Chapter - 12
Introduction to Graphs

Exercise

In questions 1 to 10, there are four options out of which one is correct. Write the correct answer.

1. Comparison of parts of a whole may be done by a
(a) bar graph   **(b) pie chart**   **(c) linear graph**   **(d) line graph**

Solution:

(b) Pie chart

2. A graph that displays data that changes continuously over periods of time is
(a) bar graph   **(b) pie chart**   **(c) histogram**   **(d) line graph**
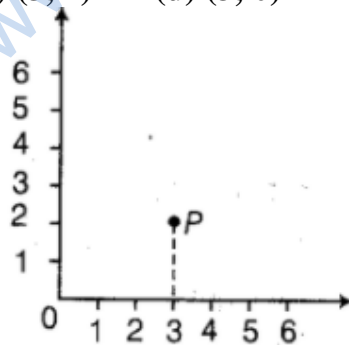
Solution:

(d) Line chart
A line graph displays the continuous change of data over the period of time like speed or distance covered.

3. In the given graph the coordinates of point x are
(a) (0, 2)   **(b) (2, 3)**   **(c) (3, 2)**   **(d) (3, 0)**
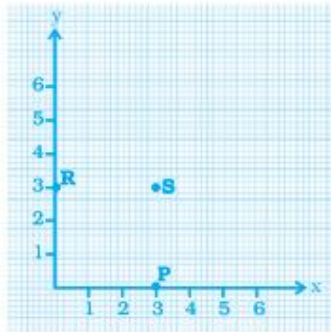

Solution:

(c) (3, 2)

To find the coordinate, draw the perpendicular line from point x to the x axis and y from the y axis.
From the given figure, the coordinate of x axis is 3, and the coordinate of y-axis is 2.

Hence, the coordinate of x is (3, 2)

4. In the given graph the letter that indicates the point (0, 3) is
(a) P   (b) Q   (c) R   (d) S

Solution:

(c) R
From the given figure, the coordinates of S is (3, 3), the coordinates of P is (3, 0) and coordinates of R is (0, 3)

Hence, option c is correct.

5. The point (3, 4) is at a distance of
(a) 3 from both the axis   (b) 4 from both the axis
(c) 4 from the x axis and 3 from y axis   (d) 3 from x axis and from y axis

Solution:

(c) 4 from the x axis and 3 from y axis

In the coordinate (3, 4), the first number represents the distance on x axis or y coordinate whereas the second number 4 represents the distance on y axis or the x coordinate.

6. A point which lies on both the axis is _____
(a) (0, 0)   (b) (0, 1)   (c) (1, 0)   (d) (1, 1)

Solution:

(a) (0, 0)

Both the x axis and y axis are perpendicular to each other and they meet at a single point called origin (0, 0)

7. The coordinates of a point at a distance of 3 units from the x axis and 6 units from the y axis is
(a) (0, 3)   (b) (6, 0)   (c) (3, 6)   (d) (6, 3)
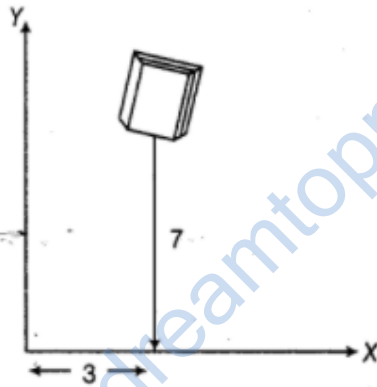
Solution:
(d) (6, 3)

It is known that, the distance from the x axis gives the y coordinate and the distance from the y axis gives the x coordinate.
Hence, the coordinate point is (6, 3).

8. In the given figure the position of the book on the table may be given by
(a) (7, 3)   (b) (3, 7)   (c) (3, 3)   (d) (7, 7)
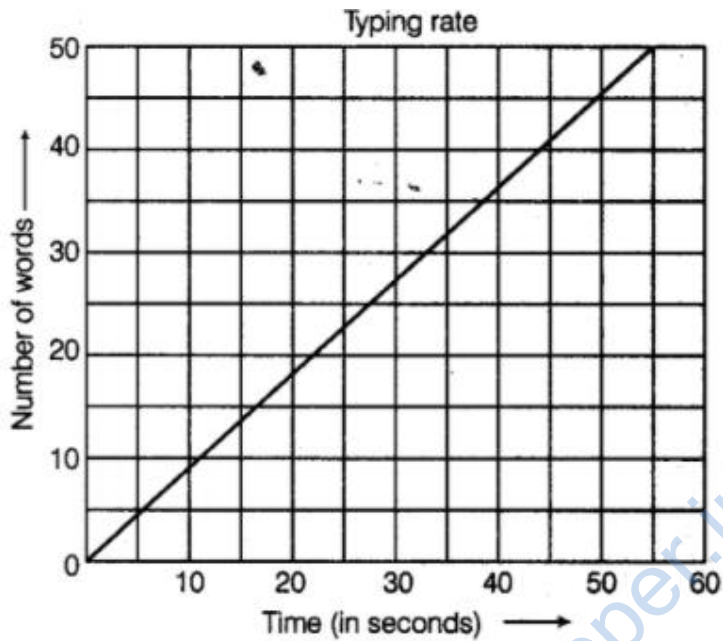

Solution:

(b) (3, 7)

The book positioned at a distance of 3 units from the y axis and 7 units from the x axis.
Hence, the required coordinate point is (3, 7).

9. Data was collected on a student's typing rate and graph was drawn as shown below. Approximately how many words had this student typed in 30 seconds?
(a) 20   (b) 24   (c) 28   (d) 34

Typing rate

Solution:

(c) 28

From the given graph, the time (in sec) is taken in x axis and the number of words in y axis.

When the look for the line graph to find the number of words corresponds to 30 seconds in the x axis, the words typed in 30 seconds comes out is approximately 28 words.

10. Which graphs of the following represent the table below?

Length of side of a square	1	2	3	4	5
Perimeter	4	8	12	16	20
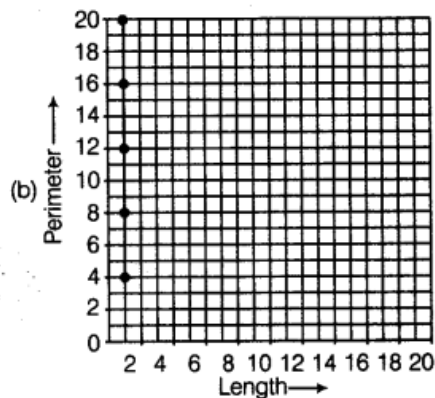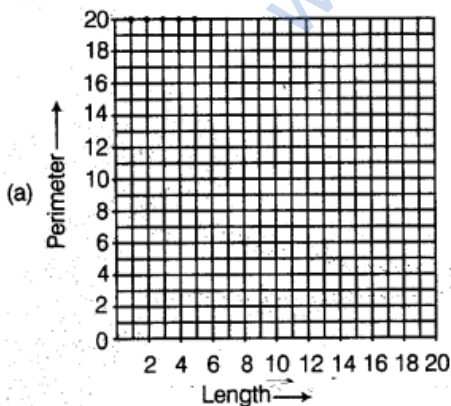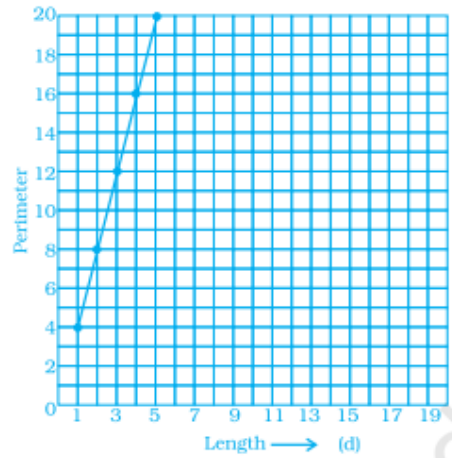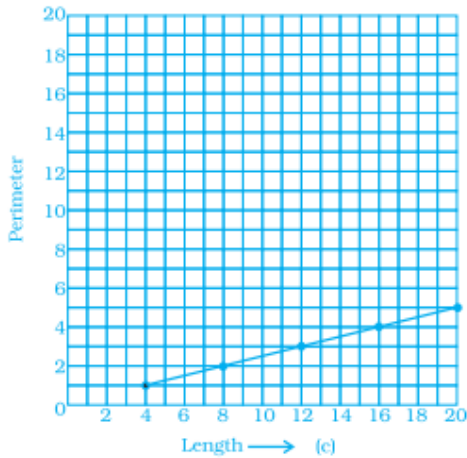
Length ⟶ (c)

Length ⟶ (d)

Solution:

(d)

It is given that, x axis represents the length of the square side and y axis represents the perimeter.

When you plot the given points in the graph, the answer should be option (d).

In questions 11 to 25, fill in the blanks to make the statements true.

11. _____ displays data that changes continuously over periods of time.

Solution:

Line Graph

Line graph displays the relationship between the constantly varying quantities.

12. The relation between dependent and independent variables is shown through a _____.

Solution:

Graph

The graph defines the relationship between the two variables where one is the dependent variable and the other one is the independent variable.

13. We need _____ coordinates for representing a point on the graph sheet.

Solution:

two (a pair)

To represent the point on the graph we need a pair of coordinate, where one represents the x coordinate and the other represents the y coordinate.

14. A point in which the x-coordinate is zero and y-coordinate is nonzero will lie on the _____

Solution:

y axis

The point lies on the y axis, when the x coordinate is zero.

15. The horizontal and vertical line in a line graph are usually called _____ and _____.

Solution:

x axis and y axis

16. The process of fixing a point with the help of the coordinates is known as _____ of the point.

Solution:

Plotting

The process of fixing the point using the coordinates is known as the plotting of points on a graph.

17. The distance of any point from the y-axis is the _____ coordinate.

Solution:

x coordinate

The distance of any point from the x axis is called y coordinate and the distance of any point from the y axis is called the x coordinate.

18. All points with y-coordinate as zero lie on the _____.

Solution:

x axis

When all the points on the y coordinate are zero, then absolutely all the points lie on the x axis.

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

Solution:

2 units.
We know that, y coordinate represents the distance from the x axis.
So the answer is 2 units.

20. The x-coordinate of any point lying on the y-axis will be _____.

Solution:

zero (0)
When the x-coordinates lies on the y axis, then the x coordinate of any point on the y axis should be zero.

21. The y-coordinate of the point (2, 4) is _____.

Solution:

4 units.
In the ordered pair, the first number always represents the x coordinate and the second number represents the y coordinate.

Hence, the y coordinate is 4 units.

22. In the point (4, 7), 4 denotes the _____.

Solution:

x- coordinate.

The first number in the ordered pair represents the x coordinate and the second number represents the y- coordinate.

23. A point has 5 as its x –coordinate and 4 as its y–coordinate. Then the coordinates of the point are given by _____.

Solution:

(5, 4)
The point is represented using the ordered pair = (x coordinate, y coordinate)

24. In the coordinates of a point, the second number denotes the _____.

Solution:

y coordinate
The second number in the coordinate point represent the y coordinate.

25. The point where the two axes intersect is called the _____.

Solution:

Origin (0, 0)
The two axis intersects at a common point in the graph is called the origin.

In the questions 26 to 34, state whether the statements are true (T) or false (F).

26. For fixing a point on the graph sheet we need two coordinates.

Solution:

True
For plotting a point, we need two coordinates such as x coordinate and y coordinate.

27. A line graph can also be a whole unbroken line.

Solution:

False
A graph which has whole unbroken lines are called linear graph.

28. The distance of any point from the x -axis is called the x-coordinate.

Solution:

False
The distance of any point from the x -axis is called the y-coordinate

29. The distance of the point (3, 5) from the y-axis is 5.

Solution:

False
The distance of the point (3, 5) from the y-axis is 3 and from x axis is 5

30. The ordinate of a point is its distance from the y-axis.

Solution:

False
The ordinate is also known as y coordinate, where it is defined as a distance from the x axis.

31. In the point (2, 3), 3 denotes the y-coordinate.

Solution:

True
From the given point,
(2, 3) = (x coordinate, y coordinate)

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

Solution:

True
Both the axis such as x axis and y axis intersects at each other when the coordinates of x and y are 0 and 0 respectively.

33. The points (3, 5) and (5, 3) represent the same point.

Solution:

False
The point (3, 5) and (5, 3) does not represent the same point.
From point (3, 5), the x coordinate is 3 and the y coordinate is 5
From point (5, 3), the x coordinate is 5 and the y coordinate is 3
When these points are plotted in graph, you will get the different graph.

34. The y-coordinate of any point lying on the x -axis will be zero.
Solution:

True

For any y coordinate point, when it lies on the x axis, then the y coordinate should be zero.
For example, (5, 0) and (7, 0), when these points are plotted in the graph, both the points will lie on the x axis.

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

Column A	Column B
(1) (0, 5)	(a) y coordinate is 2 × x – coordinate + 1
(2) (2, 3)	(b) Coordinates of orgin
(3) (4, 8)	(c) Only y-coordinate is zero
(4) (3, 7)	(d) The distance from x-axis is 5
(5) (0, 0)	(e) y coordinate is double of x-coordinate
(6) (5, 0)	(f) The distance from y-axis is 2

Solution.

(1) In the pair (0,5), the second number also known as ordinate represents the distance from X-axis, i.e. 5.

(2) In the pair (2,3), 2 the first number, also known as abscissa represents the distance from Y-axis that is 2.

(3) We have the coordinates (4,8). Clearly, coordinate is double of x-coordinate.

(4) We have the coordinate (3,7),
x-coordinate = 3
y-coordinate = 7
y coordinate is 2 × x – coordinate + 1

(5) (0,0) are the coordinates of origin.

(6) In the point (5,0), the y-coordinate is zero.

Hence,
(1) d,
(2) f,
(3) e,
(4) a,
(5) b,
(6) c.

36. Match the ordinates of the points given in Column A with the items mentioned in Column B.

| Column A	Column B
(a) (7, 0)	(i) The ordinate is double the abscissa
(b) (11, 11)	(ii) The ordinate is zero
(c) (4, 8)	
(d) (6, 2)	(iii) The ordinate is equal to the abscissa
(e) (0, 9)	(iv) The abscissa is double the ordinate
(f) (6, 3)	(v) The abscissa is triple the ordinate
	(vi) The abscissa is zero

Solution.

(a) Clearly, the ordinate of the point (7,0) is zero.
(b) In the point (11,11), the ordinate is equal to the abscissa.
(c) In the point (4,8), the ordinate is double of the abscissa.
(d) In the point (6,2), the abscissa, which is. x-coordinate is triple of the ordinate and y-coordinate.
(e) The abscissa of the point (0,9) is zero.
(f) Clearly,the abscissa is double of the ordinate.

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

37. From the given graph, choose the letters that indicate the location of the points given below.

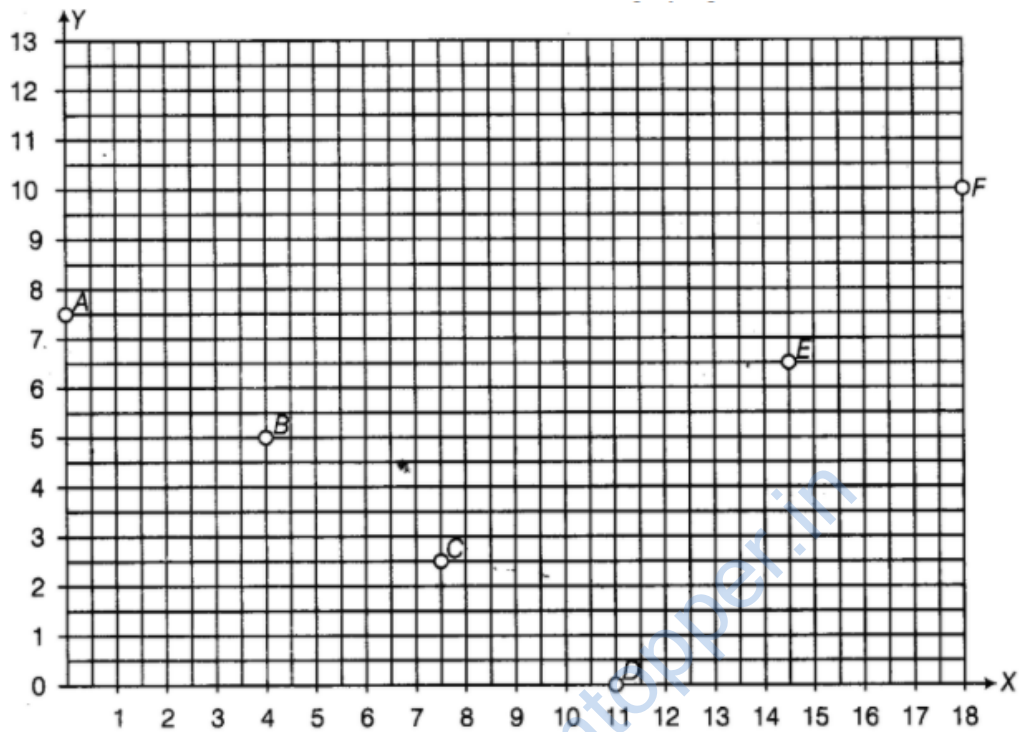**(a) (2, 0)   (b) (0, 4)   (c) (5, 1)   (d) (2, 6)   (e) (3,3)**
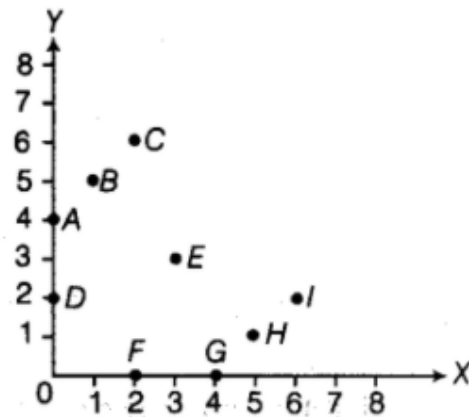
Solution.

The letters that indicate the location of point is given below:

A indicates the points (0, 4)
B indicates the points (1, 5)
C indicates the points (2, 6)
D indicates the points (0, 2)
E indicates the points (3, 3)
F indicates the points (2, 0)

38. Find the coordinates of all letters in the graph given below.

Solution:

From the given graph, the coordinates of the given letters are:

A Coordinates = (0, 7.5)
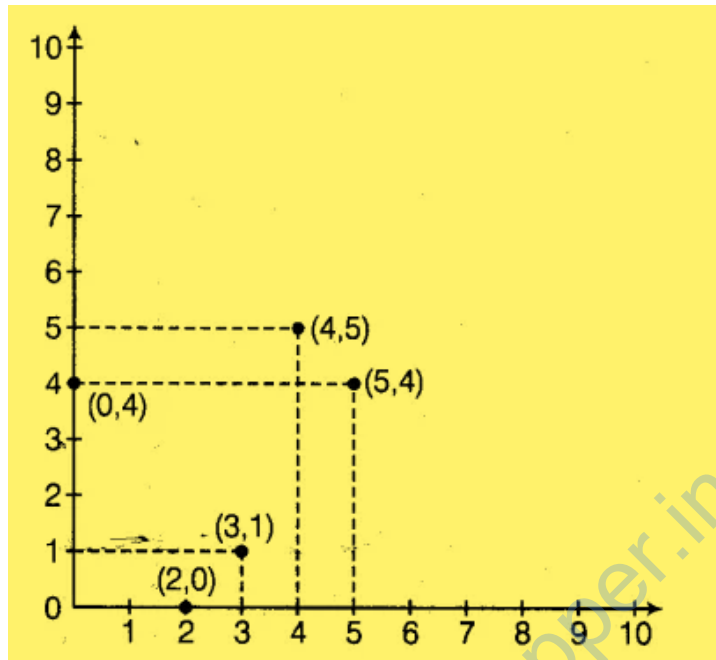
B Coordinates = (4, 5)
C Coordinates = (7.5, 2.5)
D Coordinates = (11, 0)
E Coordinates = (14.5, 6.5)
F Coordinates = (18, 9.5)

39. Plot the given points on a graph sheet.
(a) (5, 4)   (b) (2, 0)   (c) (3, 1)   (d) (0, 4)   (e) (4, 5)

Solution:

40. Study the given map of a zoo and answer the following questions.
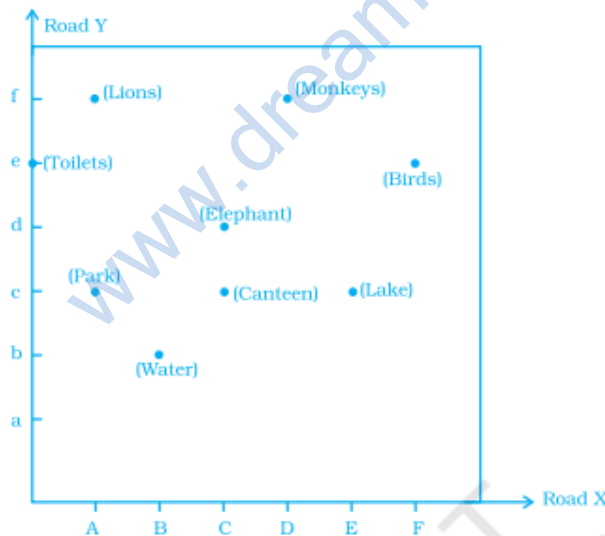
(a) Give the location of lions in the zoo.

(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.

Solution:

(a) Lions are at a distance of A units from road Y and f units from road X.
The location of lions is represented by the point (A,f)

(b) We see that (D, f) denotes the location of monkeys and (C,d) denotes the location of elephants.

(c) Toilets are located on the road Y at a distance of e units from the origin. Hence, the location of toilets is (0, e).

(d) Canteen is located at a distance of C units from road Y and c units from road X. Hence, the location of the canteen is (C,c).

41. Write the x -coordinate (abscissa) of each of the given points.
(a) (7, 3)   (b) (5, 7)   (c) (0, 5)

Solution:

(a) The x-coordinate of the point (7,3) is 7
(b) The x-coordinate of the point (5,7) is 5
(c) The x-coordinate of the point (0,5) is 0

42. Write the y-coordinate (ordinate) of each of the given points.
(a) (3, 5)   (b) (4, 0)   (c) (2, 7)

Solution:

(a) The y-coordinate of the point (3,5) is 5.
(b) y-coordinate of the point (4,0) is 0.
(c) The y coordinate of the point (2,7) is 7.

43. Plot the given points on a graph sheet and check if the points lie on a straight line. If not, name the shape they form when joined in the given order.
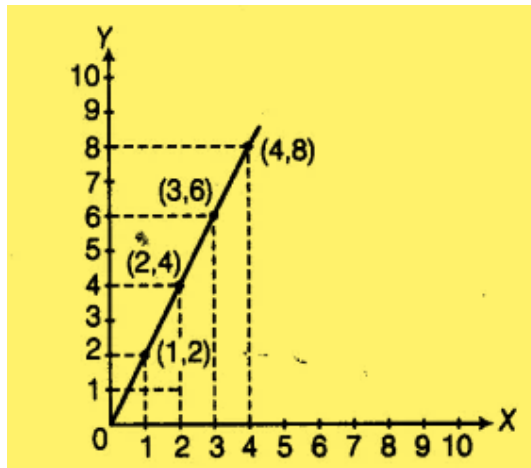**(a) (1, 2), (2, 4), (3, 6), (4, 8).**
(b) (1, 1), (1, 2), (2, 1), (2, 2).
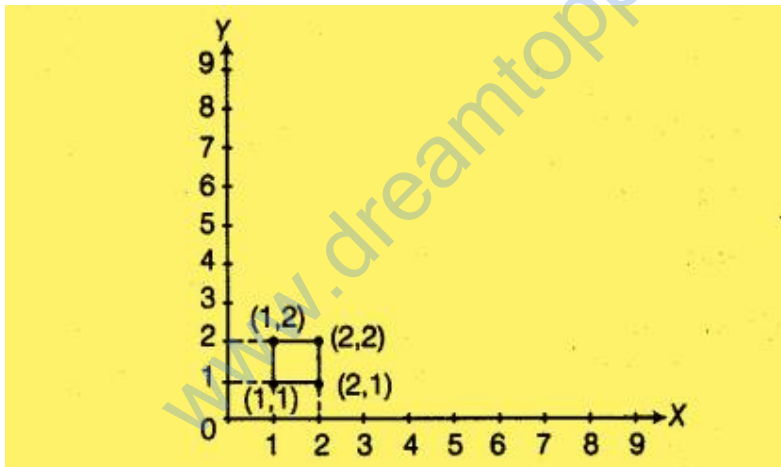**(c) (4, 2), (2, 4), (3, 3), (5, 4).**

Solution:
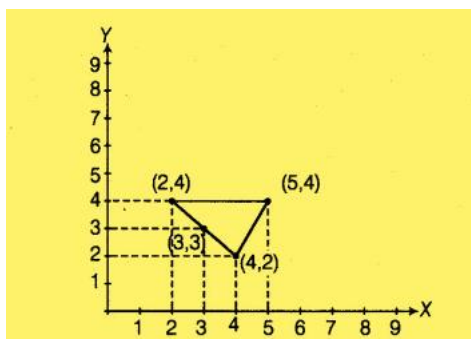(a) For (1, 2), (2, 4), (3, 6), (4, 8), the obtained graph is given below:

All the points lie on the straight line.

(b) For (1, 1), (1, 2), (2, 1), (2, 2), the obtained graph is given below:

The given points does not lie in the straight line.

(c) For (4, 2), (2, 4), (3, 3), (5, 4), the obtained graph is given below:

44. If y–coordinate is 3 times x -coordinate, form a table for it and draw a graph.

Solution:

Given,
y = 3x

Let x = 1, 2, 3, 4

The corresponding y coordinate values are given as follows:

When x = 1,
y = 3(1)
  = 3
(1, 3)

When x = 2,
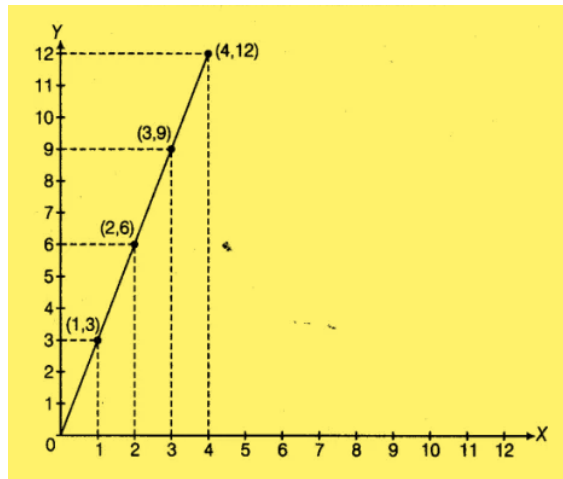y = 3(2)
  = 6
(2, 6)

When x = 3,
y = 3(3)
  = 9
(3, 9)

When x = 4,
y = 3(4)
  = 12
(4, 12)

Hence, the obtained points are:
(1, 3), (2, 6), (3, 9) and (4, 12)

The graph for the above given points are:

45. Make a line graph for the area of a square as per the given table.

Side (in cm)	1	2	3	4
Area (in cm²)	1	4	9	16

Is it a linear graph?

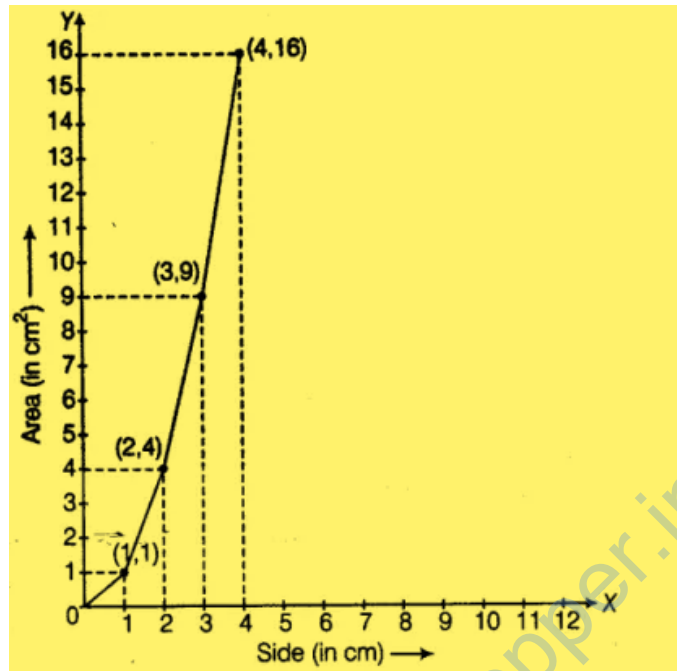## Solution:

From table, the coordinates are:
(1, 1), (2, 4), (3, 9), (4, 16)

The graph for the given points are:

Here, x axis represents the square side and y axis represents the area of a square.

From the given graph, it is shown that, it is not a linear graph, because the points are not in the same line (not collinear).
Hence, it is not a linear graph.

46. The cost of a note book is Rs 10. Draw a graph after making a table showing cost of 2, 3, 4, ... note books. Use it to find
(a) The cost of 7 notebooks.
(b) The number of note books that can be purchased with Rs 50.

Solution:
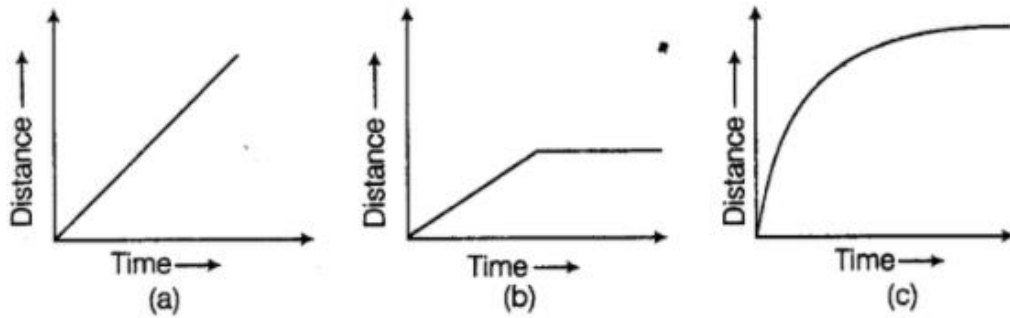
It is given that, the cost of one note book is Rs.10

(a) Hence, the cost of 7 note books is 7×10 = 70 Rs

(b) To find the number of note books that can be purchased for Rs. 50 is = 50/10
= 5

Hence, the number of note books for Rs. 50 is 5.

47. Explain the situations represented by the following distance-time graphs.

(a)   (b)   (c)

Solution:

(a) The first figure shows that, the distance increases time also increase with equal intervals

(b) The second figure shows that, the distance increases time also increases and the remaining part shows that the distance is constant for a long time.

(c) The third figure shows that, distance increases times also increases unequal intervals.

48. Complete the given tables and draw a graph for each.

(a)

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

(b)

x	1	2	4	6
y = x−1	0			

Solution:

(a) It given that,
    y= 3x+1

When x= 0, then y = 1
When x=1, then y = 4

Now, we have to find the value of y, when x= 2 and x = 3
So,
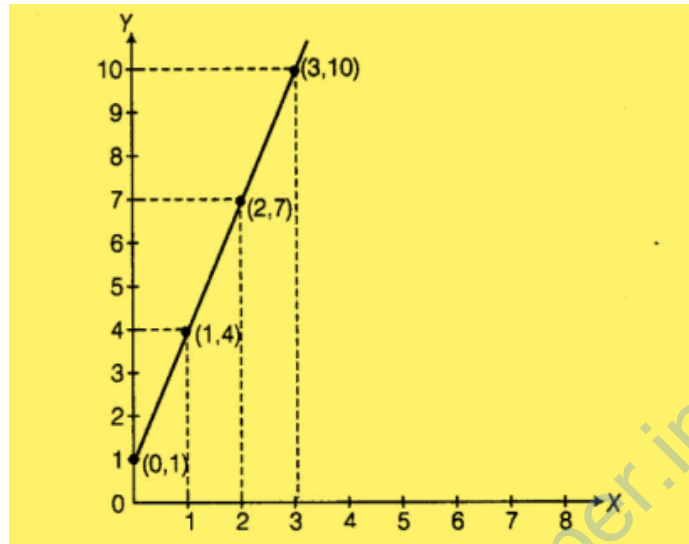When x= 2,
y = 3(2) +1
  = 7

When x= 3,
y = 3(3) +1
  = 10

Hence, the obtained coordinate points are:
(0, 1), (1, 4), (2, 7) and (3, 10)

The graph for the given points is:

(b) It given that,
   y= x-1

When x= 1, then y = 0
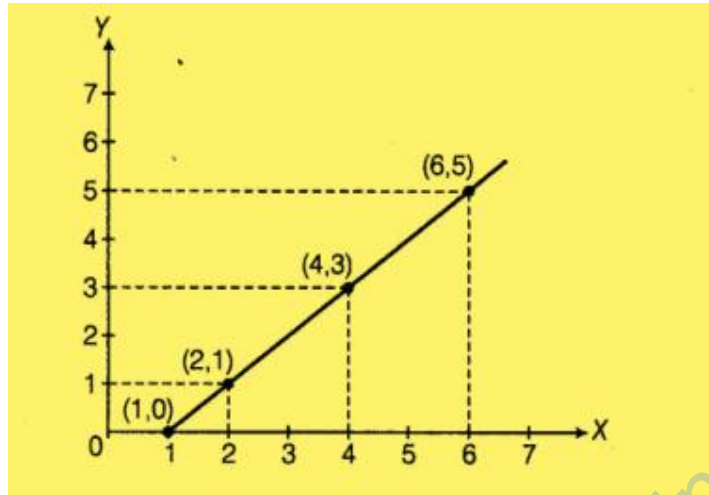
Now, we have to find the value of y when x= 2, 4, 6,
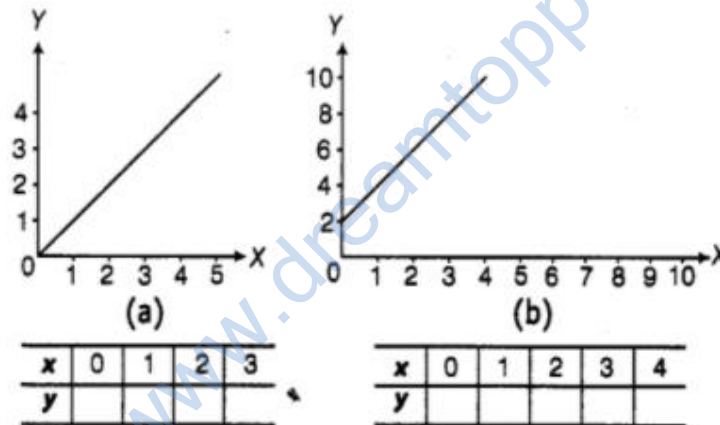
When x= 2,
y = 2 -1
  = 1

When x= 4,
y = 4- 1
  = 3

When x= 6,
y = 6- 1
  = 5

Hence, the obtained coordinate points are:
(1, 0), (2, 1), (4, 3) and (6, 5)

The graph for the given points is:

49. Study the given graphs (a) and (b) and complete the corresponding tables below.

Solution:

(a) From the given graph, the y coordinates of the first table is given as:

Let take x = 1,
Now draw a line parallel to y axis at 1, and check whether where it cuts the graph.
So we get y=4

Similarly for other x values, repeat the procedure.

Then the coordinates are given the table as follows:

x	0	1	2	3
y	0	1	2	3

(b) From the given graph, the y coordinates of the first table is given as:

Let take x = 1,
Now draw a line parallel to y axis at 1, and check whether where it cuts the graph.
So we get y=1

Similarly for other x values, repeat the procedure.

Then the coordinates are given the table as follows:

x	0	1	2	3	4
y	2	4	6	8	10

50. Draw a graph for the radius and circumference of circle using a suitable scale.
(Hint : Take radius = 7, 14, 21 units and so on)
From the graph,
(a) Find the circumference of the circle when radius is 42 units.
(b) At what radius will the circumference of the circle be 220 units?

Solution:

We know that, the circumference of a circle is $2\pi r$.
The radius depends on the circumference of a circle.

So, now we have to plot the radius on the x axis and the circumference on the y axis.
Because radius is an independent variable and circumference is a dependent variable.

Now, the equations in terms of x and y is given as:

$y = 2\pi x$

When x= 0,
 $y = 2\pi (0)$
   $= 0$

When x= 7,
$y = 2\pi (7)$
  $= 44$

When x= 14,
 $y = 2\pi (14)$
   $= 88$

When x= 21,

$y = 2\pi (21)$
   $= 132$

Hence, the coordinates are (0, 0), (7, 44, (14, 88) and (21, 132)

The graph of the points are:
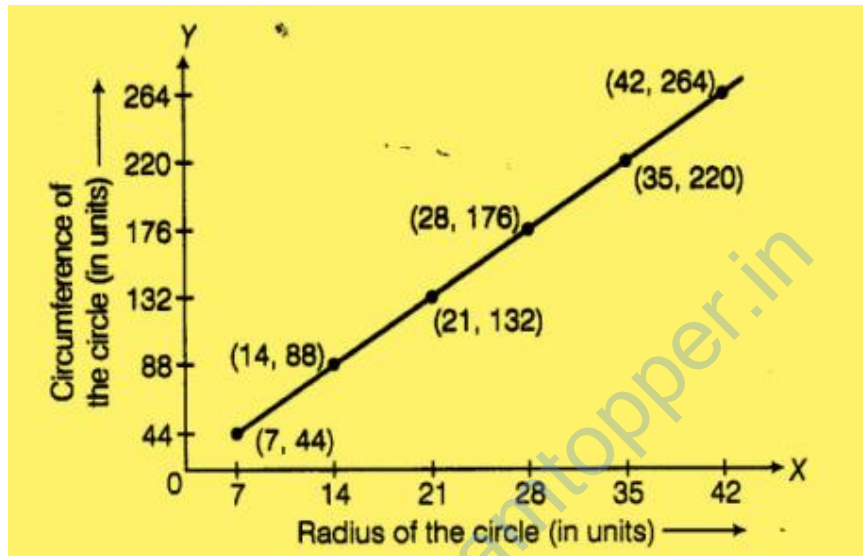
(a) When the radius is 42 units, from the graph, the value of y (circumference) is 264

(b) From the graph, it is obtained that when the circumference is 220, the value of radius is 35 units.

51. The graph shows the maximum temperatures recorded for two consecutive weeks of a town. Study the graph and answer the questions that follow.
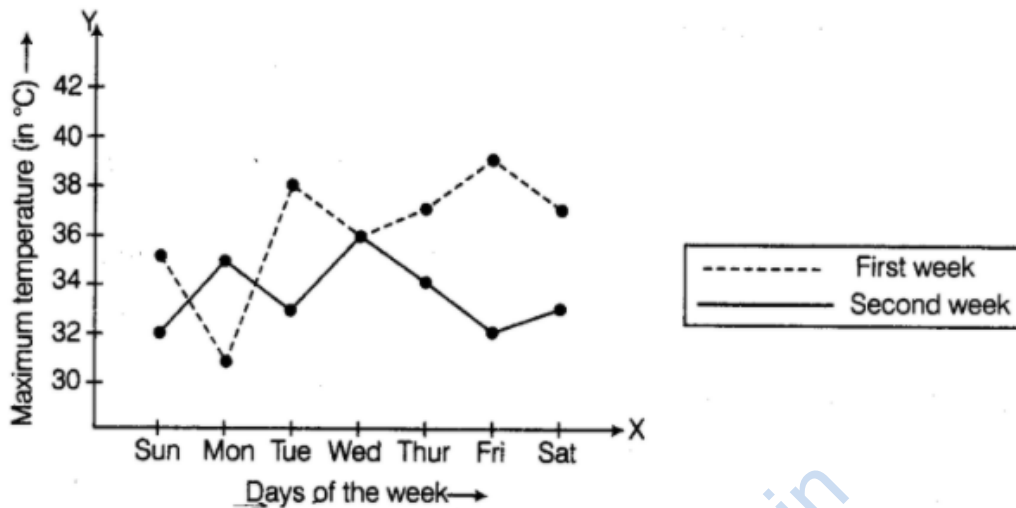
(a) What information is given by the two axes?
(b) In which week was the temperature higher on most of the days?
(c) On which day was the temperature same in both the weeks?
(d) On which day was the difference in temperatures the maximum for both the weeks?
(e) What were the temperatures for both the weeks on Thursday?
(f) On which day was the temperature 35°C for the first week?
(g) On which day was the temperature highest for the second week?

Solution:

(a) The X-axis represents days of a particular week and the X-axis represents the maximum temperature (in °C) recorded.
(b) Observing the graph, we see that in the first week temperature was higher on most of the days.
(c) The temperature was same on Wednesday in both the weeks.
(d) The difference in temperatures was the maximum on Friday for both the weeks.
(e) The temperature for the first week on Thursday was 37°C and the temperature for the second week on the same day was 34°C.
(f) On Sunday, the temperature was 35° for the first week.
(g) On Wednesday, the temperature was highest for the second week.

52. The graph given below gives the actual and expected sales of cars of a company for 6 months. Study the graph and answer the questions that follow.
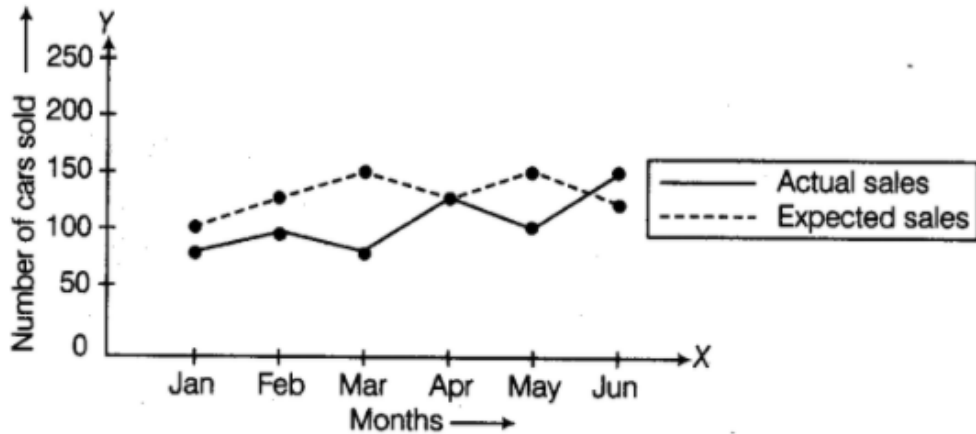
(a) In which month was the actual sales same as the expected sales?
(b) For which month(s) was (were) the difference in actual and expected sales the maximum?
(c) For which month(s) was (were) the difference in actual and expected sales the least?
(d) What was the total sales of cars in the months–Jan, Feb. and March?
(e) What is the average sales of cars in the last three months?
(f) Find the ratio of sales in the first three months to the last three months.

Solution:

We conclude that:
(a) In April, the actual sales was same as the expected sales.
(b) In March, the difference in actual and expected sales was the maximum.
(c) In April, the difference in actual and expected sales was the least.
(d) The total sales of cars in the months January, February and March was
$\quad$ (75 + 100+75) = 250.

(e) The average sales of cars in the last three months = $125 + 100+ \dfrac{150}{3}$
$$= 125$$

(f) The number of sales of car in the first three months = 250 and the number of sales of car in the last three months = 375
The required ratio = 250 : 375
$\quad\quad\quad\quad\quad\quad = 2:3$

53. The graph given below shows the marks obtained out of 10 by Sonia in two different tests. Study the graph and answer the questions that follow.
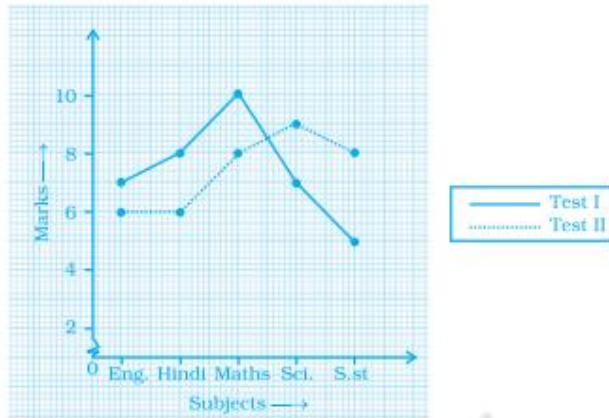
(a) What information is represented by the axes?
(b) In which subject did she score the highest in Test I?
(c) In which subject did she score the least in Test II?
(d) In which subject did she score the same marks in both the Tests?
(e) What are the marks scored by her in English in Test II?
(f) In which test was the performance better?
(g) In which subject and which test did she score full marks?

Solution:

According to question:

(a) The X-axis represents subjects and the Y-axis represents the marks obtained by Sonia.
(b) In Maths, she scored the highest in Test I.
(c) In English and Hindi, she scored the least in Test II.
(d) In Hindi and Maths, she scored the same marks in both tests.
(e) She scored 6 marks in English in Test II.
(f) Same performance in both tests.
(g) Test I in Maths, she scored full marks = 10 marks.

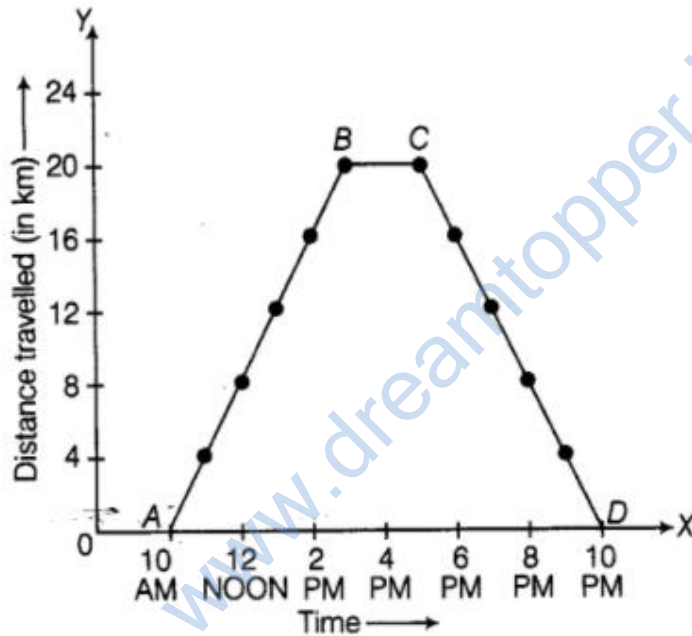**54. Find the coordinates of the vertices of the given figures.**
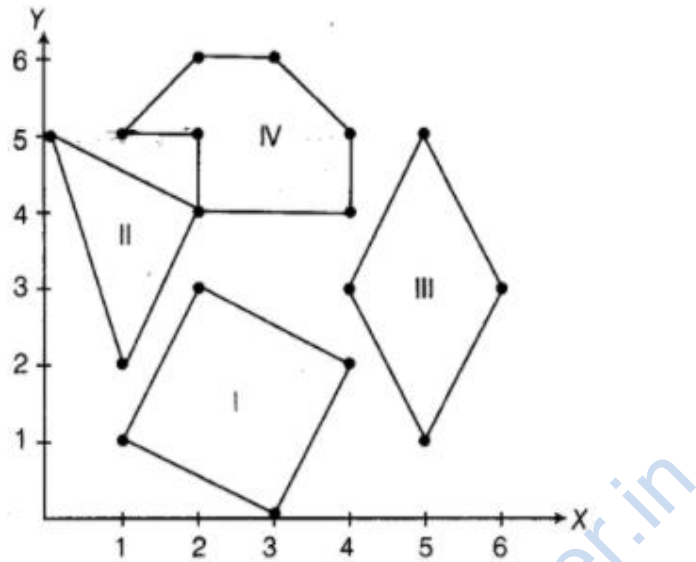
Solution:
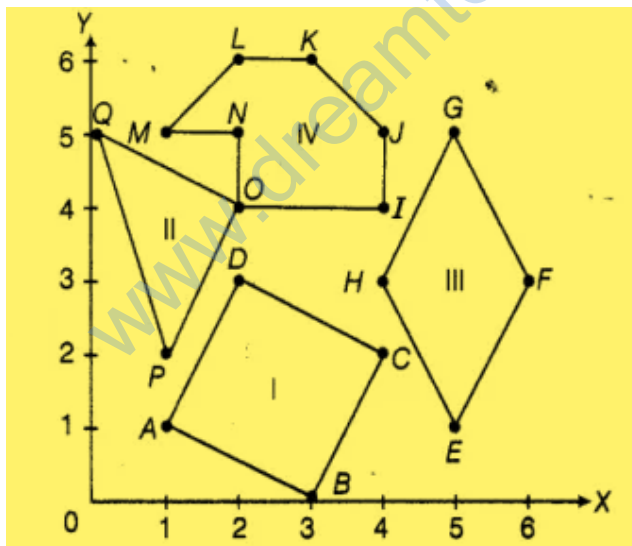
The coordinates of the vertices of the given figure are:

A(1,1)
B(3,0)
C(4,2)
D(2,3)
E(5,1)
F(6,3)
G(5,5)
H(4,3)

I(4,4)
J(4,5)
K(3,6)
L(2,6)
M(1,5)
N(2,5)
O(2,4)
P(1,2)
Q(0,5)

55. Study the graph given below of a person who started from his home and returned at the end of the day. Answer the questions that follow.

(a) At what time did the person start from his home?
(b) How much distance did he travel in the first four hours of his journey?
(c) What was he doing from 3 pm to 5 pm?
(d) What was the total distance travelled by him throughout the day?
(e) Calculate the distance covered by him in the first 8 hours of his journey.
(f) At what time did he cover 16 km of his journey?
(g) Calculate the average speed of the man from (a) A to B (b) B to C (c) At what time did he return home?

Solution:

According to question:

(a) At 10 AM, the person start from his home.

(b) In first 4 h (till 2PM), he travelled 16 km.
(c) He was taking rest from 3 PM to 5 PM.
(d) The total distance covered by the person throughout the day was 40 km,
    which is 20 km from A to S and then 20 km from C to D.
(e) The distance covered by him in the first 8 h which is from 10 AM to 6 PM was 24 km
(f) He covered 16 km of his journey at 2 PM
(g) The total distance covered from A to S=20 km
    The time taken to travel from A to B = 5 h

Average speed of the man from A to B $= \dfrac{20}{5}$

$$= 4 \text{ km/h}$$

And,

Average speed from S to C $= \dfrac{0}{2}$

$$= 0 \text{ km/h}$$

(h) He returned home at 10 PM.

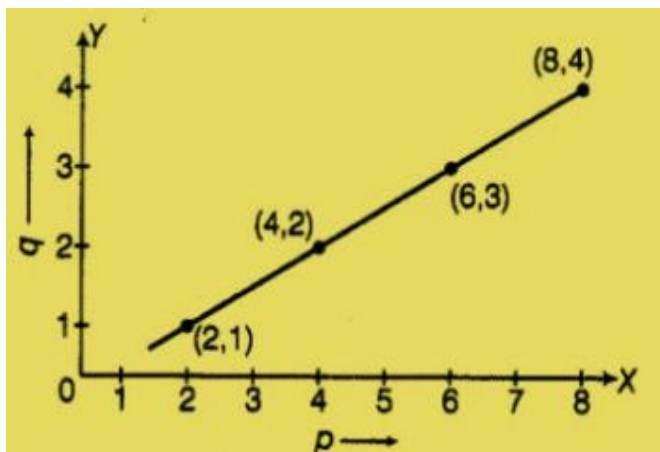**56. Plot a line graph for the variables p and q where p is two times q i.e, the equation is p = 2q. Then find.**
(a) the value of p when q = 3
(b) the value of q when p = 8

Solution.

Given, p = 2q
So, the table is,

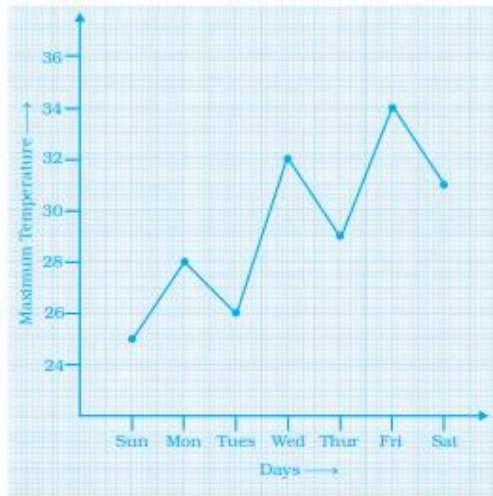| q	2	4	6	8
p	1	2	3	4

According to the above data the graph is shown below:

a) When p = 3, then the value of q = 6
b) When p = 8, then the value of q = 4

57. 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?

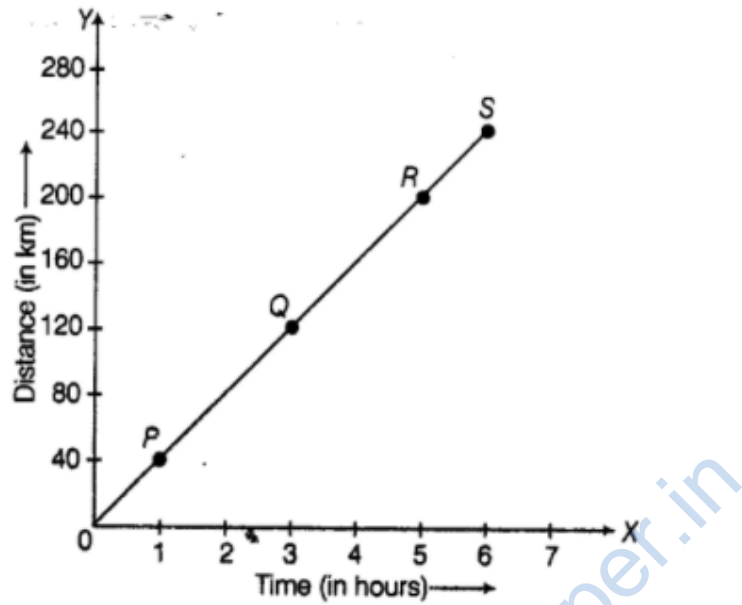**Solution:**

(a) The information obtained from the given graph is that the maximum temperature is 34°C
    Minimum temperature is 25°C in a week.
(b) On Sunday, the temperature was 25°C.
    So, it is least temperature in the week.
(c) On Saturday, the temperature was 31 °C.
(d) On Friday, the temperature was maximum which is 34°C.
    Hence, it is the hottest day of the week.

58. Study the distance-time graph given below for a car to travel to certain
places and answer the questions that follow.
(a) How far does the car travel in 2 hours?
(b) How much time does the car take to reach R?
(c) How long does the car take to cover 80 km?
(d) How far is Q from the starting point?
(e) When does the car reach the place S after starting?

Solution:

(a) From the given graph, the car travels 80 km in 2h.
(b) 5 h taken by car to reach ft.
(c) 2 h taken by car to cover 80 km.
(d) G is 120 km far from the starting point.
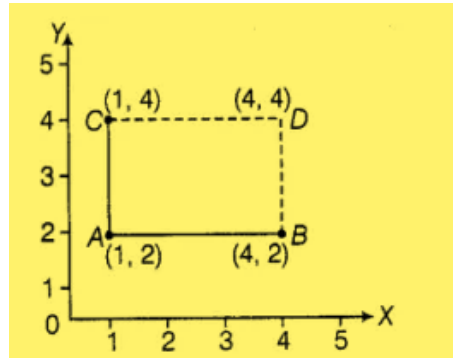(e) The car reaches the places after starting in 6 h.

59. Locate the points A (1,2), B (4,2) and C (1,4) on a graph sheet taking suitable axes. Write the coordinates of the fourth point D to complete the rectangle ABCD.

Solution:

Given,
The points = A (1, 2), B (4,2) and C (1,4)
The graph of these points is shown below:

To complete the rectangle ABCD, the coordinates of fourth point D will be (4,4),
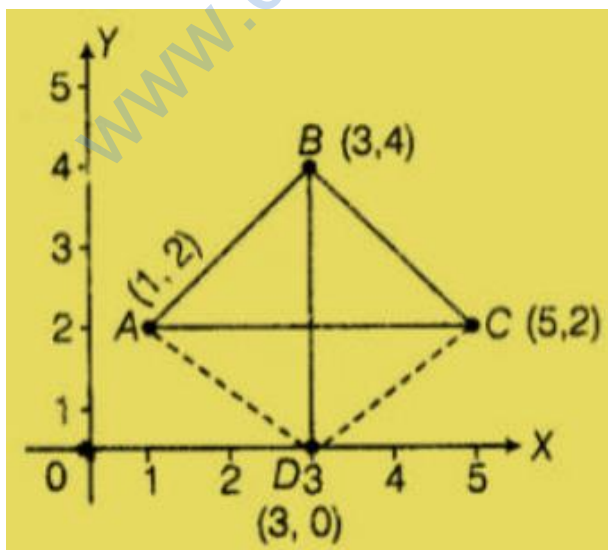D(4,4)

60. Locate the points A(1,2), B (3,4) and C (5,2) on a graph sheet taking suitable axes. Write the coordinates of the fourth point D to complete the rhombus ABCD. Measure the diagonals of this rhombus and find whether they are equal or not.

Solution:

Given,
The points = A (1,2), B (3,4) and C (5,2)
These points show an incomplete rhombus on graph. The graph is shown below:
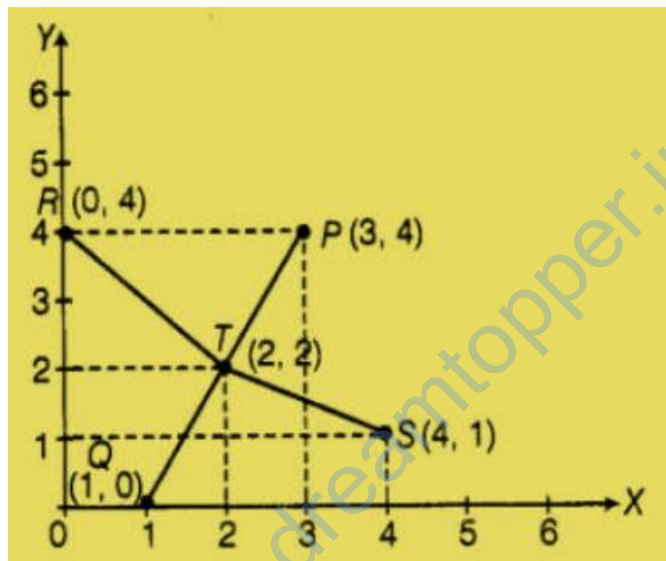

The length of diagonals in ABCD rhombus = 4 units.

61. Locate the points P (3,4), Q (1,0), R (0,4), S (4,1) on a graph sheet and write the coordinates of the point of intersection of line segments PQ and RS.
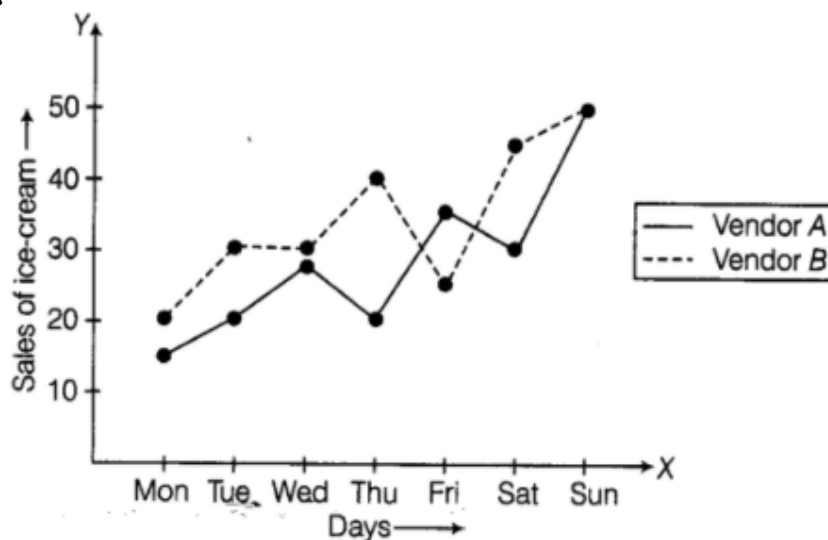
Solution:

As per question, the graph is shown below:

Observing the graph, we see that the intersecting point of RS and PQ is T (2, 2).

62. The graph given below compares the sales of ice creams of two vendors for a week.

Observe the graph and answer the following questions.
(a) Which vendor has sold more ice-cream on Friday?
(b) For which day was the sales same for both the vendors?
(c) On which day did the sale of vendor A increase the most as compared to the previous day?
(d) On which day was the difference in sales the maximum?
(e) On which two days was the sales same for vendor B?

Solution:

We conclude that:

(a) Vendor A has sold more ice-creams on Friday.
(b) On Sunday , the sales was the same for both the vendors.
(c) On Sunday, the sale of vendor A increased the most as compared to Saturday.
(d) The difference in sales was the maximum on Thursday.
(e) On Tuesday and Wednesday, the sales was the same for vendor B.

63. The table given below shows the temperatures recorded on a day at different times.

Observe the table and answer the following questions.
(a) What is the temperature at 8 am?
(b) At what time is the temperature 3°C?
(c) During which hour did the temperature fall?
(d) What is the change in temperature between 7 am and 10 am?
(e) During which hour was there a constant temperature?

Solution:

We have,

(a) At 8 AM, the temperature is 7°C.
(b) At 6 AM, the temperature is 3°C.
(c) The temperature fall in the hour 5 AM to 6 AM.
(d) The change in temperature is 3°C between 7 AM and 10 AM.
(e) Between 8 AM to 9 AM, there was a constant temperature.

64. The following table gives the growth chart of a child.

Height (in cm)	75	90	110	120	130
Age (in years)	2	4	6	8	10

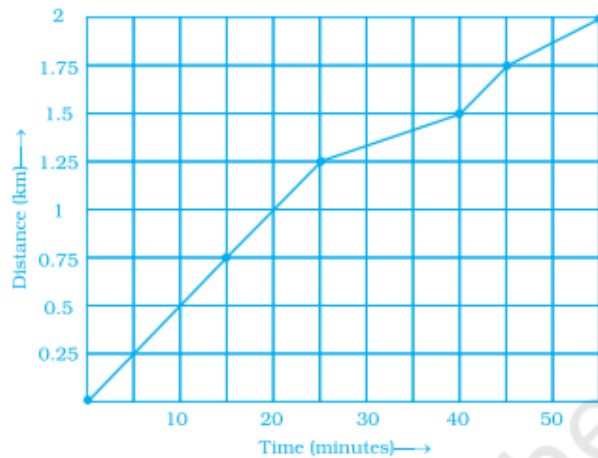**Draw a line graph for the table and answer the questions that follow.**
(a) What is the height at the age of 5 years?
(b) How much taller was the child at the age of 10 than at the age of 6?
(c) Between which two consecutive periods did the child grow more faster?

Solution:
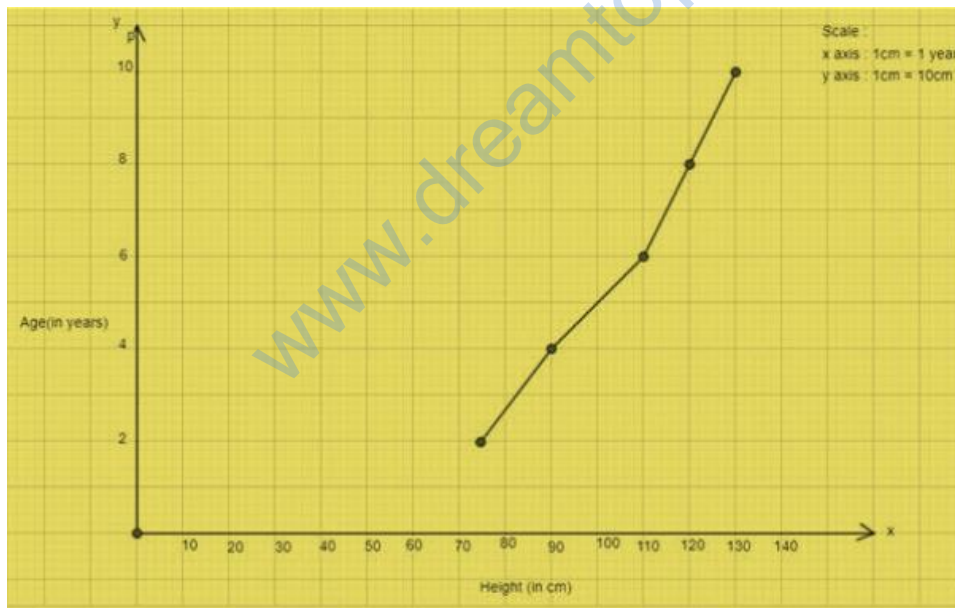
a) 100 cm
b) 130 cm
c) 2 – 4 years and 4 – 6 years.

65. The following is the time-distance graph of Sneha's walking.

(a) When does Sneha make the least progress? Explain your reasoning.
(b) Find her average speed in km/hour.

Solution:

We have,
a) Least progress = 25 to 40 min.
According to the graph, sneha travelled 0.5 km in 10 minutes, 0.25 km in 5 minutes, till the Ist 25 minutes.

But graph shows that after 25 minutes, sneha's speed decreased between 25 minutes to 40 minutes. This time she travelled 0.25 km in 15 minutes.

b) We know that,

$$\text{Average speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$
$$= \frac{2 \times 60}{55}$$
$$= 2.18 \text{ km/hour}$$

66. Draw a parallelogram ABCD on a graph paper with the coordinates given in Table I. Use this table to complete Tables II and III to get the coordinates of E, F, G, H and J, K, L, M.
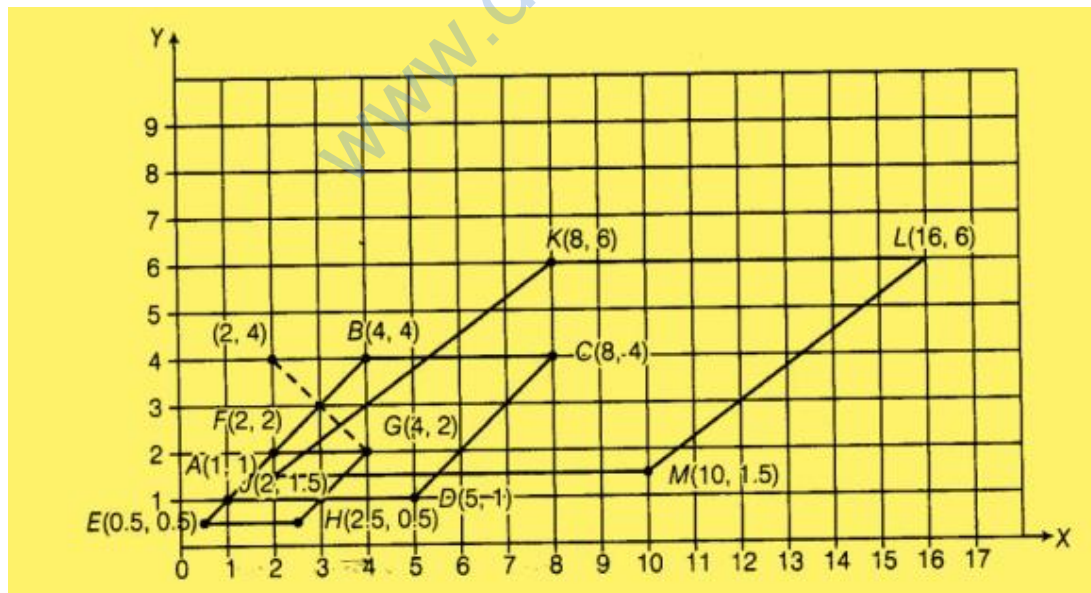
Table I		Table II		Table III	
Point	**(x, y)**	**Point**	**(0.5x, 0.5y)**	**Point**	**(2x, 1.5y)**
A	(1, 1)	E	(0.5, 0.5)	J	(2, 1.5)
B	(4, 4)	F	(2,2)	K	(8, 6)
C	(8, 4)	G	(4,2)	L	(16, 6)
D	(5, 1)	H	(2.5, 0.5)	M	(10,1.5)

Draw parallelograms EFGH and JKLM on the same graph paper. Plot the points (2, 4) and (4, 2) on a graph paper, then draw a line segment joining these two points.
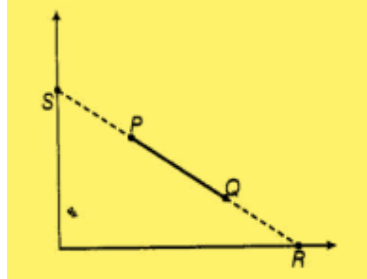
Solution:

Complete table is :

Points	(0.5x,0.5y)	Points	(2x,1.5y)
E	(0.5,0.5)	J	(2,1.5)
F	(2,2)	K	(8,6)
G	(4,2)	L	(16,6)
H	(2.5,0.5)	M	(10,1.5)

67. Extend the line segment on both sides to meet the coordinate axes. What are the coordinates of the points where this line meets the x -axis and the y-axis?
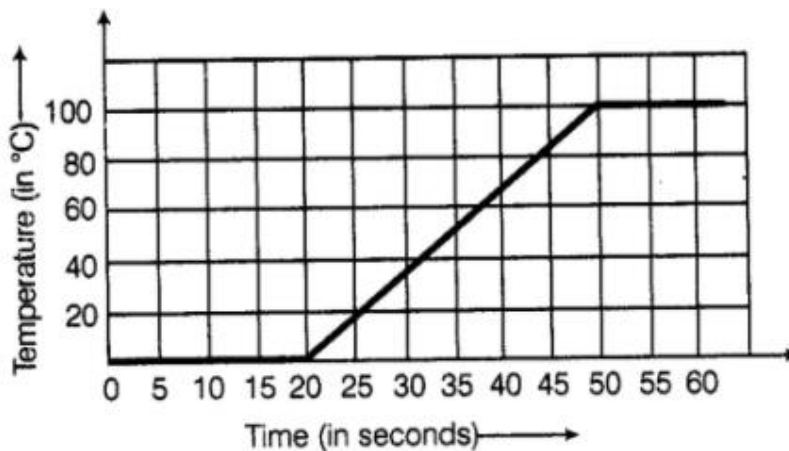
Solution:

Let PQ is a line segment which is extended from both ends to meet the axes.

The coordinates of the point on y-axis, where the line segment meet will be of form (0,y) whereas the coordinates of the point of interaction on X-axis will be of type (x,0).

68. The following graph shows the change in temperature of a block of ice when heated. Use the graph to answer the following questions:
**(a) For how many seconds did the ice block have no change in temperature?**
(b) For how long was there a change in temperature?
(c) After how many seconds of heating did the temperature become constant at 0°C?
(d) What was the temperature after 25 seconds?
(e) What will be the temperature after 1.5 minutes? Justify your answer.

Solution:

(a) In the first 20 s, the ice block have no change in temperature.
(b) There was a change in temperature from 20 s to 50 s,
    50-20 = 30s.
(c) Observing the graph, we see that after 50 s of heating the temperature became constant.
(d) 20°C was the temperature after 25 s.
(e) Since, the temperature became constant at 100°C after 50 s heating, so the temperature will be 100°C even after 1.5 min.

69. The following graph shows the number of people present at a certain shop at different times. Observe the graph and answer the following questions.
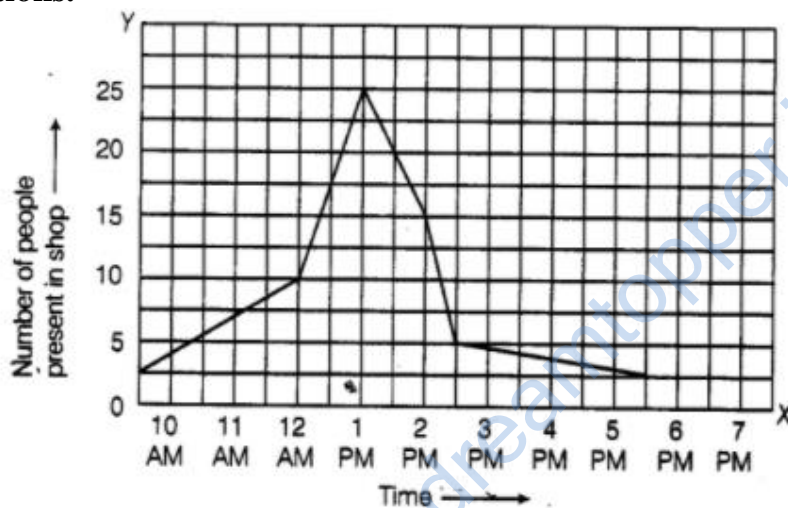
(a) What type of a graph is this?
(b) What information does the graph give?
(c) What is the busiest time of day at the shop?
(d) How many people enter the shop when it opens?
**(e) About how many people are there in the shop at 1:30 pm?**

Solution:

(a) This is a line graph.
(b) It represents the number of people, who visited the store at a particular time.
(c) The busiest time of day is 1 PM at a shop, as at this time maximum number of people 25 visited the shop.
(d) When it opens less than 5 people enter the shop.
(e) There are 20 people in the shop at 1:30 PM.

70. A man started his journey on his car from location A and came back. The given graph shows his position at different times during the whole journey.
(a) At what time did he start and end his journey?

(b) What was the total duration of journey?
(c) Which journey, forward or return, was of longer duration?
(d) For how many hours did he not move?
**(e) At what time did he have the fastest speed?**
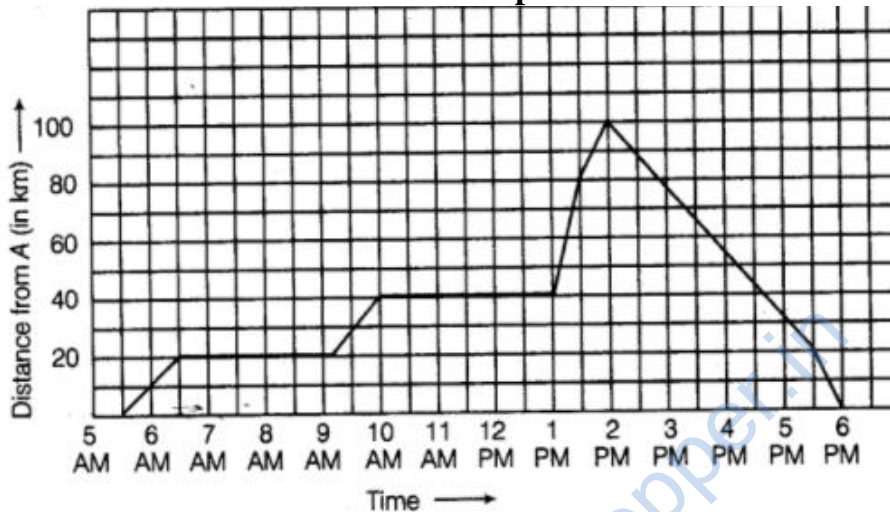
Solution:

We observe that,

(a) He started his journey at 5:30 AM and end at 6 PM.
(b) Total duration of journey was 12:30 h.
(c) His forward journey is of duration 8:30 h and return journey is of duration 4 h. Forward journey was of longer duration.
(d) He did not move from 6:30 AM to 9:30 AM and 10 AM to 1 PM.
So, he did not move for 6 h.
(e) He have the fastest speed at 1 PM.

71. The following graph shows the journey made by two cyclists, one from town A to B and the other from town B to A.
(a) At what time did cyclist II rest? How long did the cyclist rest?
(b) Was cyclist II cycling faster or slower after the rest?
(c) At what time did the two cyclists meet?
(d) How far had cyclist II travelled when he met cyclist I?
(e) When cyclist II reached town A, how far was cyclist I from town B?
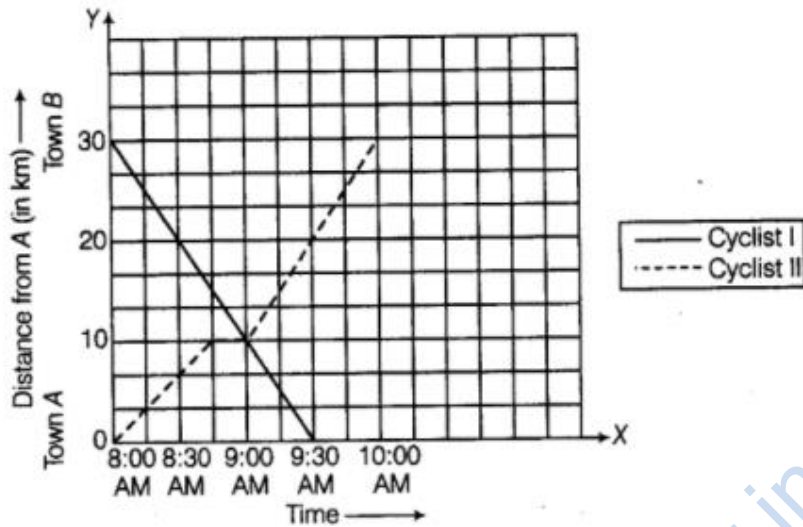
Solution:

(a) On the basis of given graph, the cyclist II rest at 8 : 45 AM for 15 min.
(b) Cyclist II is cycling faster after rest as he has covered a distance of 20 km in 1 h.
(c) Both cyclists meet at 9:00 AM.
(d) The cyclist II had travelled 20 km, when he met cyclist I.
(e) When cyclist II reached town A, the cyclist I was 10 km for from town B.

72. Ajita starts off from home at 07.00 hours with her father on a scooter that goes at a uniform speed of 30 km/h and drops her at her school after half an hour. She stays in the school till 13.30 hours and takes an auto rickshaw to return home. The rickshaw has a uniform speed of 10 km/h. Draw the graph for the above situation and also determine the distance of Ajita's school from her house.
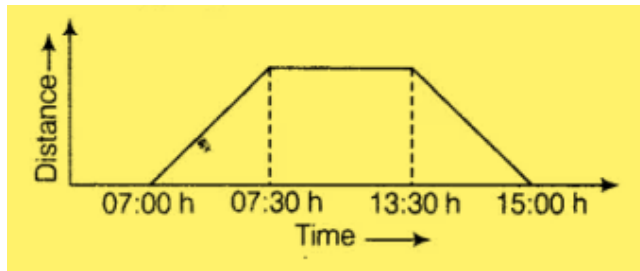
Solution:

Uniform speed Ajita's father on scooter = 30 km/h

Time taken to drop Ajita = $\frac{1}{2}$ hour on 30 minutes

So,

Distance between Ajita's school and her home = $\frac{1}{2}$ x 30

$= 15$ km

Distance cover in 1 minute = $\frac{15}{30}$ km
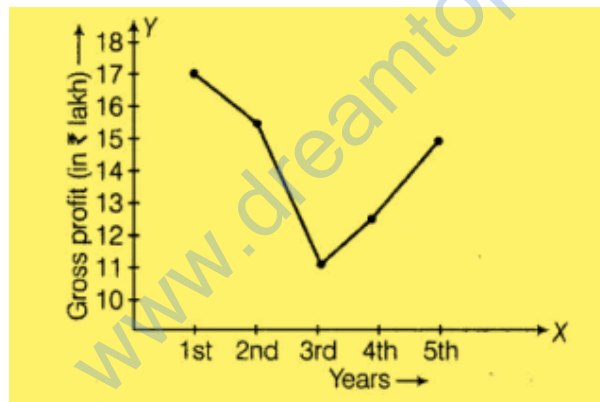
$= \frac{1}{2}$ km

$= 500$ m

73. Draw the line graph using suitable scale to show the annual gross profit of a company for a period of five years.

Years	1st	2nd	3rd	4th	5th
Gross profit (in ₹)	1700000	1550000	1140000	1210000	1490000

Solution:

We have taken years on X-axis and gross profit on Y-axis.

The line graph of an annual gross profit of a company for a period of five years are given below.

74. The following chart gives the growth in height in terms of percentage of full height of boys and girls with their respective ages.

Age (in years)	8	9	10	11	12	13	14	15	16	17	18
Boys	72%	75%	78%	81%	84%	88%	92%	95%	98%	99%	100%
Girls	77%	81%	84%	88%	91%	95%	98%	99%	99.5%	100%	100%

Draw the line graph of above data on the same sheet and answer the following questions. (a) In which year both the boys and the girls achieve their maximum height?

(b) Who grows faster at puberty (14 years to 16 years of age)?

Solution:
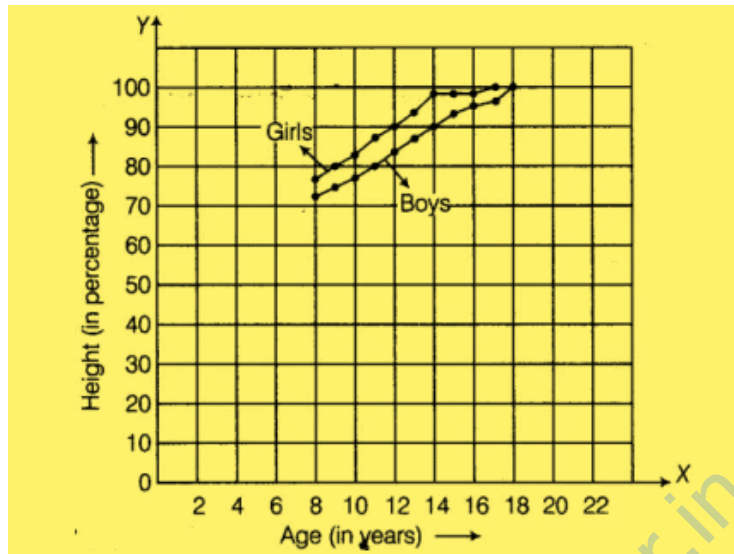
(a) In 18 yr, the boys and in 17 yr, the girls achieve their maximum height.
(b) Boys grows faster than the girls during puberty.

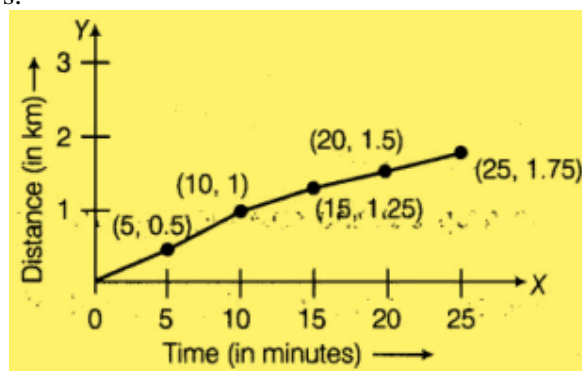## 75. The table shows the data collected for Dhruv's walking on a road.

Time (in minutes)	0	5	10	15	20	25
Distance (in km)	0	0.5	1	1.25	1.5	1.75

(a) Plot a line graph for the given data using a suitable scale.
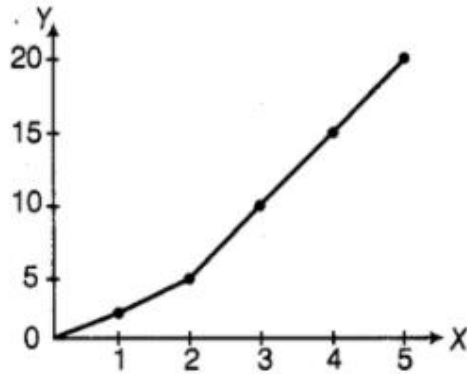**(b) In what time periods did Dhruv make the most progress?**

Solution:

(a)
The graph is as follows:

(b) Dhruv makes most progress in 0-5 minutes and in 5-10 minutes.

76. Observe the given graph carefully and complete the table given below.
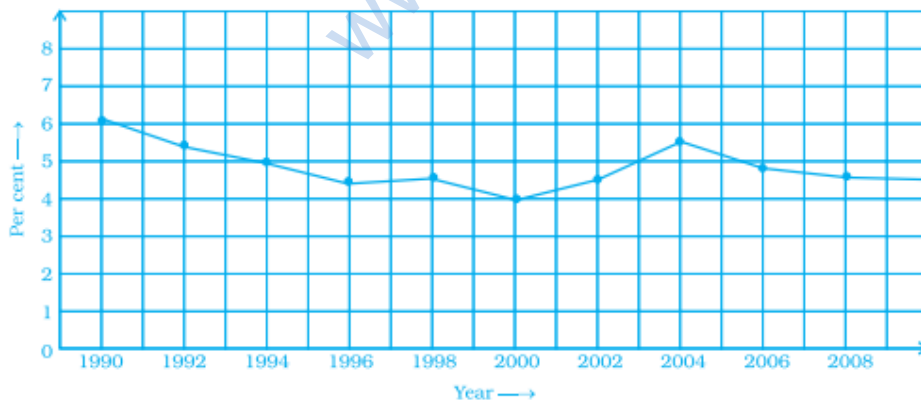
x	1	2	3	4	5
y					

Solution:

From the graph, we graph,

x	1	2	3	4	5
y	2.5	5	10	15	20

77. This graph shows the per cent of students who dropped out of school after completing High School. The point labelled A shows that, in 1996, about 4.7% of students dropped out.

(a) In which year was the dropout the rate highest? In which year was it the lowest?
(b) When did the per cent of students who dropped out of high school first fall below 5%? (c) About what per cent of students dropped out of high

school in 2007? About what per cent of students stayed in high school in 2008?

Solution:

We have,
(a) The drop out rate was the highest in the year 1990 and the least in 2000.
(b) In the year 1996, the per cent of students dropped out of high school first fall below 5%.
(c) About 4.7% students dropped out of high school in 2007.

78. Observe the toothpick pattern given below:

Pattern 1   Pattern 2   Pattern 3   Pattern 4
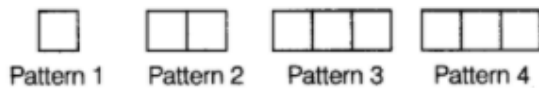
(a) Imagine that this pattern continues. Complete the table to show the number of toothpicks in the first six terms.

Pattern	1	2	3	4	5	6
Toothpicks.	.4			13		

(b) Make a graph by taking the pattern numbers on the horizontal axis and the number of toothpicks on the vertical axis. Make the horizontal axis from 0 to 10 and the vertical axis from 0 to 30.
(c) Use your graph to predict the number of toothpicks in patterns 7 and 8. Check your answers by actually drawing them.
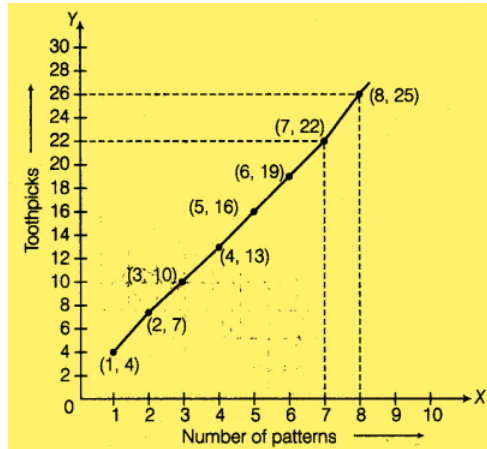**(d) Would it make sense to join the points on this graph? Explain.**

Solution:
(a)

Pattern	1	2	3	4	5	6
Toothpicks	4	7	10	13	16	19

Pattern:
y = 3x +1

(b) On the basis of given points, we can draw the following graph,

(c) As the graph follows,

   y = 3x + 1

Then:

x	7	8
y	22	25

(d) Yes

   It shows relation between x and y.

   y = 3x +1

79. Consider this input/output table.

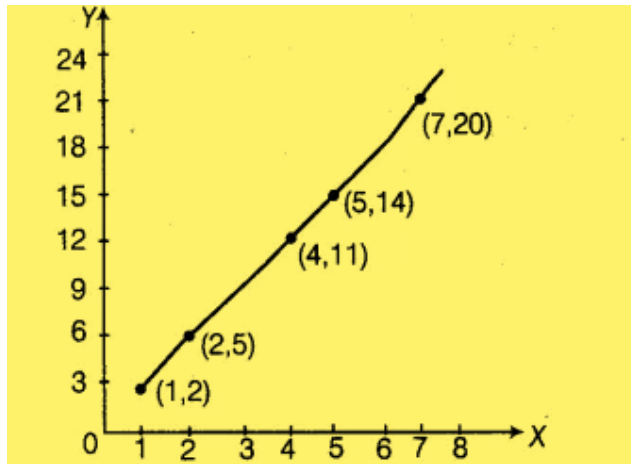| Input	1	2	4	5	7
Output	2	5	11	14	20

(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.
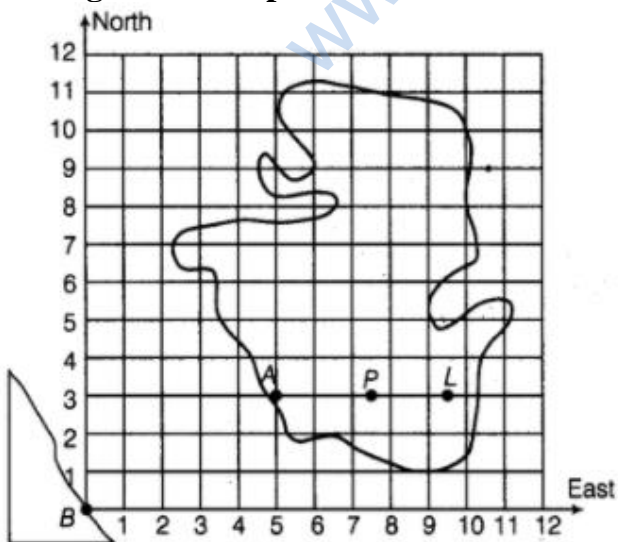
Solution:

(a) From the table :

The graph shows y = 3x – 1

(b) Pattern, y = 3x – 1
If x =3,
y = 3(3) -1
y = 8

If x =8,
y = 3(8) – 1
y = 23

80. This graph shows a map of an island just off the coast of a continent. The point labelled B represents a major city on the coast. The distance between grid lines represents 1 km.

Point A represents a resort that is located 5 km East and 3 km North of Point B. The values 5 and 3 are the coordinates of Point A. The coordinates

can be given as the ordered pair (5, 3), where 5 is the horizontal coordinate and 3 is the vertical coordinate.

(i) On a copy of the map, mark the point that is 3 km East and 5 km North of Point B and label it S. Is Point S in the water or on the island? Is Point S in the same place as Point A?

(ii) Mark the point that is 7 km east and 5 km north of Point B and label it C. Then mark the point that is 5 km east and 7 km north of Point B and label it D. Are Points C and D in the same place? Give the coordinates of Points C and D.

(iii) Which point is in the water, (2, 7) or (7, 2)? Mark the point which is in water on your map and label it E.
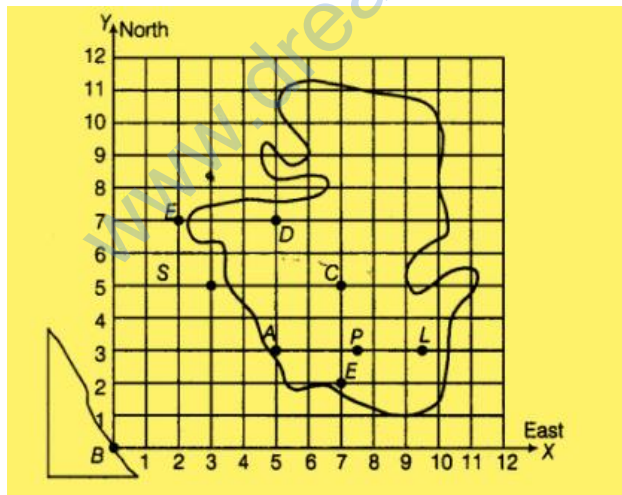
(iv) Give the coordinates of two points on the island that are exactly 2 km from Point A.

(v) Give the coordinates of the point that is halfway between Points L and P.

(vi) List three points on the island with their x-coordinates greater than 8.

(vii) List three points on the island with a y-coordinate less than 4.

Solution:

(i) The points is in the water.
No, it is not in the same place as point A
(ii)No, they are not in the same place.
The coordinates of points C and D are (7, 5) and (5, 7), respectively.
(iii)(2, 7) is in the water.
(iv)(7, 3), (5, 5)
(v) (8.5, 3)
(vi)(9,4), (10,4), (11,5)

(vii)(5, 3), (6, 2), (7, 2)

(Answer for option (vi) and (vii) may vary from student to student)

81. As part of his science project, Prithvi was supposed to record the temperature every hour one Saturday from 6 am to midnight. At noon, he was taking lunch and forgot to record the temperature. At 8:00 pm, his favourite show came on and so forgot again. He recorded the data so collected on a graph sheet as shown below.
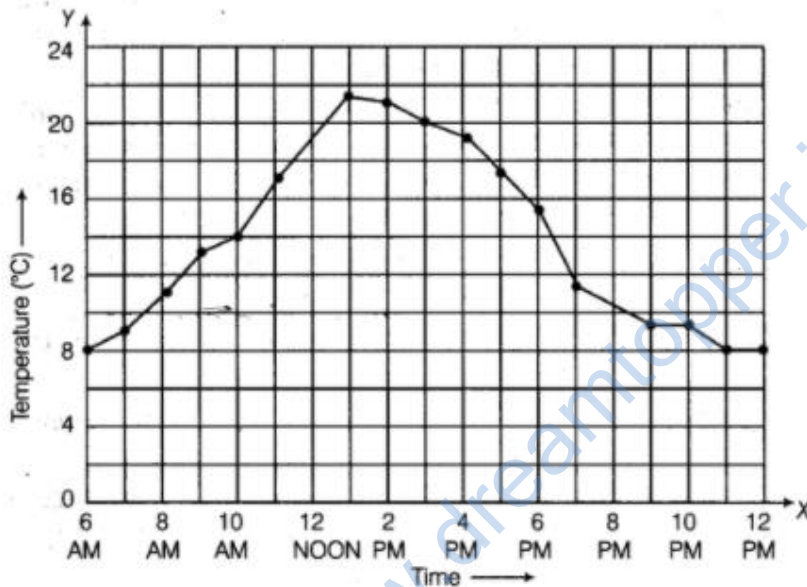

(a) Why does it make sense to connect the points in this situation?
(b) Describe the overall trend, or pattern, in the way the temperature changes over the time period shown on the graph.
(c) Estimate the temperature at noon and 8 pm.

Solution:
(a) By connecting the points, it is easier to understand a change in the temperature.
(b) Initially the temperature was 8°C at 6 AM and started increasing strictly till 1 PM and after that it decreased to 8°C till 12 PM.
(c) At 12 PM 19°C and at 8PM 10°C.

82. The graph given below compares the price (in Rs) and weight of 6 bags (in kg) of sugar of different brands A, B, C, D, E, F.
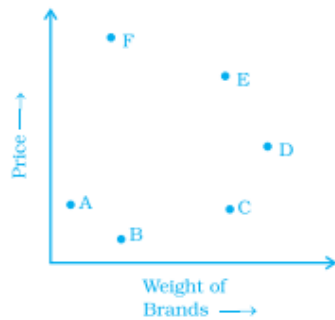
(a) Which brand(s) costs/cost more than Brand D?
(b) Bag of which brand of sugar is the heaviest?
(c) Which brands weigh the same?
(d) Which brands are heavier than brand B?
(e) Which bag is the lightest?
(f) Which bags are of the same price?

Solution:
On observing the graph, we have,

(a) The brands E and F cost more than brand D.
(b) The bag of sugar of brand D is the heaviest.
(c) The weights of bag of brand S and F
     Brand E and C weighs same.
(d) Brands C, D, E are heavier than brand B.
(e) Bag of brand A is the lightest.
(f) Bags of brand A and C are of the same price.

83. The points on the graph below represent the height and weight of the donkey, dog, crocodile, and ostrich shown in the drawing.
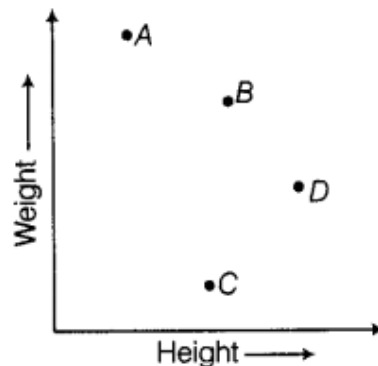
(a) What are the two variables represented in the graph?
(b) Which point represents each animals? Explain.

Solution:

(a) Height and weight are the two variables in the graph.
(b) In the graph, we observe that the points A represents a crocodile as it has least height and greatest weight among all animals.

A-Crocodile   [least height, greatest weight]
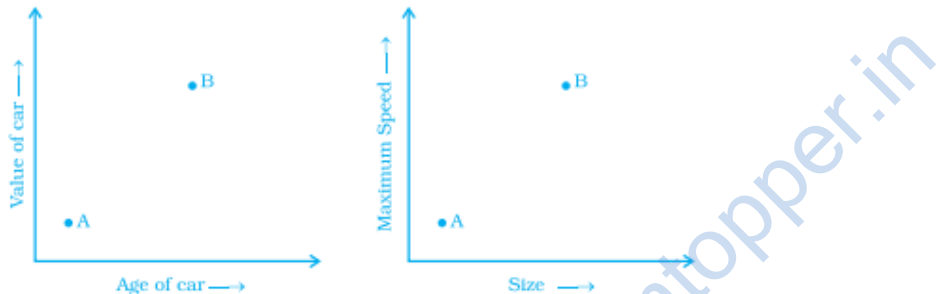B – Donkey   [height and weight more than dog]
C – Dog
D – Ostrich   [greatest height]

84. The two graphs below compare Car A and Car B. The left graph shows the relationship between age and value. The right graph shows the relationship between size and maximum speed.

Use the graphs to determine whether each statement is true or false, and explain your answer.
(a) The older car is less valuable.
(b) The faster car is larger.
(c) The larger car is older.
(d) The faster car is older.
(e) The more valuable car is slower.

Solution:

(a) False, the older car is 8 i.e. 8 valuable more than car A.
(b) True, in the second graph 8 is larger car having greater speed.
(c) True, larger car is 8 which is older than A
(d) True, as 8 is faster as well as older than A.
(e) False, as 8 is more valuable but not slower.

85. Sonal and Anmol made a sequence of tile designs from square white tiles surrounding one square purple tile. The purple tiles come in many sizes. Three of the designs are shown below.
(a) Copy and complete the table

Side length of purple	1	2	3	4	5	10	100
Number of white tiles in border							

Side length 1
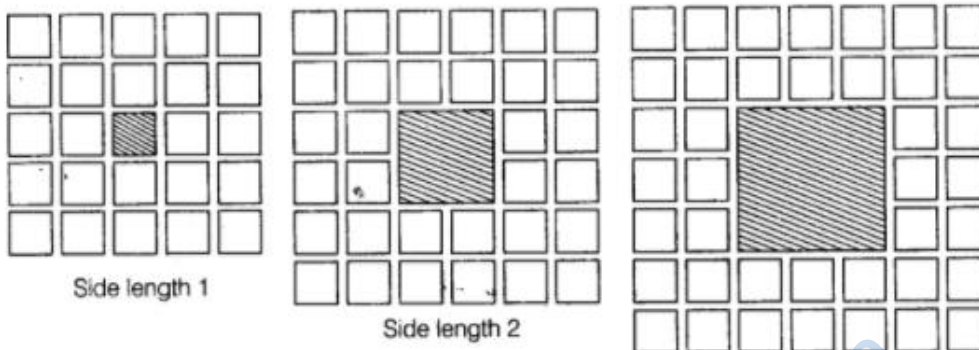
Side length 2

(b) Draw a graph using the first five pairs of numbers in your table.
(c) Do the points lie on a line?
Solution:

(a) In side length 1 the number of white tile surrounding purple tile is 4.
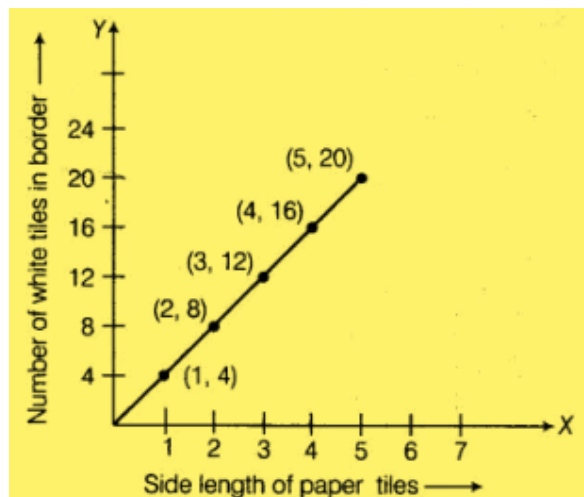Similarly, in side length 2 the number of white tiles surrounding purple tile is 8.
Thus, we can arrange the following table which shows side length of purple corresponding to the number of white tiles in border.

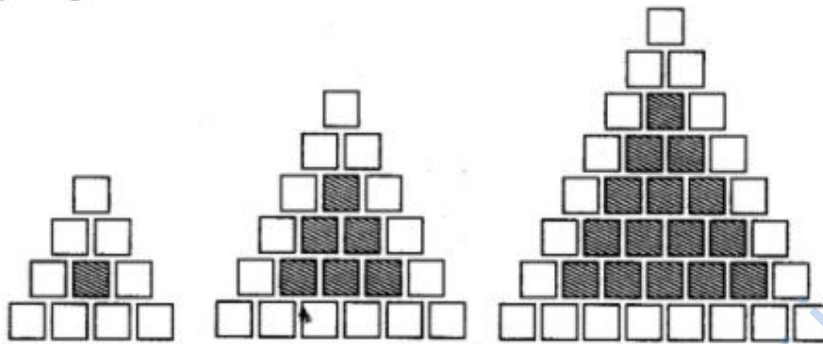| Side length of purple	1	2	3	4	5	10	100
Number of white tiles in border	4	8	12	16	20	40	400

So,
y = 8x+16

(b) On basis of table, we will draw the graph as,

(c) Yes all points lies on a line.

86. Sonal and Anmol then made another sequence of the designs. Three of the designs are shown below.

(a) Complete the table.

Rows, r	4	6	8
Number of white tiles, w	9		
Number of purple tiles, p	1		

(b) Draw a graph of rows and number of white tiles. Draw another graph of the number of rows and the number of purple tiles. Put the number of rows on the horizontal axis.
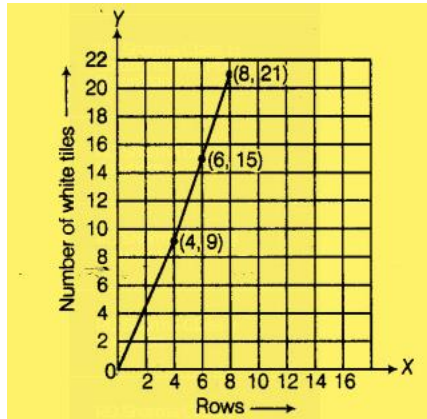**(c) Which graph is linear?**

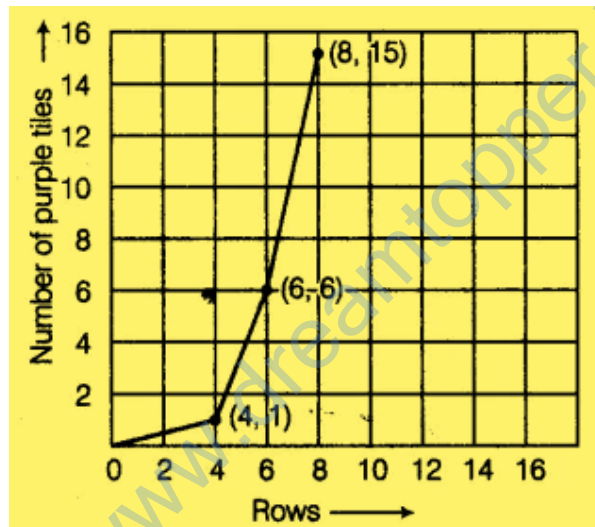**Solution:**

(a) The complete table is :

Rows, r	4	6	8
Number of white tiles,w	9	15	21
Number of purple tiles, p	1	6	15

(b) Graph of rows and number of white tiles is :

Graph of the number of rows and the number of purple tiles :

(c) No graph is linear.