

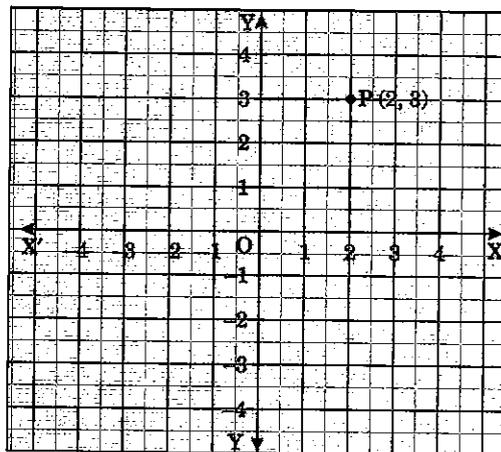
Introduction to Graphs

Understanding the Lesson

- Drawing of Line Graph (Linear Graph).
- Location of a point on a graph paper.
- To define the coordinates of point.

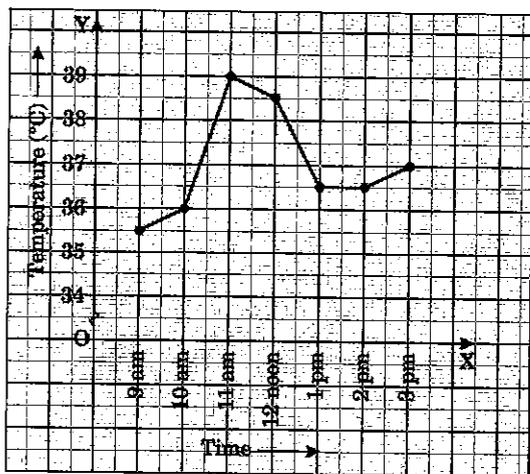
Conceptual Facts

- XOX' and YOY' taken together are called coordinate axes.
- The plane containing the coordinate axes is called cartesian plane.
- The point of intersection of the coordinate axes is called origin.
- The x -coordinate is always written before y -coordinate e.g., if 2 is x -coordinate and 3 is y -coordinate, then the coordinates are (2, 3).
- The x -coordinate of a point lying on y -axis is zero.
- The y -coordinate of a point lying on x -axis is zero.
- The x -coordinate is also called abscissa and y -coordinate ordinate.



EXERCISE 15.1

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



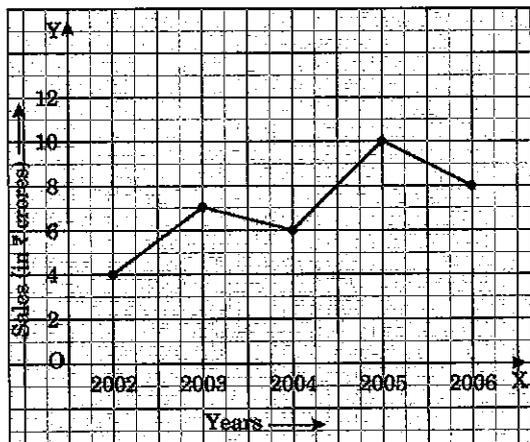
- What was the patient's temperature at 1 pm?
- When was the patient's temperature 38.5°C?
- The patient's temperature was the same two times during the period given. What were the two times?
- What was the temperature at 1:30 pm? How did you arrive at your answer?
- During which periods did the patient's temperature show an upward trend?

- Sol. (a) The patient's temperature at 1 pm was 36.5°C
- (b) The patient's temperature was 38.5°C at 12:00 noon.
- (c) The patient's temperature was 36.5°C at 1 pm and 2 pm.
- (d) The temperature at 1:30 pm was 36.5°C. We have taken the mid value of 1 pm. and 2 pm,

i.e., 1:30 p.m and proceed perpendicularly upwards to meet the horizontal line showing 36.5°C .

(e) During 9 am to 10 am and 10 am to 11 am, the temperature showed upwards trend.

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



- What were the sales in (i) 2002 (ii) 2006?
- What were the sales in (i) 2003 (ii) 2005?
- Compute the difference between the sales in 2002 and 2006.
- In which year was there the greatest difference between the sales as compared to its previous year?

Sol. (a) The sales in the year 2002 was ₹ 4 crore and in the year 2006 was ₹ 8 crore.

(b) The sales in the year 2003 was ₹ 7 crore and in 2005 was ₹ 10 crore.

(c) Sales in 2002 = ₹ 4 crore
Sales in 2006 = ₹ 8 crores

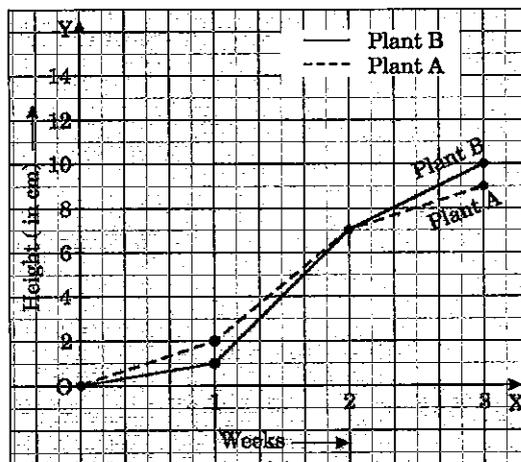
\therefore Difference = ₹ (8 - 4) crore = 4 crore.

(d) The greatest difference between the sales was in the year 2005, as compared to previous year.

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.

- How high was plant A after (i) 2 weeks (ii) 3 weeks
- How high was plant B after (i) 2 weeks (ii) 3 weeks
- How much did plant A grow during the 3rd week?
- How much did plant B grow from the end of the 2nd week to the end of the 3rd week?

- During which week did plant A grow most?
- During which week did plant B grow least?
- Were the two plants of the same height during any week shown here? Specify.



Sol. (a) The height of plant A (i) after 2 weeks was 7 cm (ii) after 3 weeks was 9 cm.

(b) The height of plant B (i) after 2 weeks was 7 cm (ii) after 3 weeks was 10 cm.

(c) Plant A grew 7 cm to 9 cm i.e., 2 cm.

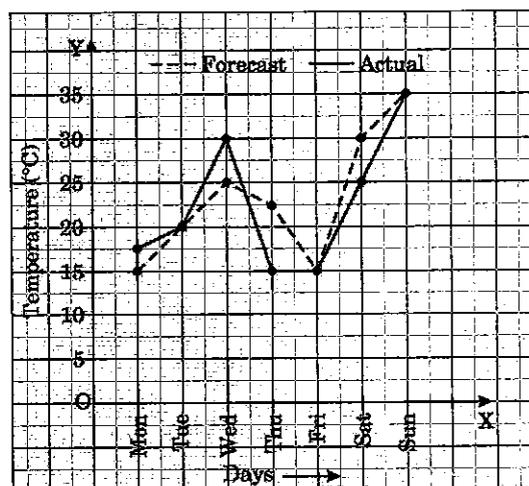
(d) Plant B grew 7 cm to 10 cm i.e., 3 cm.

(e) Plant A grew most in 2nd week i.e., 5 cm.

(f) Plant B grew the least in first week i.e., 1 cm.

(g) Yes, the two plants grew the same height at the end of 2nd week i.e., 7 cm.

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?

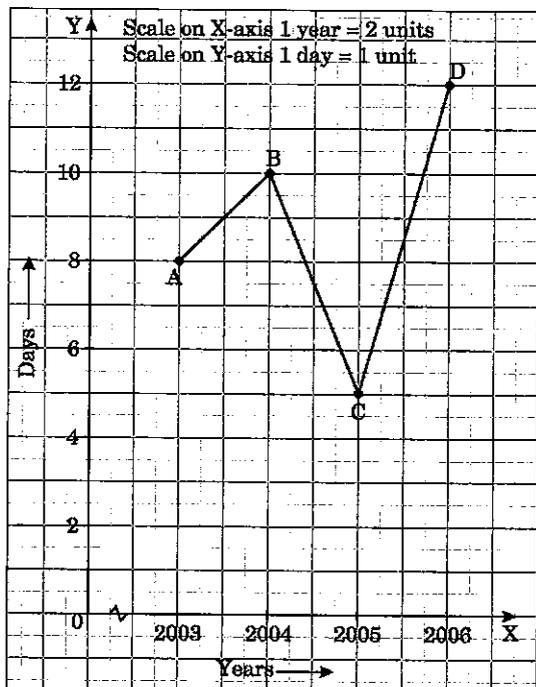
Sol. (a) On Tuesday, Friday and Sunday, the forecast temperature was same as the actual temperature i.e., 20°C, 15°C and 35°C respectively.
 (b) The forecast maximum temperature during the week was 35°C
 (c) The minimum actual temperature during the week was 17.5°C
 (d) On Thursday, the actual temperature differed the most from the forecast temperature i.e., $22.5^\circ\text{C} - 15^\circ\text{C} = 7.5^\circ\text{C}$.

Q5. Use the tables below to draw linear graphs.

- (a) The number of days a hill side city recovered show in different years.

Year	2003	2004	2005	2006
Days	8	10	5	12

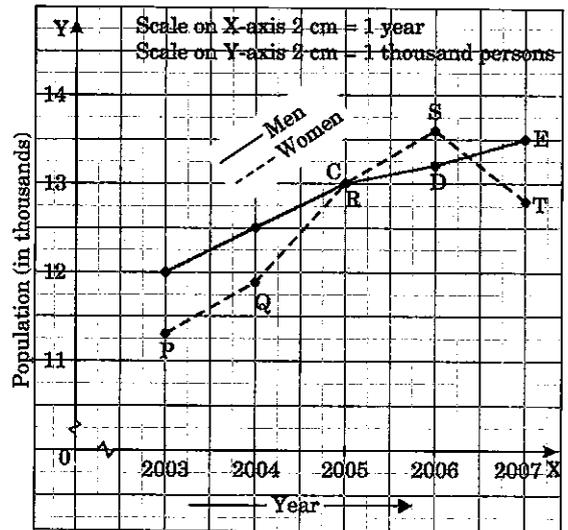
Sol.



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

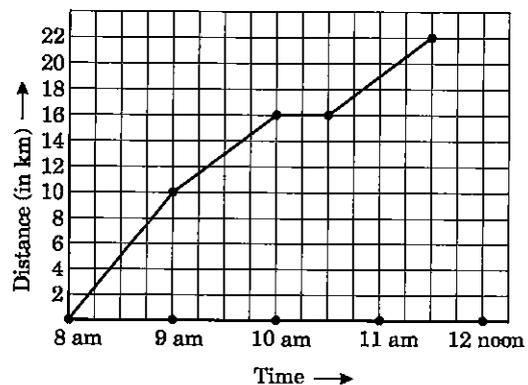
Year	2003	2004	2005	2006	2007
Number of men	12	12.5	13	13.2	13.5
Number of women	11.3	11.9	13	13.6	12.8

Sol.



Q6. A courier-person cycles from a town to a neighbouring suburban area to deliver a parcel to merchant. His distance from the town at different times is shown by the following graph.

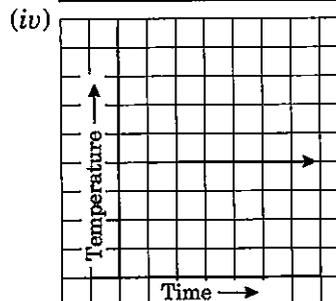
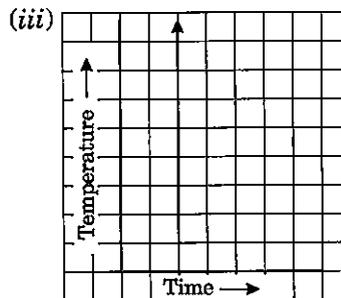
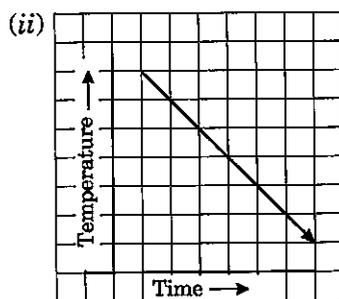
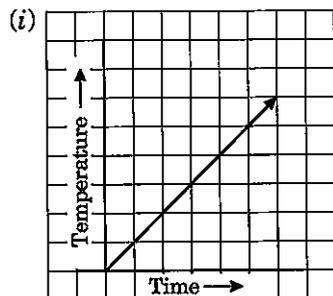
- (a) What is the scale taken for the time axis?
 (b) How much time did the person take for the travel?
 (c) How far is the place of the merchant from the town?
 (d) Did the person stop on his way? Explain?
 (e) During which period did he ride fastest?



Sol. (a) Scale taken on time-axis i.e., x-axis is 4 units = 1 hour

- (b) Total time taken by the person for total journey is 3 hours 30 minutes.
- (c) The place of the merchant is at a distant of 22 km from the town.
- (d) Yes, this is indicated by the horizontal part of the graph clearly the person stopped from 10 am to 10:30 am.
- (e) He rode fastest between 8 am and 9 am.

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

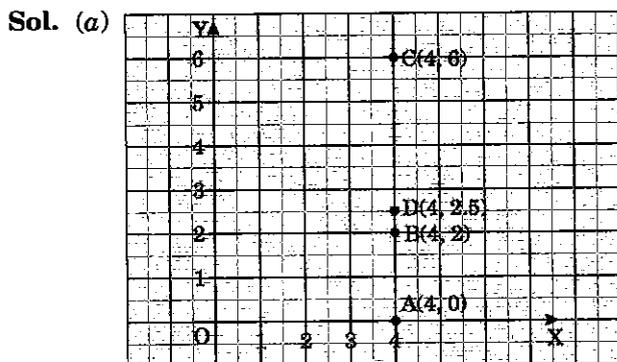


- Sol.**
- (i) It represents a time-temperature graph where temperature increases as the time increases.
 - (ii) It shows a time-temperature graph where temperature decreases as the time increases.
 - (iii) It does not represent a time-temperature graph. Here temperature is increasing at constant time which is not possible.
 - (iv) It represents a time-temperature graph where temperature remains constant when the time is increasing.

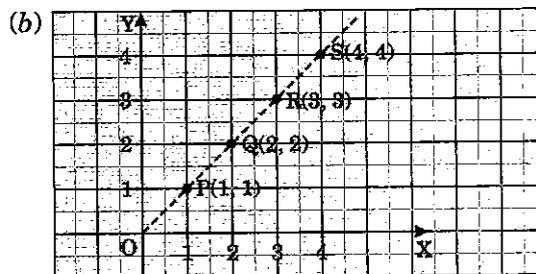
EXERCISE 15.2

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

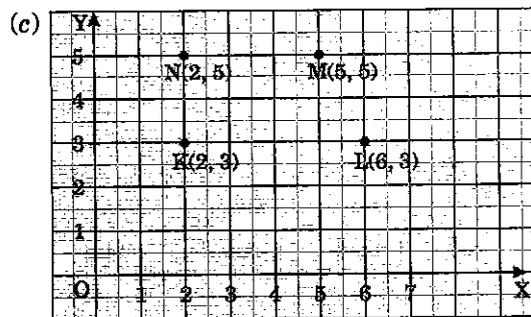
- (a) A (4, 0), B(4, 2), C(4, 6), D(4, 2.5)
- (b) P(1, 1), Q(2, 2), R(3, 3), S(4, 4)
- (c) K(2, 3), L(6, 3), M(5, 5), N (2, 5)



Yes all the coordinate points lie on a line



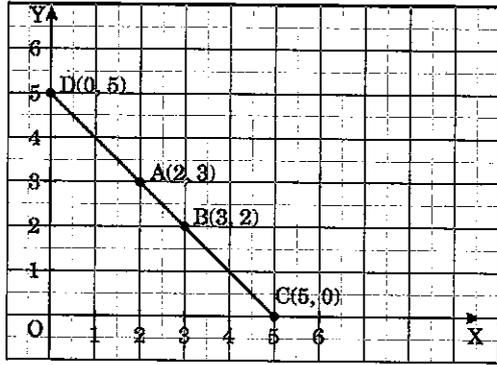
Yes, all the coordinate points lie on a line.



No, the coordinate points do not lie on a line.

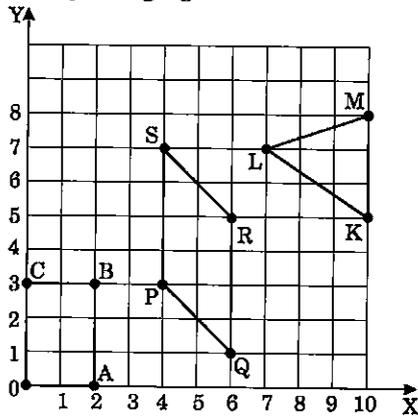
Q2. Draw the line passing through (2, 3) and (3, 2). Find the coordinates of the points at which this line meets the x-axis and y-axis.

Sol.



CD is the required line passing through the points A(2, 3), B(3, 2) which meets x-axis at C(5, 0) and y-axis at D(0, 5).

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



Sol. Required coordinates are as follows:

Coordinates of rectangle OABC are:

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

Coordinates of parallelogram PQRS are:

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

Coordinates of triangle KLM are:

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

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 x-axis.

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

Sol. (i) True

(ii) False, the point will lie on x-axis with coordinates (5, 0).

(iii) True

TRY THESE (PAGE 244)

Q1. In the Example, use the graph to find how much petrol can be purchased for ₹ 800.

Sol. Refer to figure 15.16 graph of NCERT book page no. 244, the amount of petrol purchased for ₹ 800 is 16 litres.

TRY THESE (PAGE 245)

Yes, Example 7 in a case of direct variation.

EXERCISE 15.3

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

(b) Distance travelled by a car.

Time (in hours)	6 am	7 am	8 am	9 am
Distance (in km)	40	80	120	160

(i) How much distance did the car cover during the period 7:30 am to 8 am?

(ii) What was the time when the car had covered a distance of 100 km since its start?

(c) Interest on deposits for a year.

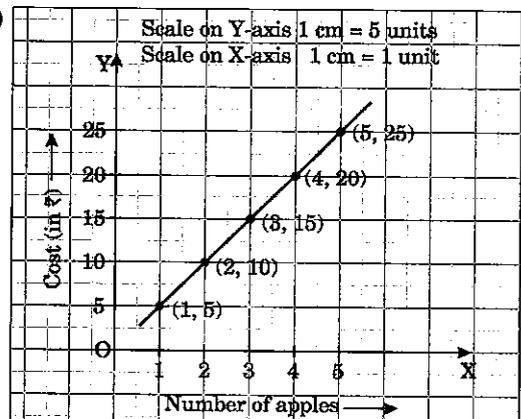
Deposits (in ₹)	1000	2000	3000	4000	5000
Simple interest (in ₹)	80	160	240	320	400

(i) Does the graph pass through the origin?

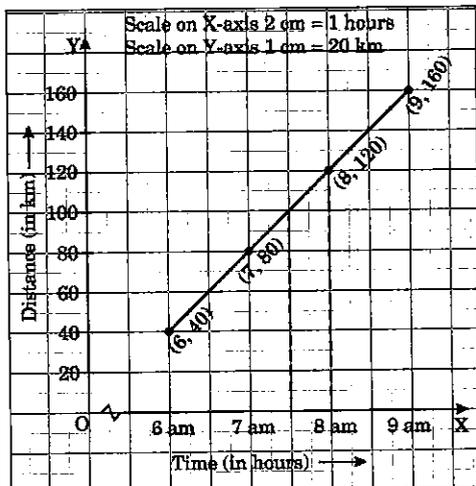
(ii) Use the graph to find the interest on ₹ 2500 for a year.

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

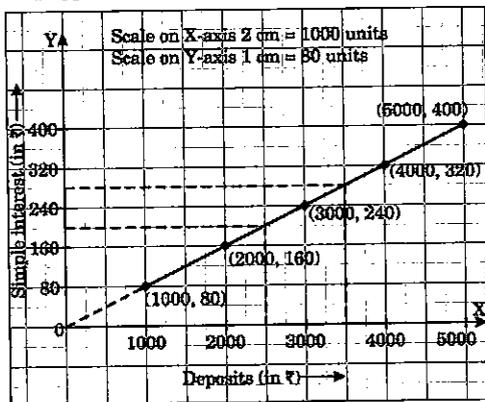
Sol. (a)



- (b) (i) The distance covered by the car during the period 7:30 am to 8 am is $(120 \text{ km} - 100 \text{ km}) = 20 \text{ km}$.
 (ii) At 7:30 am, the car had covered the distance of 100 km.



- (c) (i) Yes, the graph passes through the origin.
 (ii) The interest on ₹ 2500 is ₹ 200 for 1 year.
 (iii) ₹ 3500 should be invested to earn an interest of ₹ 280.



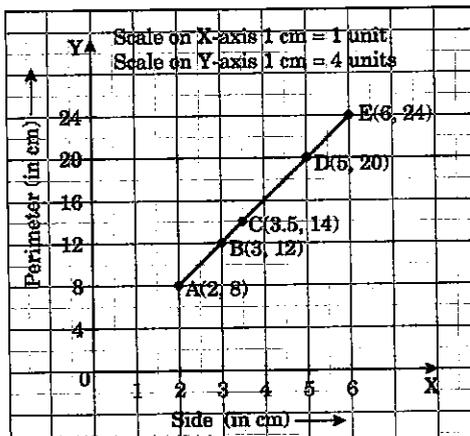
Q2. Draw the graph for the following:

(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?

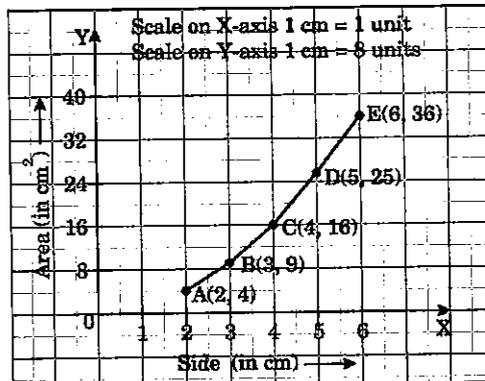
(ii) Side of square (in cm)	2	3	4	5	6
Area (in cm ²)	4	9	16	25	36

Sol. (i)



Yes, it is a linear graph.

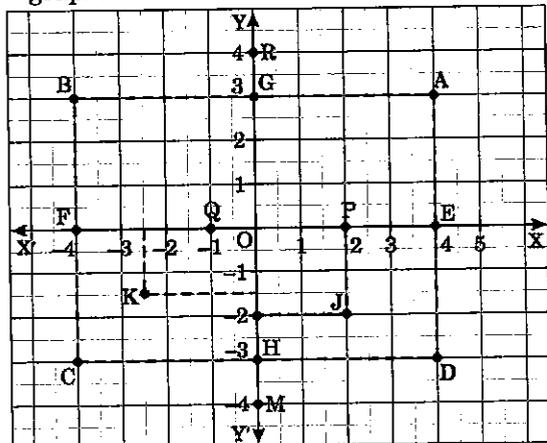
(ii)



No, it is not a linear graph.

Learning More Q & A

Q1. Write the coordinates of each point shown in the graph.



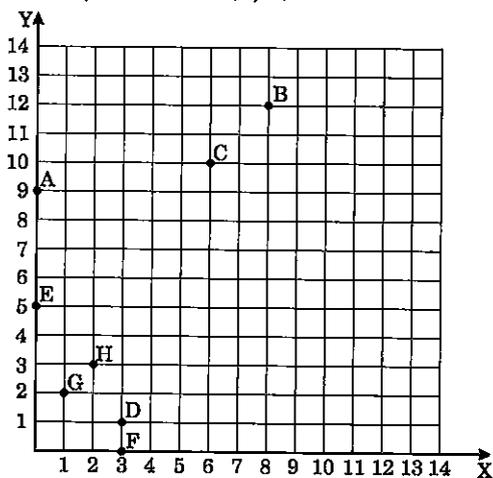
Sol.

Point	Coordinate
A	(4, 3)
B	(-4, 3)
C	(-4, -3)
D	(4, -3)
E	(4, 0)
F	(-4, 0)
G	(0, 3)
H	(0, -3)
J	(2, -2)
K	(-2.5, -1.5)

M	(0, -4)
O	(0, 0)
P	(2, 0)
Q	(-1, 0)
R	(0, 4)

Q2. From the given figure, choose the letters that indicate the location of the points.

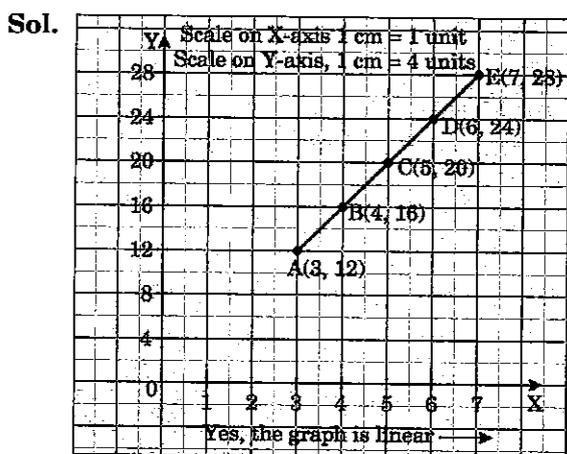
- (i) (3, 1) (ii) (0, 5) (iii) (3, 0)
 (iv) (1, 2) (v) (2, 3) (vi) (8, 12)
 (vii) (6, 10) (viii) (0, 9)



Sol. (i) D(3, 1), (ii) E(0, 5), (iii) F(3, 0), (iv) G(1, 2), (v) H(2, 3), (vi) B(8, 12), (vii) C(6, 10), (viii) A(0, 9)

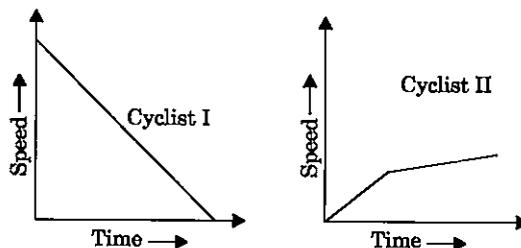
Q3. Draw the graph of the following table. Is it a linear graph?

x	3	4	5	6	7
y	12	16	20	24	28



Yes, it is a linear graph.

Q4. The given graphs show the progress of two different cyclists during a ride. For each graph, describe the rider's progress over the period of time. (NCERT Exemplar)



Sol. (a) As time passes, the speed of cyclist I decreases steadily.
 (b) Speed of cyclist II increases for a short time period, and then increases very slowly.

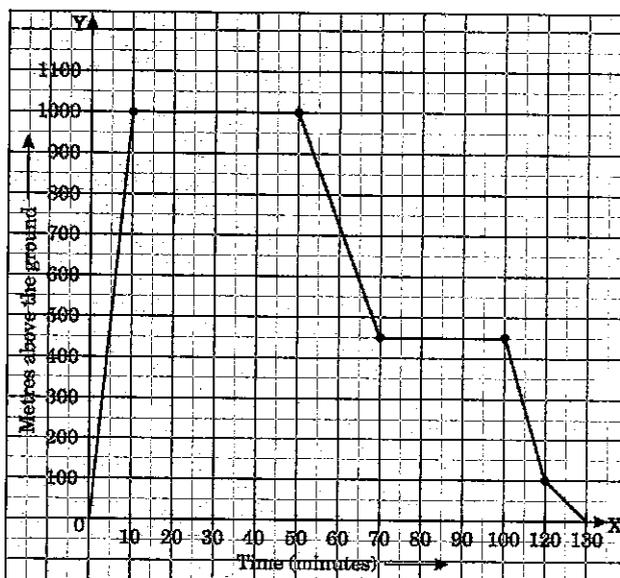
Q5. Match the coordinates given in Column A with the items mentioned in Column B.

(NCERT Exemplar)

Column A	Column B
(i) (0, 5)	(a) y coordinate is $2 \times x$ -coordinate + 1
(ii) (2, 3)	(b) Coordinates of origin.
(iii) (4, 8)	(c) Only y -coordinate is zero.
(iv) (3, 7)	(d) The distance from x -axis is 5.
(v) (0, 0)	(e) y coordinate is double of x -coordinate.
(vi) (5, 0)	(f) The distance from y -axis is 2.

Sol. (i) —(d), (ii) —(f), (iii) —(e), (iv) —(a), (v) —(b), (vi) —(c)

Q6. The given graph shows the flight of an aeroplane.



- (i) What are the scales taken on x -axis and y -axis?
 (ii) Upto what height the aeroplane rises?

- (iii) What was the speed of the aeroplane while rising?
- (iv) How long was the plane in level flight?
- (v) How long did the whole flight take?

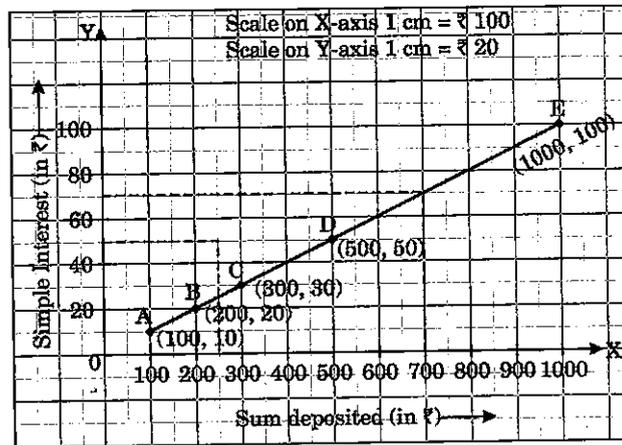
- Sol.** (i) Scale on x-axis, 1 cm = 10 minutes
Scale on y-axis, 1 cm = 100 metres
- (ii) The aeroplane rose upto 1000 metres.
 - (iii) The speed of the aeroplane while rising was 100 m per minutes.
 - (iv) The time taken by the aeroplane to be in level flight is $40 + 30 = 70$ minutes
 - (v) Total flight time is 130 minutes.

Q7. A bank gives 10% interest on the deposits by the Ladies. Draw a graph showing the relation between the amount deposited and the simple interest earned by the ladies and state following from the graph.

- (i) The annual interest earned for an investment of ₹ 250
- (ii) The investment one has to make to get an annual interest of ₹ 70.

Sum deposited (in ₹)	100	200	300	500	1000
Simple interest (in ₹)	10	20	30	50	100

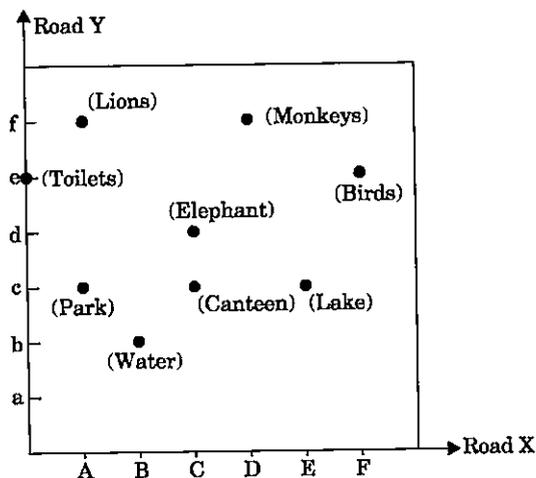
Sol. Required graph is as under.



- (i) ₹ 25 is Earned as annual interest for an investment of ₹ 250
- (ii) ₹ 700 is to be invested to get an annual interest of ₹ 70.

Test Yourself

- Q1.** Write the x-coordinate (abscissa) of each of the given points. (NCERT Exemplar)
(a) (7, 5) (b) (8, 7) (c) (0, 3)
- Q2.** Write the y-coordinate (ordinate) of each of the given points. (NCERT Exemplar)
(a) (3, 4) (b) (6, 0) (c) (2, 9)
- Q3.** Study the given map of a zoo and answer the following questions. (NCERT Exemplar)



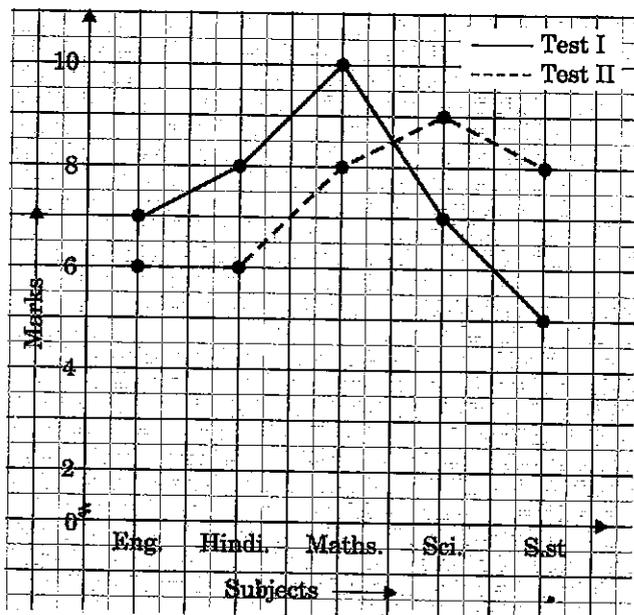
- (a) Give the location of lions in the zoo.
- (b) (D, f) and (C, d) represent locations of which animals in the zoo?

- (c) Where are the toilets located?
- (d) Give the location of canteen.

Q4. Consider this input/output table.

Input	1	2	4	5	7
Output	2	5	11	14	20

- (a) Graph the values from the table by taking input along horizontal axis from 0 to 8 and Output along vertical axis from 0 to 24.
- (b) Use your graph to predict the outputs for inputs of 3 and 8. (NCERT Exemplar)
- Q5.** The graph given on next page shows the marks obtained out of 10 by Sonia in two different tests. Study the graph and answer the questions that follow.
 - (a) What information is represented by the axes?
 - (b) In which subject did she score the highest in Test I?
 - (c) In which subject did she score the least in Test II?
 - (d) In which subject did she score the same marks in both the Tests?
 - (e) What are the marks scored by her in English in Test II?
 - (f) In which test was the performance better?
 - (g) In which subject and which test did she score full marks? (NCERT Exemplar)



Q6. Plot a line graph for the variables p and q where p is two times q i.e., the equation is $p = 2q$. Then find.

(a) the value of p when $q = 3$

(b) the value of q when $p = 8$

(NCERT Exemplar)

Q7. Study the graph and answer the questions that follow.

(a) What information does the graph give?

(b) On which day was the temperature the least?

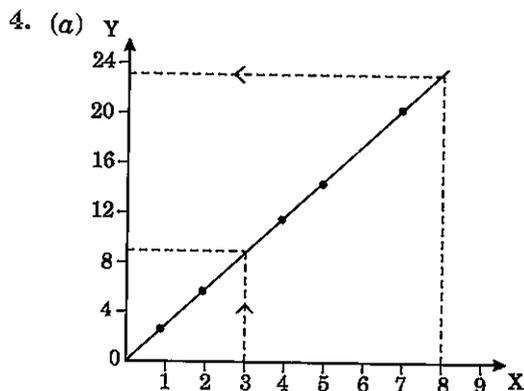
(c) On which day was the temperature 31°C ?

(d) Which was the hottest day?

(NCERT Exemplar)

ANSWERS

- (a) 7 (b) 8 (c) 0
- (a) 4 (b) 0 (c) 9
- (a) (A, f) (b) Monkeys and Elephant
(c) (O, e) (d) (C, c)



(b) For input 3, output is 9 and for input 8, output is 23.

5. (a) Subjects marks obtained (out of 10) by Sania in two terms exams in class VIII.

(b) Maths (c) English & Maths

(d) English & Hindi (e) 6

(f) Same in boths (g) Test I Maths

6. (a) $p = 6$

(b) $q = 4$

7. (a) Maximum temp. is 31°C in a week

(b) Sunday, 25°C (c) Wednesday

(d) Friday

Internal Assessment

Q1. Fill in the blanks:

(i) The distance of any point from the y -axis is the _____ coordinate.

(ii) All points with y -coordinate as zero lie on the _____.

(iii) For the point (5, 2), the distance from the x -axis is _____ units.

(iv) The x -coordinate of any point lying on the y -axis will be _____. (NCERT Exemplar)

Q2. State True (T) and False (F).

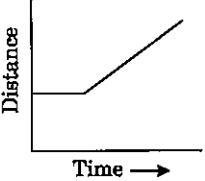
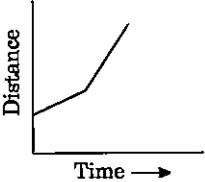
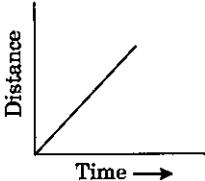
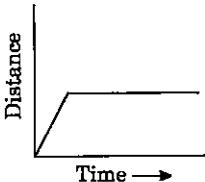
(i) Time- distance graph for a uniform speed represents a linear graph.

(ii) Radius-circumference graph of a circle represents a curved line.

(iii) Multiplication of 6 represents a linear graph.

(iv) Side-Area graph of a square represents a linear graph.

Q3. Match the following

(a) The car is travelling at a constant speed and then stopped.	(i) 
(b) The car moves at a constant speed throughout the journey	(ii) 
(c) The car is travelling at a certain speed and then increased that speed.	(iii) 
(d) The car was stationary at first and then move off a constant speed.	(iv) 

MULTIPLE CHOICE QUESTIONS (MCQ)

- Q4. The point $(-2, 3)$ lies in the quadrant.
 (a) 2nd (b) 1st
 (c) 4th (d) 3rd
- Q5. The ordinate of a point is its distance from the
 (a) origin (b) x -axis
 (c) y -axis (d) none of these
- Q6. The point where the y -axis and x -axis intersect is called the
 (a) ordinate (b) abscissa
 (c) origin (d) ordered pair

- Q7. In which quadrant does the point lie if
 (i) both numbers of the ordered pair are positive?
 (ii) both numbers of the ordered pair are negative?
 (iii) the x -coordinate is negative and y -coordinate is positive?
 (iv) the x -coordinate is positive and y -coordinate is negative?
- Q8. Locate the following points on the graph and state the nature of the figure so formed:
 A $(0, 0)$, B $(0, 4)$, C $(4, 0)$, D $(4, 4)$

ANSWERS

1. (i) x (ii) x -axis
 (iii) 2 (iv) 0
2. (i) T (ii) F (iii) T (iv) F
3. (a) \leftrightarrow (iv) (b) \leftrightarrow (iii)
 (c) \leftrightarrow (ii) (d) \leftrightarrow (i)

4. (a) 5. (b) 6. (c)
7. (i) 1st (ii) 3rd
 (iii) 2nd (iv) 4th
8. square