15 Introduction to Graphs

Learn and Remember

1. Graphical presentation of data is easier to understand.
2. A line graph consists of bits of line segments joined consecutively and contains a straight or unbroken line. Such a graph is called a **linear graph.**
3. A dot is a point without having length, breadth or thickness.
4. In 17th century, a mathematician Rene Descartes noticed the movements of an insect near a corner of the ceiling. Since then, he started to think of determining the position of a given point in a plane. His system of fixing a point with the help of two measurements, vertical and horizontal, came to be known as Cartesian system in his honour.
5. **A bar graph** is used to show comparision among categories.
6. **A pie graph** is used to compare parts of a whole.
7. **A historgram** is a bar graph that shows data in intervals.
8. **A line graph** displays data that changes continuously over periods of time.
9. A line graph which is a whole unbroken line is called a linear graph.
10. For fixing a point on the graph sheet, we need x-coordinate and y-coordinate.
11. The relation between dependent variable and independent variable is shown through a graph.
12. A graph obtained by joining the plotted points is called a line and such graphs are known as linear graphs.
13. A horizontal line and a vertical line intersecting at a point is known as x-axis and y-axis respectively.

TEXTBOOK QUESTIONS SOLVED

EXERCISE 15.1 *(Page-236-239)*

Q1. The following graph shows the temperature of a patient in a hospital, recorded every hour.

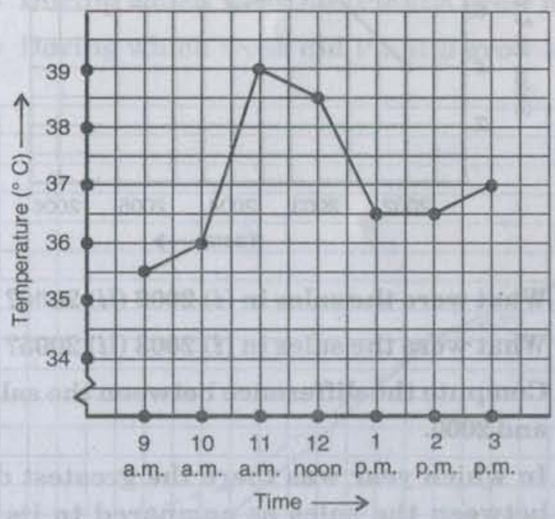
(a) What was the patient's temperature at 1 p.m.?

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

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

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

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



Sol. (a) The patient's temperature was 36.5° C at 1 p.m. .

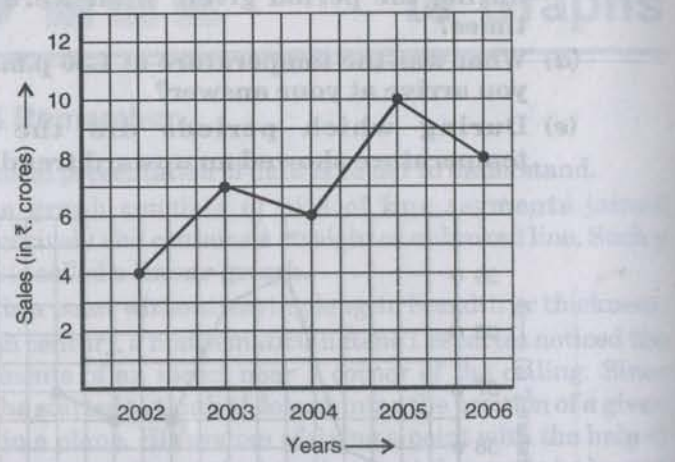
(b) The patient's temperature was 38.5° C at 12 noon.

(c) The patient's temperature was the same at 1 p.m. and 2 p.m. .

(d) The temperature at 1.30 p.m. is 36.5° C. The point between 1 p.m. and 2 p.m. x-axis is equidistant from the two points showing 1 p.m. and 2 p.m. So, it will represent 1.30 p.m. Similarly, the point on the y-axis, between 36°C and 37°C will represent 36.5°C.

(e) The patient's temperature showed an upward trend from 9 a.m. to 11 a.m. .

Q2. The following line graph shows the yearly sales figure for a manufacturing company.



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

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

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

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

Sol. (*a*) The sales in

(*i*) 2002 was ₹ 4 crores and in (*ii*) 2006 was ₹ 8 crores.

(*b*) The sales in

(*i*) 2003 was ₹ 7 crores and in (*ii*) 2005 was ₹ 10 crores.

(*c*) The difference of sales in 2002 and 2006 = ₹ 8 crores – ₹ 4 crores = ₹ 4 crores.

(*d*) In the year 2005 there was the greatest difference between the sales as compared to its previous year, which is (₹ 10 crores – ₹ 6 crores) ₹ 4 crores.

Q3. 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?

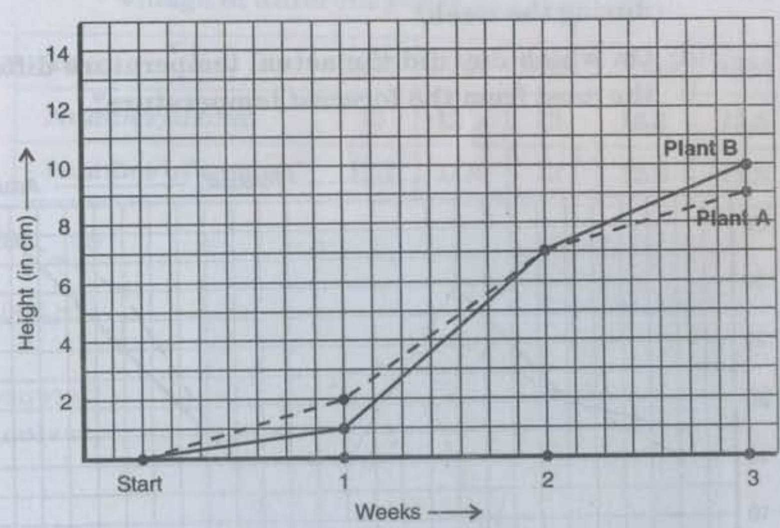
(*b*) How high was Plant B after (*i*) 2 weeks (*ii*) 3 weeks?

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

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

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

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



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

Sol. (*a*) (*i*) The plant A was 7 cm high after 2 weeks and (*ii*) after 3 weeks it was 9 cm high.

(*b*) (*i*) Plant B was also 7 cm high after 2 weeks and (*ii*) after 3 weeks it was 10 cm high.

(*c*) Plant A grew = 9 cm – 7 cm = 2 cm during 3rd week.

(*d*) Plant B grew during end of the 2nd week to the end of the 3rd week = 10 cm – 7 cm = 3 cm.

(*e*) Plant A grew the highest during second week.

(*f*) Plant B grew the least during first week.

(*g*) At the end of the second week, plant A and B were of the same height.

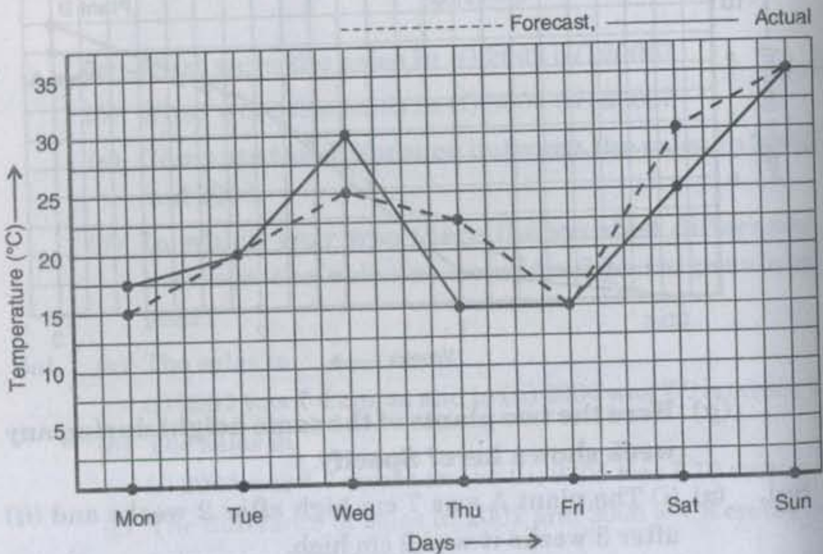
Q4. The following graph shows the temperature forecast and the actual temperature for each day of a week.

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

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

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

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



Sol. (*a*) On Tuesday, Friday and Sunday, the forecast temperature was same as the actual temperature.

(*b*) The maximum forecast temperature was 35°C.

(*c*) The minimum actual temperature was 15°C.

(*d*) The actual temperature differed the most from the forecast temperature on Thursday.

Q5. Use the tables below to draw linear graphs.

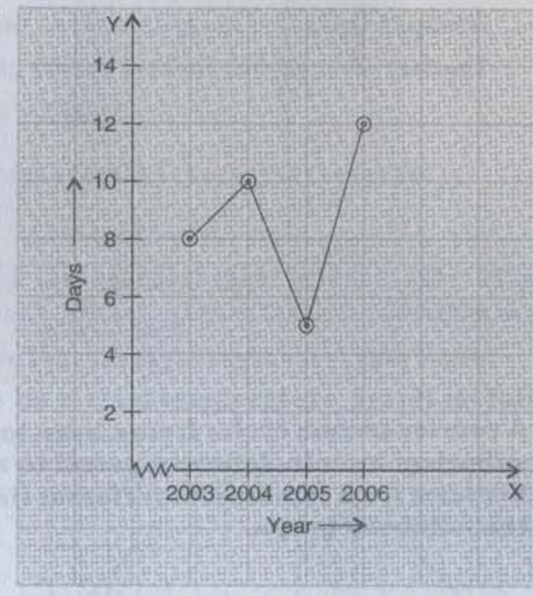
(*a*) The number of days a hill side city received snow in different years.

Year	2003	2004	2005	2006
Days	8	10	5	12

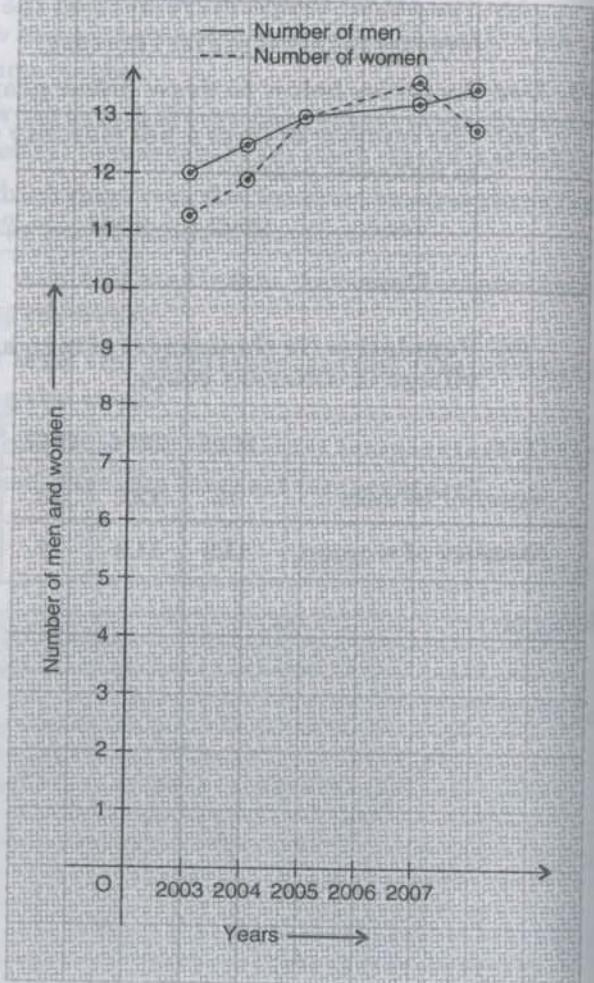
(*b*) Population (in thousands) of men and women in a village in different years.

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

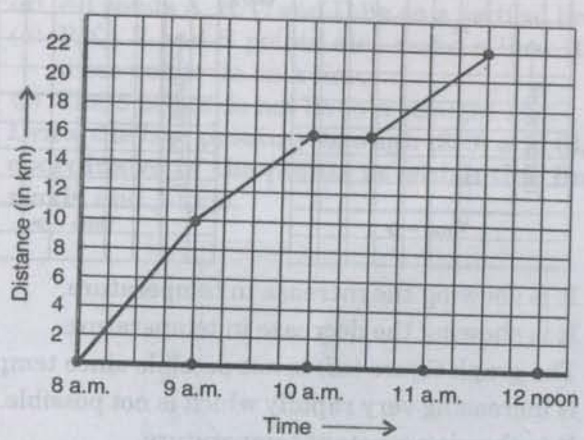
Sol. (*a*)



(b)



Q6. 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?

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

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

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

(e) During which period did he ride fastest?

Sol. (a) 4 units = 1 hour.

(b) The person took $3\frac{1}{2}$ hours for the travel.

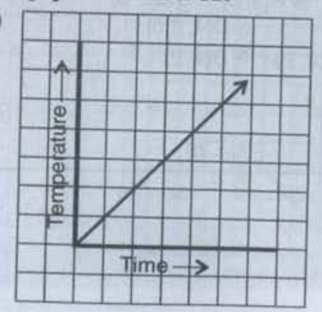
(c) It was 22 km far from the town.

(d) Yes, this has been indicated by the horizontal part of the graph. He stayed from (10 a.m. – 10.30 a.m.)

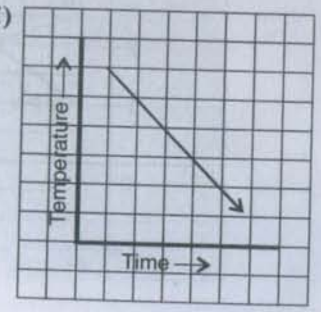
(e) He rode the fastest between 8 a.m. and 9 a.m. .

Q7. Can there be a time-temperature graph as follows? Justify your answer.

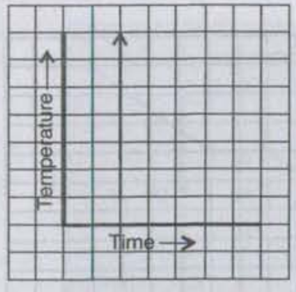
(i)



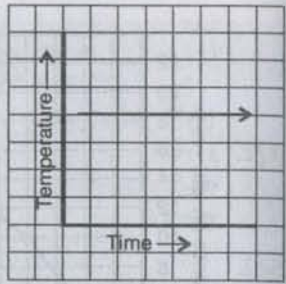
(ii)



(*iii*)



(*iv*)



Sol. (*i*) It is showing the increase in temperature.

(*ii*) It is showing the decrease in temperature.

(*iii*) The graph figure (*iii*) is not possible since temperature is increasing very rapidly which is not possible.

(*iv*) It is showing constant temperature.

EXERCISE 15.2 (*Page –243*)

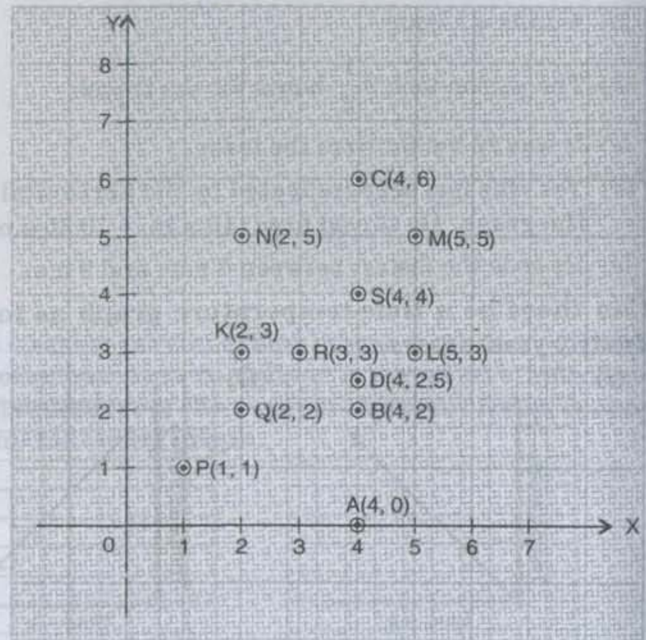
Q1. Plot the following points on a graph sheet. Verify if they lie on a line

(*a*) A(4, 0), B(4, 2), C(4, 6), D(4, 2.5)

(*b*) P(1, 1), Q(2, 2), R(3, 3), S(4, 4)

(*c*) K(2, 3), L(5, 3), M(5, 5), N(2, 5)

Sol.



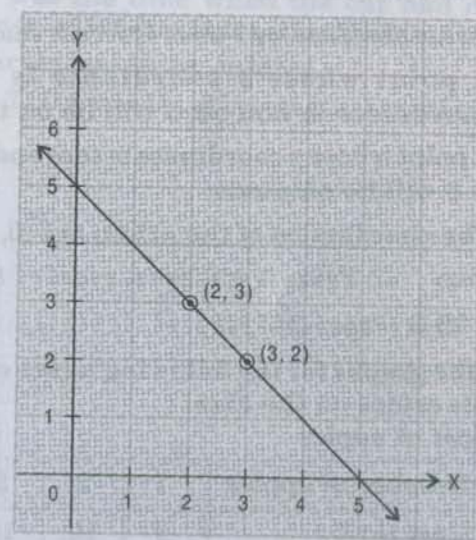
(*a*) All points A, B, C and D lie on a vertical line.

(*b*) P, Q, R and S points also make a line. It verifies that these points lie on a line.

(*c*) These points do not lie in a straight line.

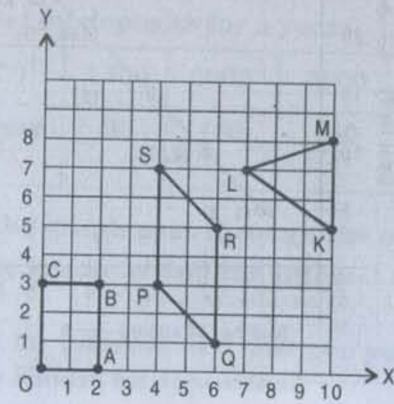
Q2. Draw the line passing through (2, 3) and (3, 2). Find the coordinates of the points at which this line meets the *x*-axis and *y*-axis.

Sol.



The coordinates of the points at which this line meets the *x*-axis at (5, 0) and *y*-axis at (0, 5).

Q3. Write the coordinates of the vertices of each of these adjoining figures.



Sol. Vertices of figure OABC

O(0, 0), A(2, 0), B(2, 3), C(0, 3)

Vertices of figure PQRS

P(4, 3), Q(6, 1), R(6, 5), S(4, 7)

Vertices of figure LMK

L(7, 7), M(10, 8), K(10, 5)

Q4. State whether True or False. Correct that are false.

(*i*) A point whose x coordinate is zero and y-coordinate is non-zero will lie on the y-axis.

(*ii*) A point whose y coordinate is zero and x-coordinate is 5 will lie on y-axis.

(*iii*) The coordinates of the origin are (0, 0).

Sol. (*i*) True (*ii*) False, it will lie on x-axis (*iii*) True.

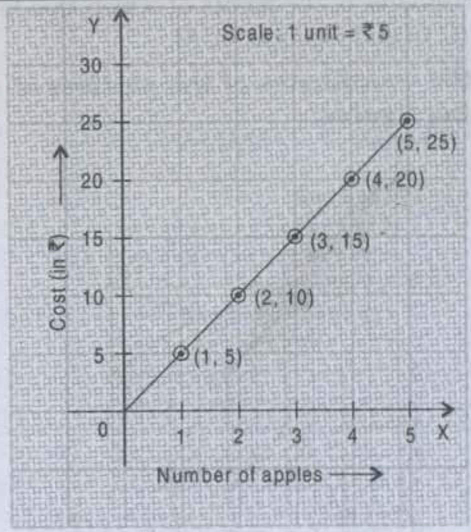
EXERCISE 15.3 (*Page –247-248*)

Q1. 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

Sol.



(*b*) Distance travelled by a car

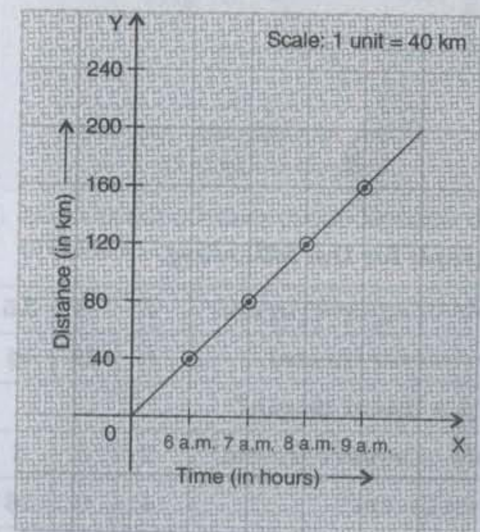
Time (in hours)	6 a.m.	7 a.m.	8 a.m.	9 a.m.
Distances (in km)	40	80	120	160

(*i*) How much distance did the car cover during the period 7.30 a.m. to 8 a.m.?

(*ii*) What was the time when the car had covered a distance of 100 km since it's start?

Sol. (*i*) The car covered 20 km distance.

(*ii*) It was 7.30 a.m. when it covered 100 km distance.



(*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?

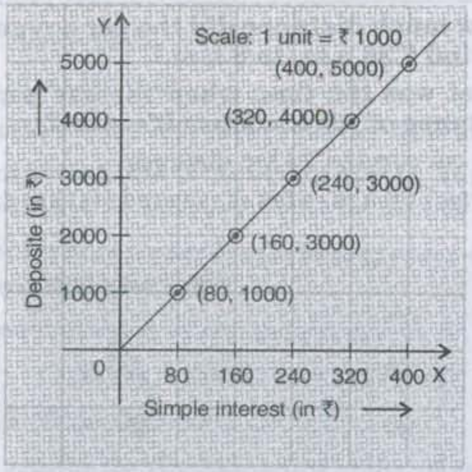
(*ii*) Use the graph to find the interest on ₹ 2500 for a year.

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

Sol. (*c*) (*i*) Yes, the graph passes through the origin.

(*ii*) Interest on ₹ 2500 is ₹ 200 for a year.

(*iii*) ₹ 3500 should be deposited for interest of ₹ 280.



Q2. 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

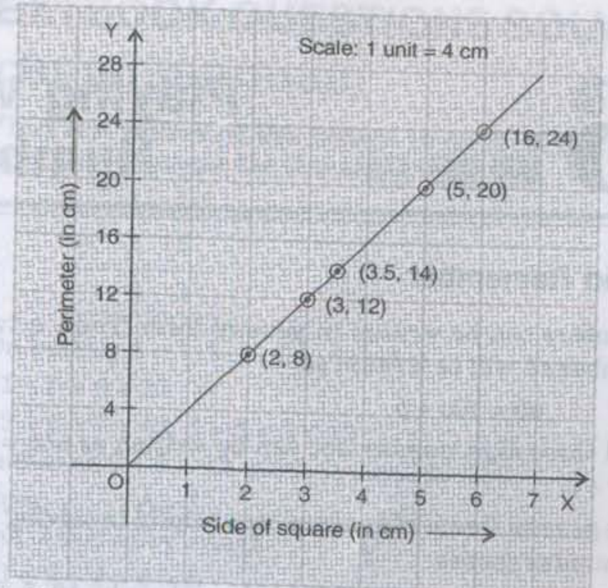
Is it a linear graph?

(*ii*)

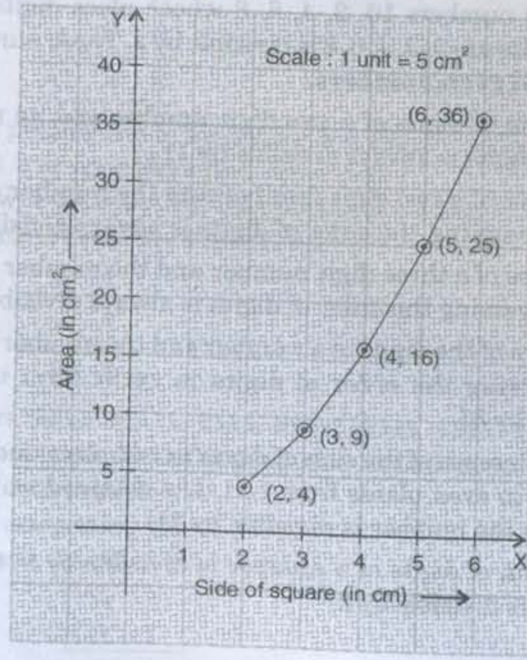
Side of square (in cm)	2	3	4	5	6
Area (in cm^2)	4	9	16	25	36

Is it a linear graph?

Sol. (*i*) Yes, it is a linear graph.



(*ii*) No, it is not a linear graph because the graph does not provide a straight line.



□□