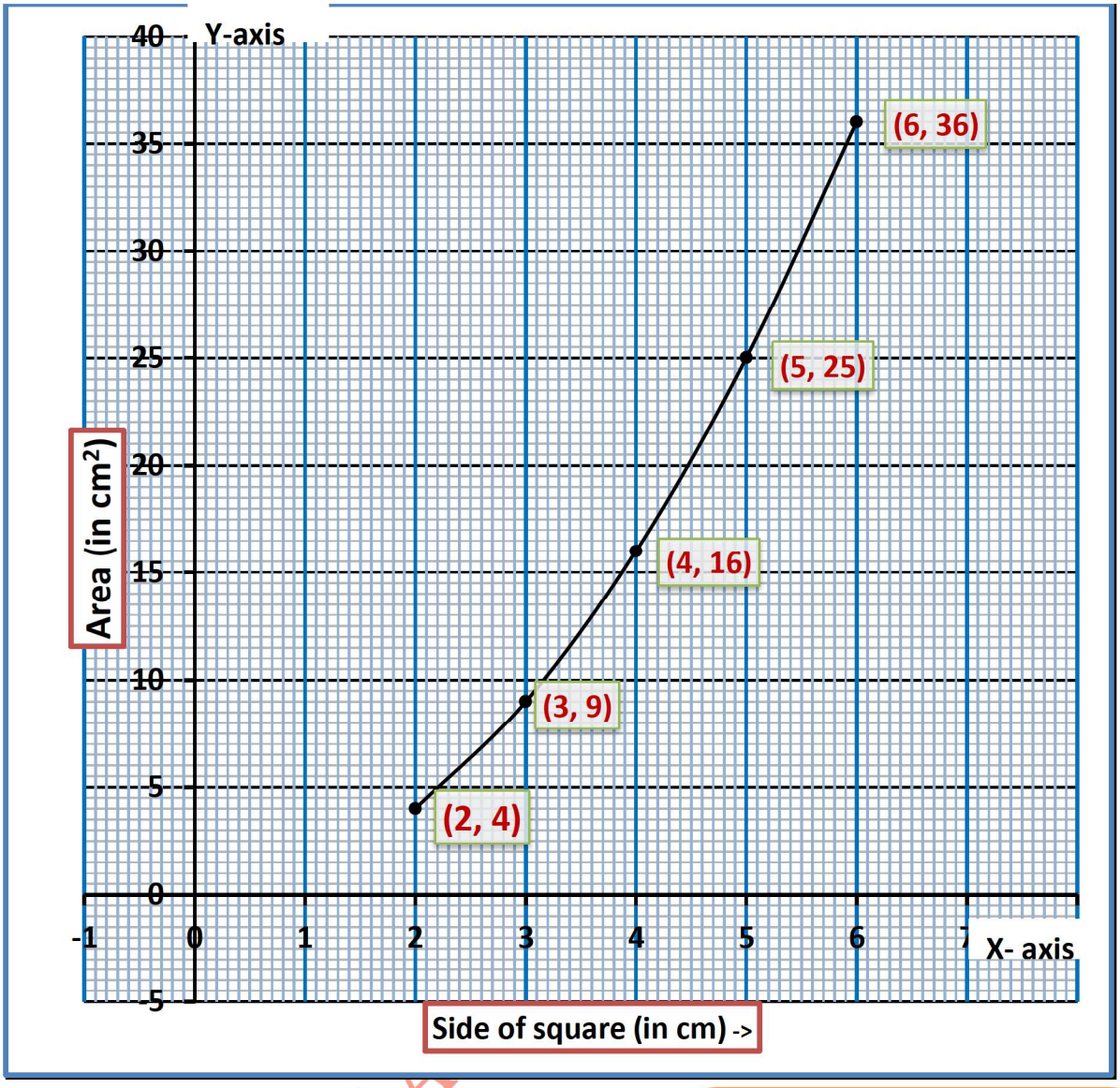
Side of square (in cm)	2	3	3.5	5	6
Perimeter (in cm)	8	12	14	20	24



Given graph is a linear graph.

(ii)Area=side×side

Side of square (in cm)	2	3	4	5	6
Area (in cm^2)	4	9	16	25	36



Given graph not a linear graph.