

27. Introduction to Graphs

Exercise 27.1

1. Question

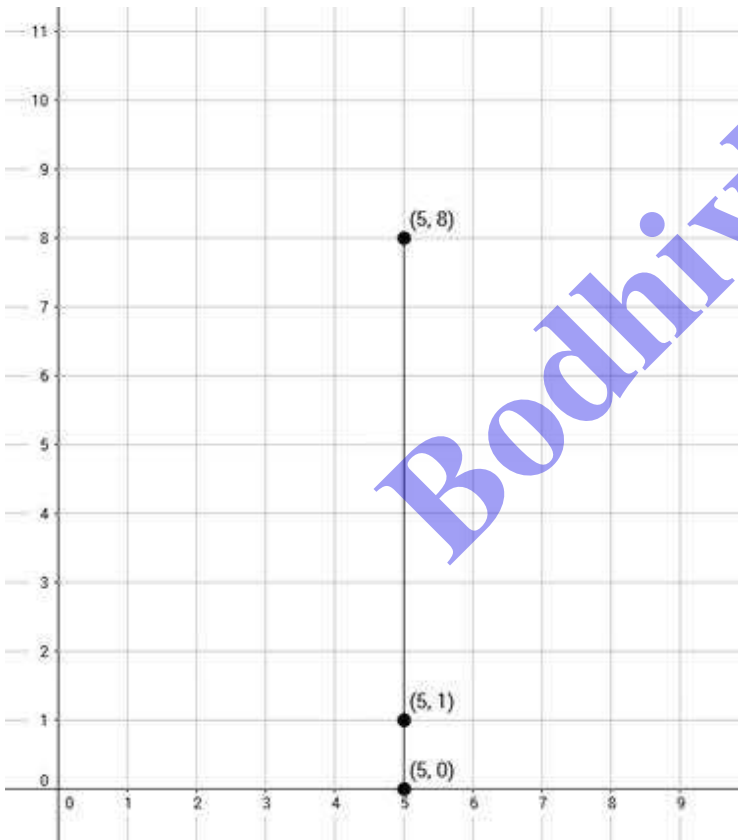
Plot the points $(5,0)$, $(5,1)$, $(5,8)$. Do they lie on a line? What is your observation?

Answer

In order to plot point $(5, 0)$, we start from the origin and move 5 cm along x- axis. The point we arrive at is point $(5,0)$.

To plot point $(5, 1)$, we move 5 cm along x- axis and 1 cm along y- axis. The point we arrive at is point $(5,1)$.

To plot point $(5,8)$, we move 5 cm along x- axis and 8 cm along y- axis. The point we arrive at is point $(5,8)$.



After plotting points, we observe that all points are having same ordinate (ie. same x-coordinate.)

Hence, all points lie on the same line.

2. Question

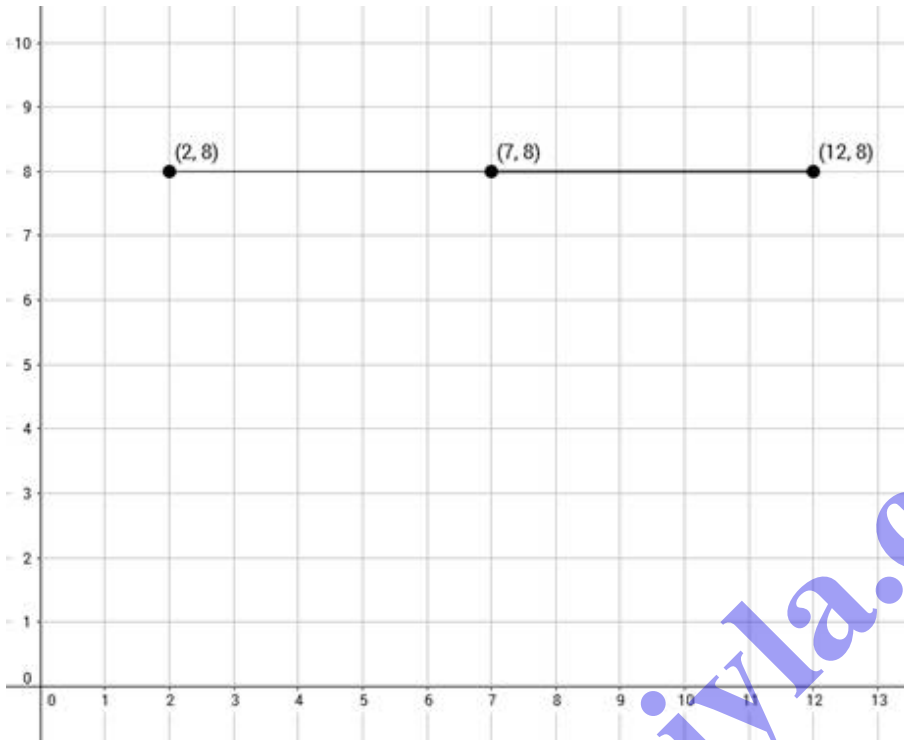
Plot the points $(2,8)$, $(7,8)$ and $(12,8)$. Join these points in pairs. Do they lie on a line? What do you observe?

Answer

In order to plot point $(2, 8)$, we move 2 cm along x-axis and 8 cm along y-axis. The point we arrive at is $(2, 8)$.

To plot point $(7, 8)$, we move 7 cm along x-axis and 8 cm along y-axis. The point we arrive at is $(7, 8)$.

To plot point $(12, 8)$, we move 12 cm along x-axis and 8 cm along y-axis. The point we arrive at is $(12, 8)$.



After plotting points, we observe that all points are having same ordinate (ie. same y-coordinate.)

Hence, all points lie on the same line.

3. Question

Locate the points :

- (i) $(1,1), (1,2), (1,3), (1,4)$
- (ii) $(2,1), (2,2), (2,3), (2,4)$
- (iii) $(1,3), (2,3), (3,3), (4,3)$
- (iv) $(1,4), (2,4), (3,4), (4,4)$

Answer

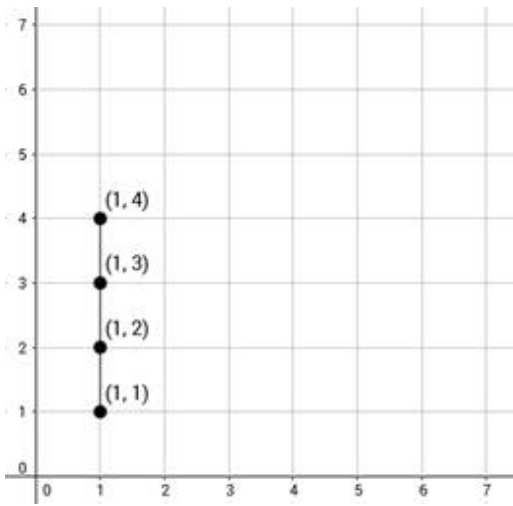
- (i) $(1,1), (1,2), (1,3), (1,4)$

In order to plot point $(1, 1)$, we move 1 cm along x-axis and 1 cm along y-axis. The point we arrive at is $(1, 1)$.

To plot point $(1, 2)$, we move 1 cm along x-axis and 2 cm along y-axis. The point we arrive at is $(1, 2)$.

To plot point $(1, 3)$, we move 1 cm along x-axis and 3 cm along y-axis. The point we arrive at is $(1, 3)$.

To plot point $(1, 4)$, we move 1 cm along x-axis and 4 cm along y-axis. The point we arrive at is $(1,4)$.



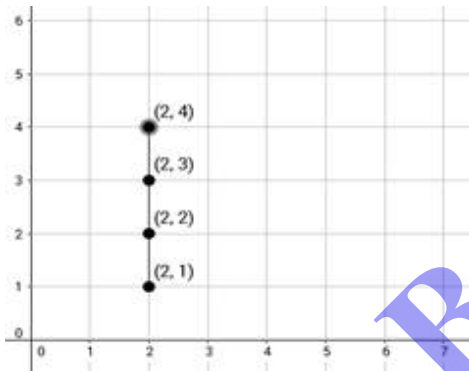
(ii) $(2,1), (2,2), (2,3), (2,4)$

In order to plot point $(2, 1)$, we move 2 cm along x-axis and 1 cm along y-axis. The point we arrive at is $(2, 1)$.

To plot point $(2, 2)$, we move 2 cm along x-axis and 2 cm along y-axis.

The point we arrive at is $(2, 2)$. To plot point $(2, 3)$, we move 2 cm along x-axis and 3 cm along y-axis. The point we arrive at is $(2,3)$.

To plot point $(2, 4)$, we move 2 cm along x-axis and 4 cm along y-axis. The point we arrive at is $(2,4)$.



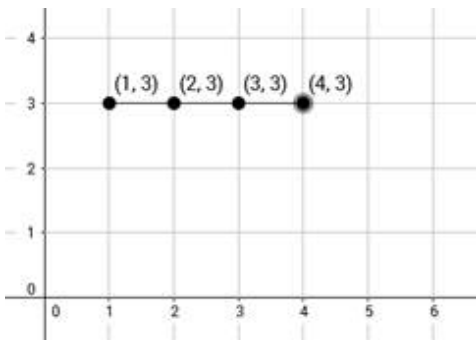
(iii) $(1,3), (2,3), (3,3), (4,3)$

In order to plot point $(1, 3)$, we move 1 cm along x-axis and 3 cm along y-axis. The point we arrive at is $(1, 3)$.

To plot point $(2, 3)$, we move 2 cm along x-axis and 3 cm along y-axis. The point we arrive at is $(2, 3)$.

To plot point $(3, 3)$, we move 3 cm along x-axis and 3 cm along y-axis. The point we arrive at is $(3,3)$.

To plot point $(4, 3)$, we move 4 0cm along x-axis and 3 cm along y-axis. The point we arrive at is $(4,3)$.



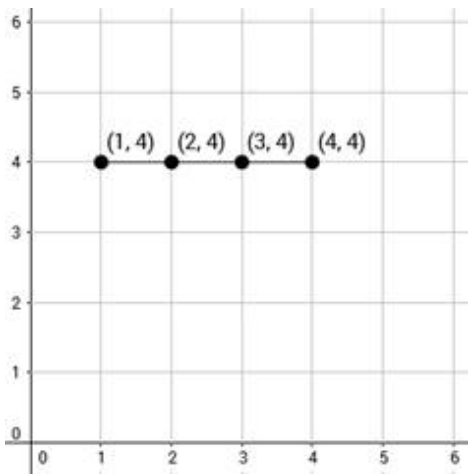
(iv) $(1,4), (2,4), (3,4), (4,4),$

In order to plot point $(1, 4)$, we move 1 cm along x-axis and 4 cm along y-axis. The point we arrive at is $(1, 4)$.

To plot point $(2, 4)$, we move 2 cm along x-axis and 4 cm along y-axis. The point we arrive at is $(2, 4)$.

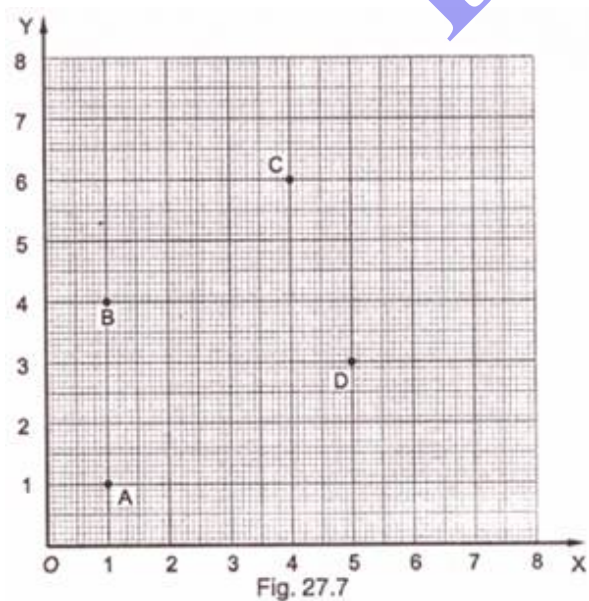
To plot point $(3, 4)$, we move 3 cm along x-axis and 4 cm along y-axis. The point we arrive at is $(3,4)$.

To plot point $(4, 4)$, we move 4 0cm along x-axis and 4 cm along y-axis. The point we arrive at is $(4,4)$.

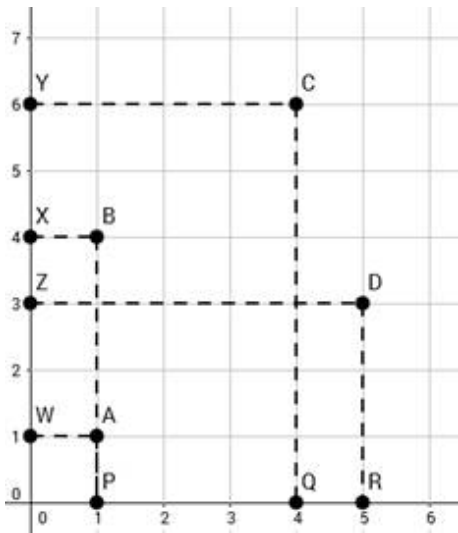


4. Question

Find the coordinates of points A, B, C, D in Fig. 27.7



Answer



Draw perpendiculars AP, BP, CQ and DR from A, B, C and D on the x-axis. Also, draw perpendiculars AW, BX, CY and DZ on the y-axis.

From the figure, we have:

AW = 1 cm and AP = 1 cm

So, the coordinates of vertex A are (1, 1).

Similarly, BX = 1 cm and BP = 4 cm

So, the coordinates of vertex B are (1, 4).

CY = 4 cm and CQ = 6 cm

So, the coordinates of vertex C are (4, 6).

DZ = 5 cm and DR = 3 cm

So, the coordinates of vertex D are (5, 3).

5. Question

Find the coordinates of points P, Q, R and S in Fig. 27.8.

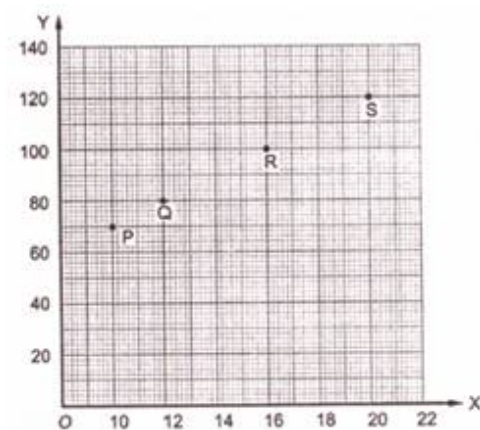
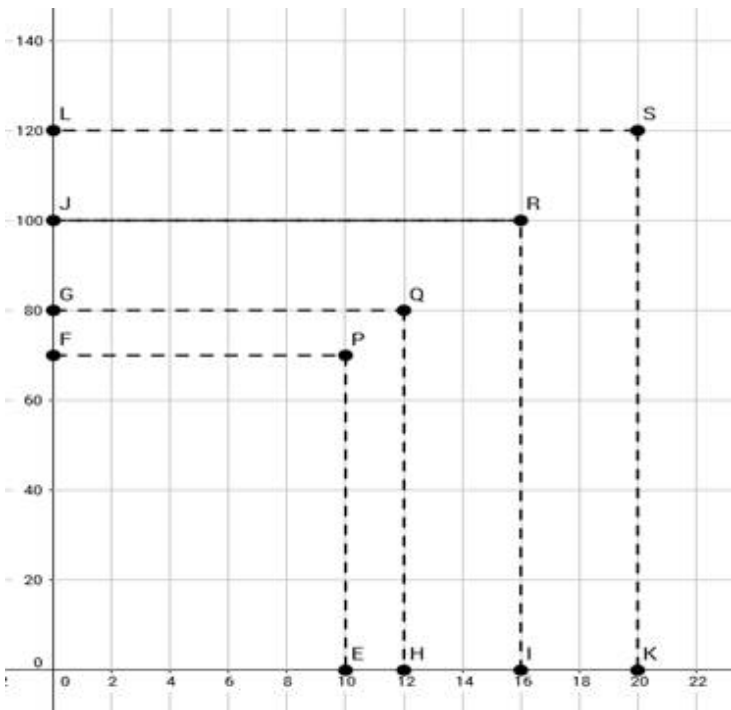


Fig. 27.8

Answer



Draw perpendiculars PE, QH, RI and SK from P, Q, R and S on the x-axis. Also, draw perpendiculars PF, QG, RJ and SL on the y-axis.

From the figure, we have:

PF = 10 cm and PE = 70 cm

So, the coordinates of vertex P are (10, 70).

Similarly, QG = 12 cm and QH = 80 cm

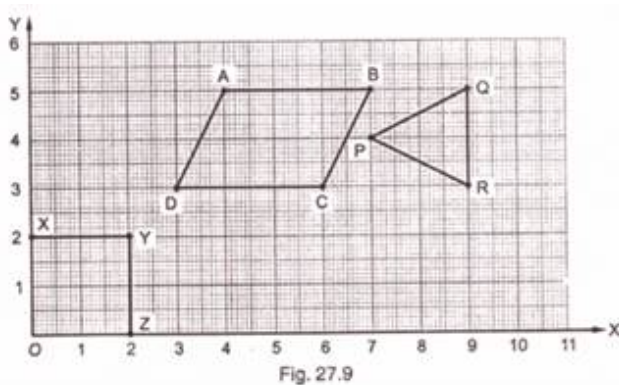
So, the coordinates of vertex Q are (12, 80).

RJ = 16 cm and RI = 100 cm So, the coordinates of vertex R are (16, 100).

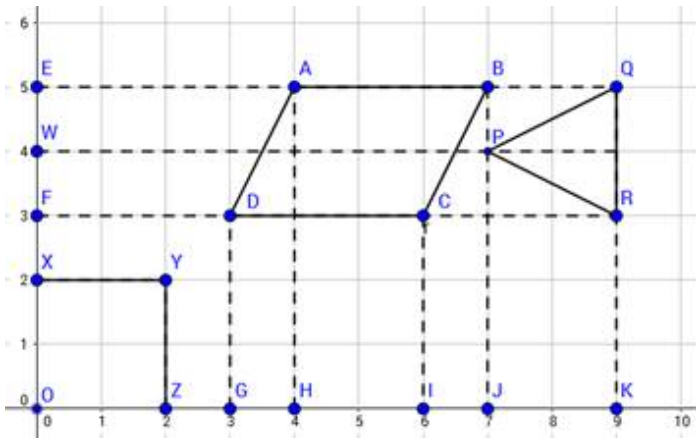
SL = 20 cm and SK = 120 cm So, the coordinates of vertex S are (20, 120).

6. Question

Write the coordinates of each of the vertices of each polygon in Fig. 27.9.



Answer



In quadrilateral OXYZ,

O lies on the origin and the coordinates of the origin are $(0, 0)$. So, the coordinates of O are $(0, 0)$.

X lies on the y -axis. So, the x -coordinate is 0. Hence, the coordinate of X is $(0, 2)$. Also, YX is equal to 2 cm and YZ is equal to 2 cm. So, the coordinates of vertex Y are $(2, 2)$.

Z lies on the x -axis. So, the y -coordinate is 0. Hence, the coordinates of Z are $(2, 0)$. In polygon ABCD,

Draw perpendiculars DG, AH, CI and BJ from A, B, C and D on the x -axis and DF, AE, CF and BE from A, B, C and D on the y -axis.

$$DF = 3 \text{ cm and } DG = 3 \text{ cm}$$

Therefore, the coordinates of D are $(3, 3)$.

$$AE = 4 \text{ cm and } AH = 5 \text{ cm}$$

Therefore, the coordinates of A are $(4, 5)$.

$$CF = 6 \text{ cm and } CI = 3 \text{ cm}$$

Therefore, the coordinates of C are $(6, 3)$.

$$BE = 7 \text{ cm and } BJ = 5 \text{ cm}$$

Therefore, the coordinates of B are $(7, 5)$.

In triangle PQR,

Draw perpendiculars PJ, QK and RK from P, Q and R on the x -axis and PW, QE and RF from P, Q and R on the y -axis.

$$PW = 7 \text{ cm and } PJ = 4 \text{ cm}$$

Therefore, the coordinates of P are $(7, 4)$.

$$QE = 9 \text{ cm and } QK = 5 \text{ cm}$$

Therefore, the coordinates of Q are $(9, 5)$.

$$RF = 9 \text{ cm and } RK = 3 \text{ cm}$$

Therefore, the coordinates of R are $(9, 3)$.

7. Question

Decide which of the following statements is true and which is false. Give reasons for your answer.

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

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

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

(iv) Points whose x and y coordinates are equal, lie on a line passing through the origin.

Answer

For $x = 0$, we have x - coordinates as zero.

For example $(0,5)$ and $(0, 7)$

These points will lie on y axis. Hence, we say that our given statement is true.

☐(ii) A point whose y -coordinate is zero, will lie on x -axis.

For $y = 0$, we have y - coordinates as zero.

For example $(5,0)$ and $(7, 0)$

These points will lie on x axis. Hence, we say that our given statement is true.

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

Origin is intersection of x -axis and y -axis. This means that coordinates of the origin will be intersection of lines $y = 0$ and $x = 0$.

Hence, coordinates of origin are $(0,0)$.

∴ Given statement is true.

☐(iv) Points whose x and y coordinates are equal, lie on a line passing through the origin.

For above statement we can conclude that our statement satisfies the equation $x = y$.

For $x = 0$ and $y = 0$, this equation gets satisfied.

Hence, our given statement is true.

Exercise 27.2

1. Question

The following table shows the number of patients discharged from a hospital with HIV diagnosis in

different years:

Years:	2002	2003	2004	2005	2006
Number of patients:	150	170	195	225	230

Represent this information by a graph.

Answer

Here, we take years on the x-axis and the number of patients on the y-axis.

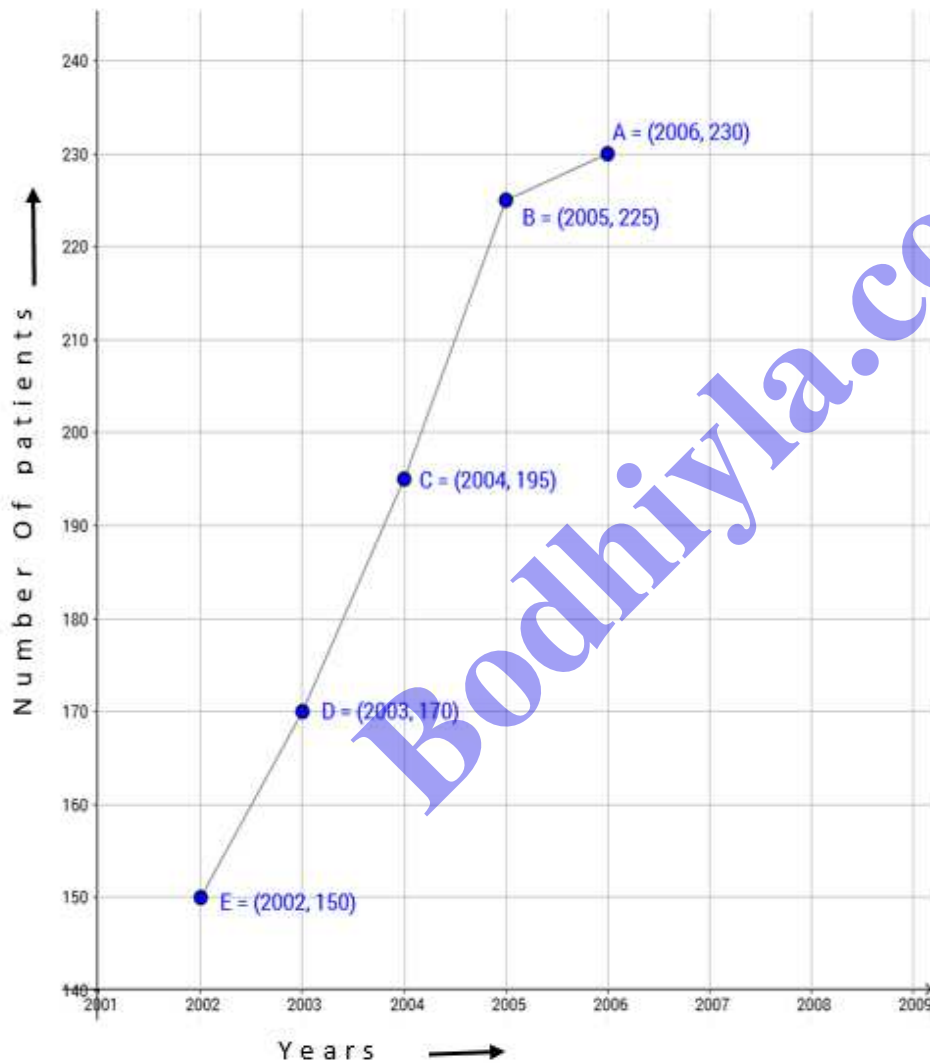
Let us choose the following scale: On x-axis: 1 cm = 1 year
On y-axis: 1 cm = 10 patients

Now, let us plot (2002, 150), (2003, 170), (2004, 195), (2005, 225), (2006, 230). These points are joined to get the graph representing the given information as shown in the figure below.

Scale:

On x axis: 1cm = 1year

On y-axis: 1 cm = 10 patients



2. Question

The following table shows the amount of rice grown by a farmer in different years:

Years:	2000	2001	2002	2003	2004	2005	2006
Rice grown (in quintals):	200	180	240	260	250	200	270

Plot a graph to illustrate this information.

Answer

Here, we take years on the x -axis and quantity of rice grown on the y -axis. Let us choose the following scale: On x -axis: 1 cm = 1 year On y -axis: 1 cm = 10 quintals

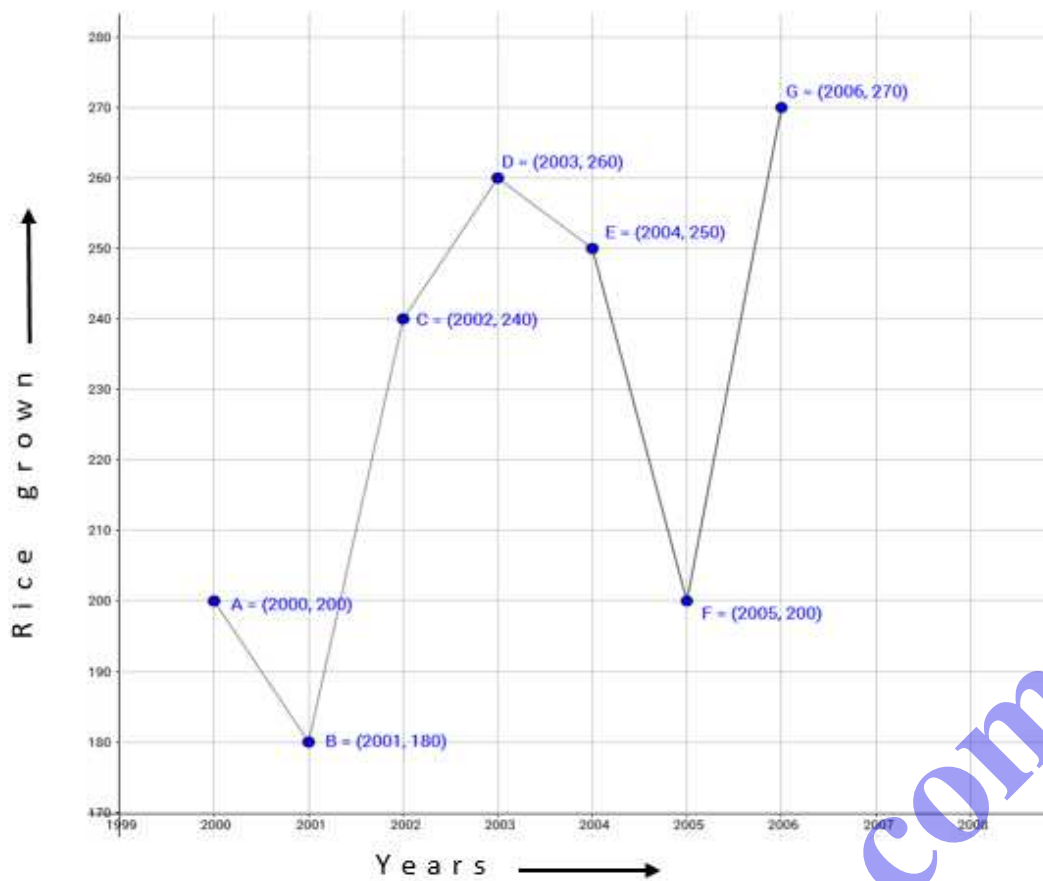
Now, let us plot (2000, 200), (2001, 180), (2002, 240), (2003, 260), (2004, 250), (2005, 200), (2006, 270). These points are joined to get the graph representing the given information as shown in the figure below.

Scale:

On x axis: 1cm = 1 year

On y -axis: 1 cm = 10 quintals

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3. Question

The following table gives the information regarding the number of persons employed to a piece of work

Number of persons:	2	4	6	8
Time taken (in days):	12	6	4	3

and time taken to complete the work:

Plot a graph of this information.

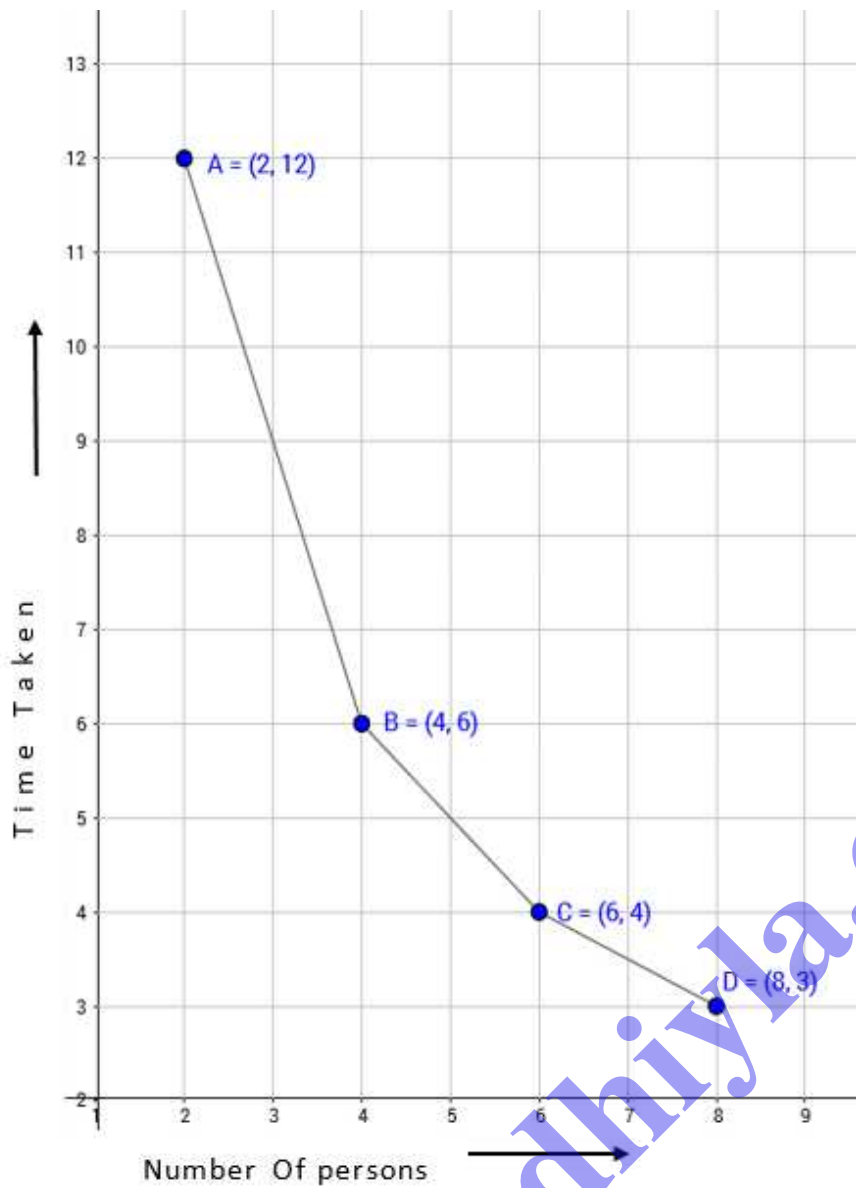
Answer

Here, we take the number of persons on the x-axis and time taken on the y-axis. Let us choose the following scale: On x-axis: 1 cm = 1 person On y-axis: 1 cm = 1 day Now, let us plot (2, 12), (4, 6), (6, 4), (8, 3). These points are joined to get the graph representing the given information as shown in the figure below.

Scale:

On x axis: 1 cm = 1 person

On y-axis: 1 cm = 1 day



4. Question

The following table gives the information regarding length of a side of a square and its area

Length of a side (in cm)	1	2	3	4	5
Area of square (in cm^2)	1	4	9	16	25

Draw a graph to illustrate this information.

Answer

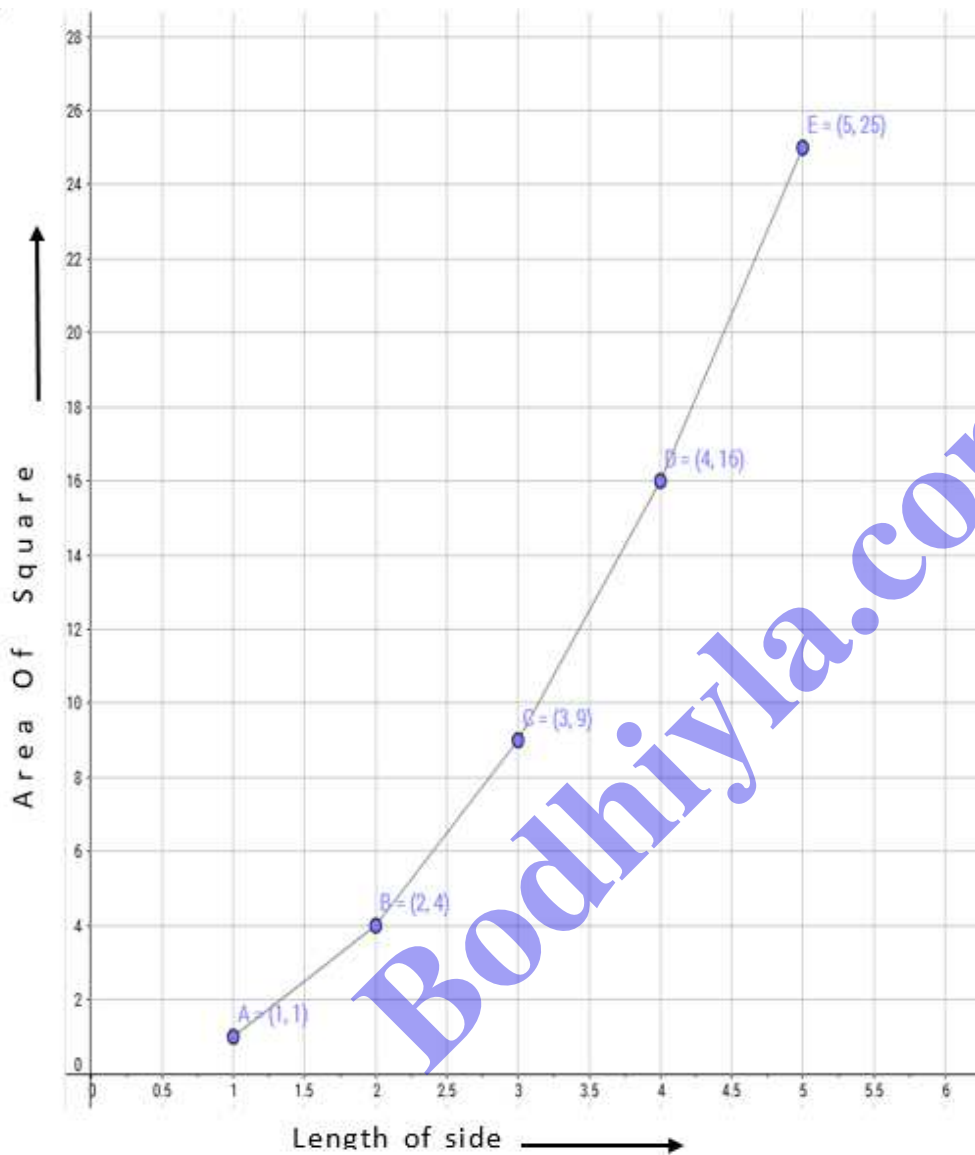
Here, we take length of a side on the x-axis and area of square on the y-axis. Let us choose the following scale: On x-axis: 1 cm = 0.5 cm On y-axis: 1 cm = 2 cm^2 Now we plot (1,1), (2,4), (3,9),

(4,16), (5,25). These points are joined to get the graph representing the given information as shown in the figure below.

Scale:

On x axis: 1cm = 0.5 cm

On y-axis: 2 cm = 1 cm²



5. Question

The following table shows the sales of a commodity during the years 2000 to 2006.

Years	2000	2001	2002	2003	2004	2005	2006
Sales (in lakhs of Rs.)	1.5	1.8	2.4	3.2	5.4	7.8	8.6

Draw a graph of this information.

Answer

Here, we take year on the x -axis and sales on the y -axis. Let us choose the following scale: On x -axis: 1 cm = 1 year
On y -axis: 1 cm = 1 lakh rupees

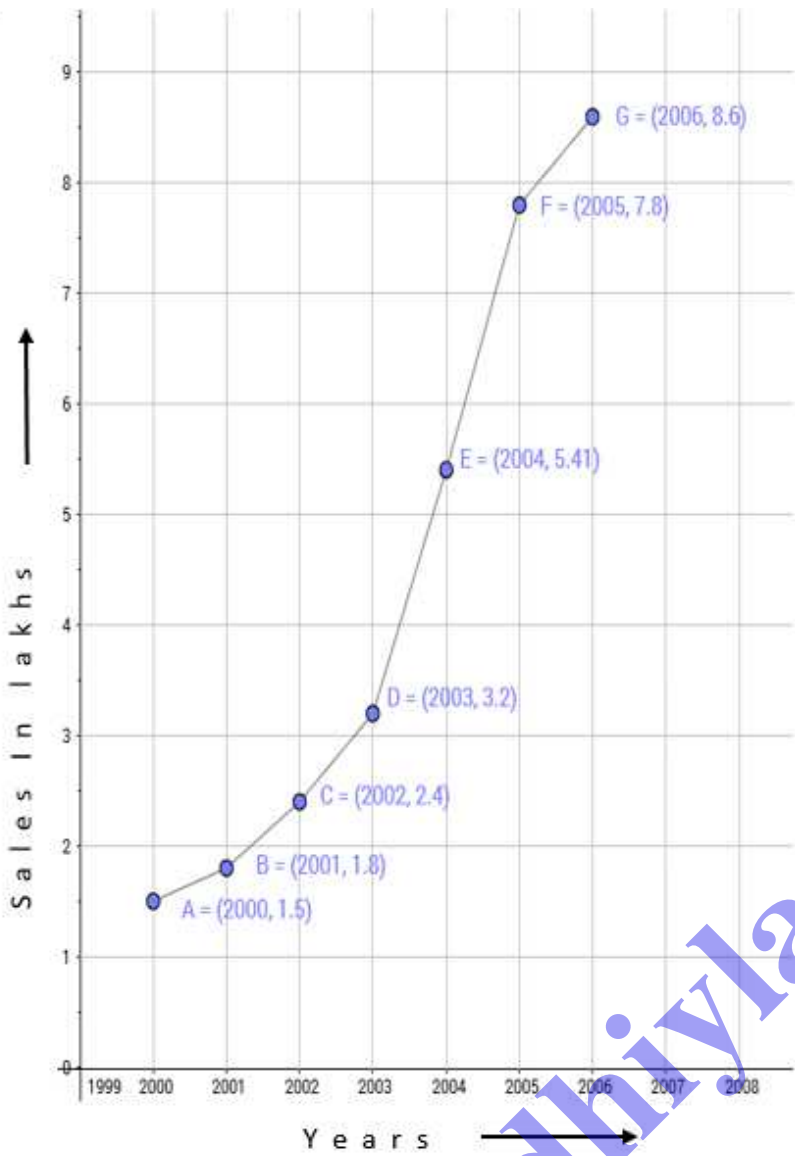
Now, let us plot (2000, 1.5), (2001, 1.8), (2002, 2.4), (2003, 3.2), (2004, 5.4), (2005, 7.8) and (2006, 8.6). These points are joined to get the graph representing the given information as shown in the figure below

Scale:

On x axis: 1 cm = 1 year

On y -axis: 1 cm = 1 lakh rupees

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6. Question

Draw the temperature-time graph in each of the following cases:

(i)

Time (in hours)	7:00	9:00	11:00	13:00	15:00	17:00	19:00	21:00
Temperature ($^{\circ}$ F) in	100	101	104	102	100	99	100	98

(ii)

Time (in hours)	8:00	10:00	12:00	14:00	16:00	18:00	20:00
Temperature ($^{\circ}$ F) in	100	101	104	103	99	98	100

Answer

(i) Here, we take time on the x-axis and temperature on the y-axis.

Let us choose the following scale:

On x-axis: 1 cm = 1 hour

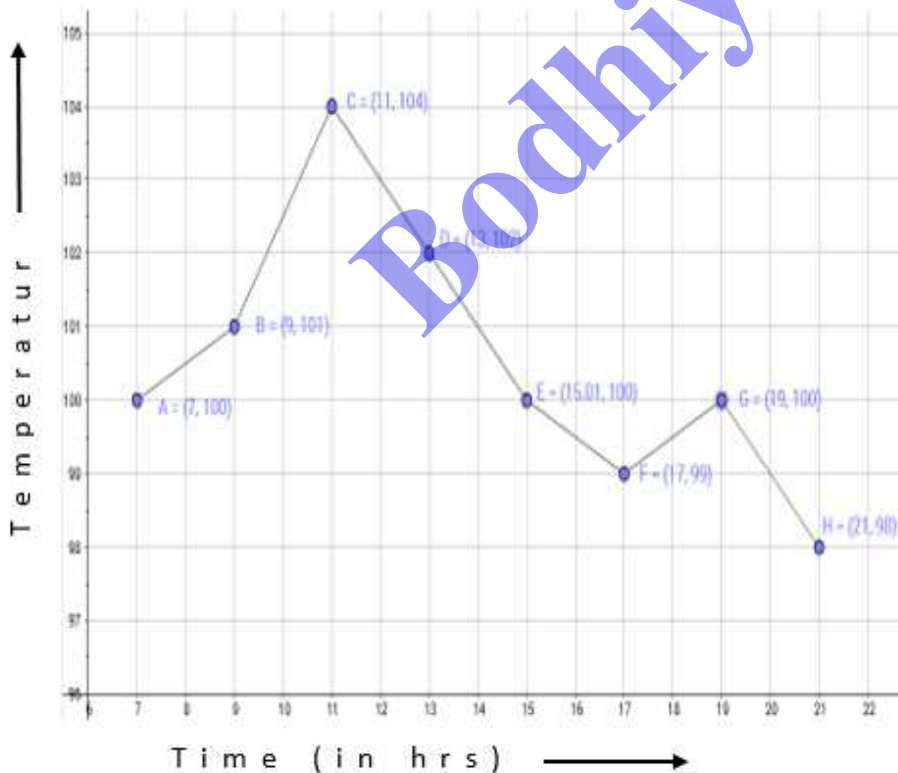
On y-axis: 1 cm = 1 $^{\circ}$ F

Now, let us plot the given points. These points are joined to get the graphs representing the given information as shown in the figures below.

Scale:

On x axis: 1cm = 1 hour

On y-axis: 1 cm = 1 $^{\circ}$ F



(ii) Here, we take time on the x-axis and temperature on the y-axis.

Let us choose the following scale:

On x-axis: 1 cm = 2 hour

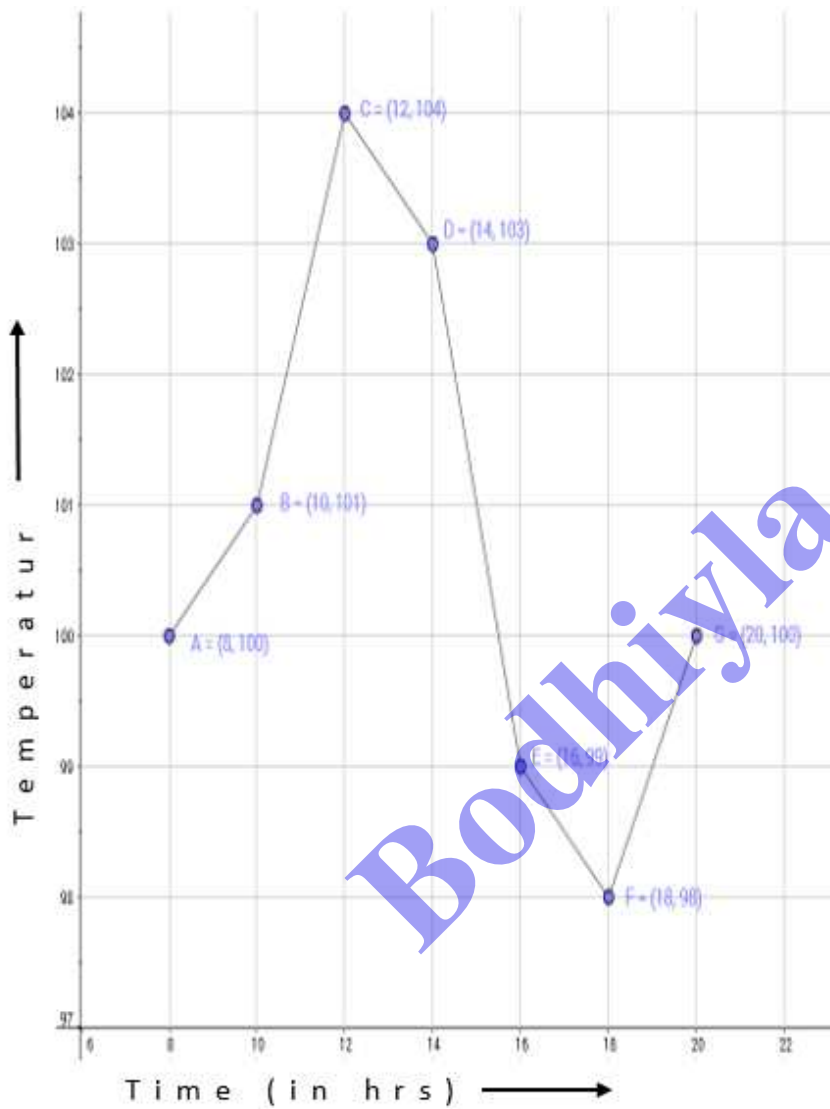
On y-axis: 1 cm = 1 °F

Now, let us plot the given points. These points are joined to get the graphs representing the given information as shown in the figures below.

Scale:

On x axis: 1cm = 2 hour

On y-axis: 1 cm = 1 °F



7. Question

Draw the velocity-time graph from the following data :

Time (in hours)	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00
Speed (in km/hr)	30	45	60	50	70	50	40	45

Answer

Here, we take time on the x-axis and speed on the y-axis.

Let us choose the following scale:

On x-axis: 1 cm = 1 hour

On y-axis: 1 cm = 5 km/hr

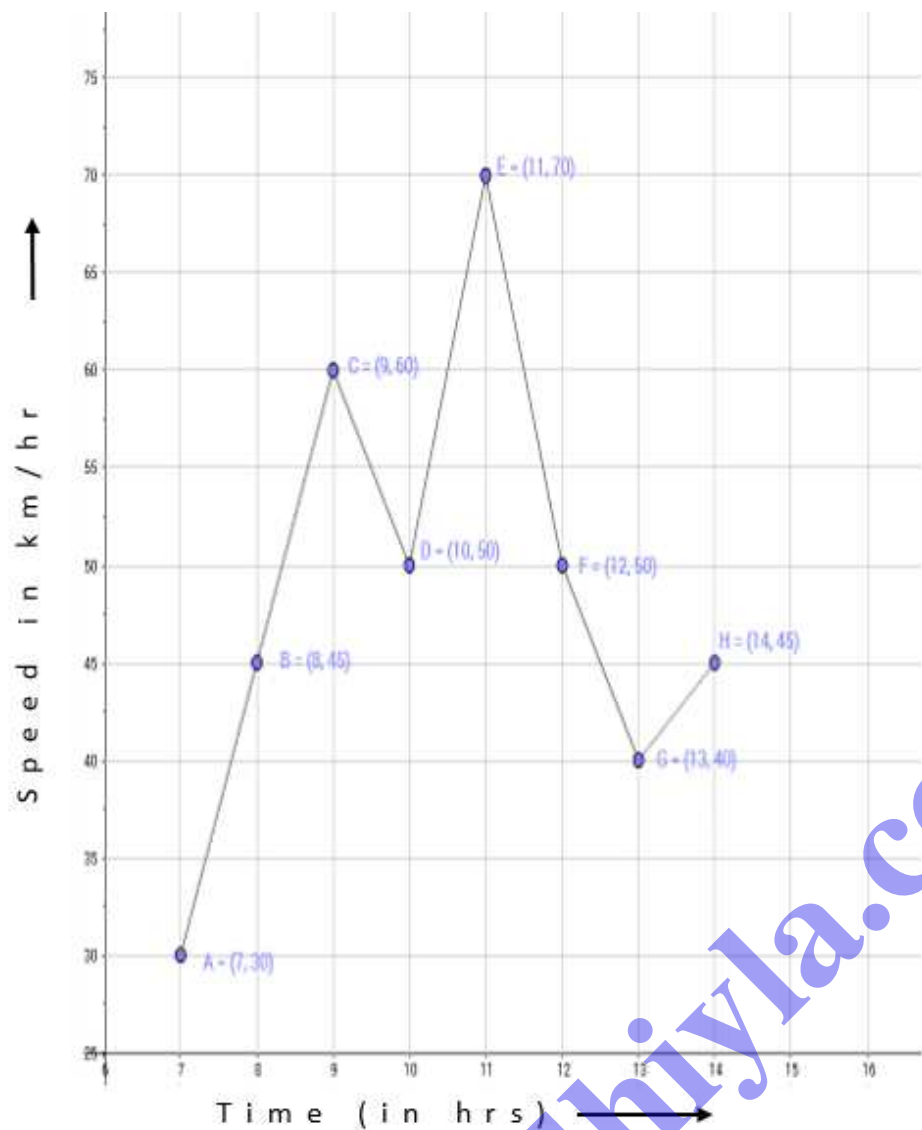
Now, let us plot (7:00,30), (8:00,45), (9:00,60), (10:00,50), (11:00,70), (12:00,50), (13:00,40), (14:00,45). These points are joined to get the graph representing the given information as shown in the figure below.

Scale:

On x axis: 1cm = 1 hour

On y-axis: 1 cm = 5 km/hr

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8. Question

The runs scored by a cricket team in first 15 overs are given below :

Overs :	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV
Runs :	2	1	4	2	6	8	10	21	5	8	3	2	6	8	12

Answer

Here, we take overs on the x-axis and runs the on y-axis.

Let us choose the following scale:

On x-axis: 1 cm = 1 over

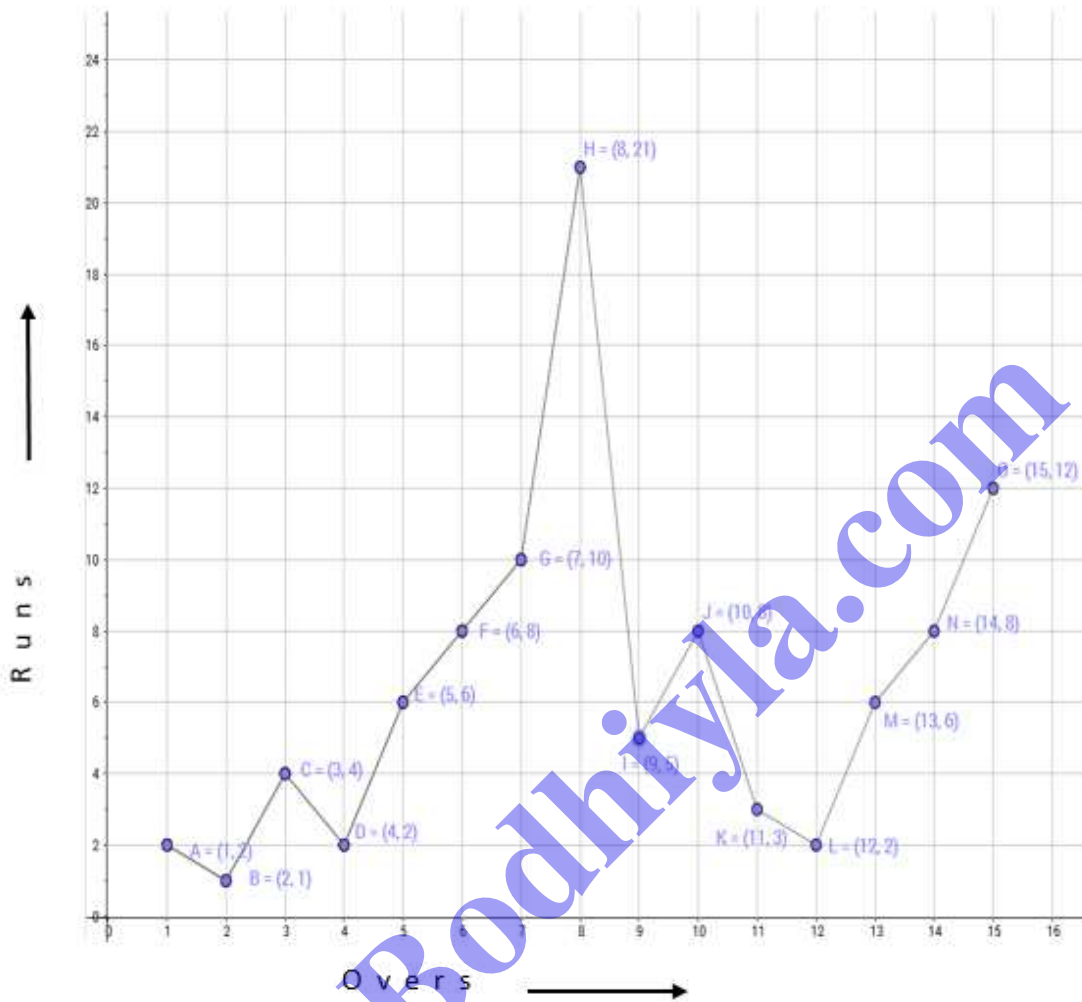
On y-axis: 1 cm = 2 runs

Now, let us plot our given points. These points are joined to get the graph representing the given information as shown in the figure below.

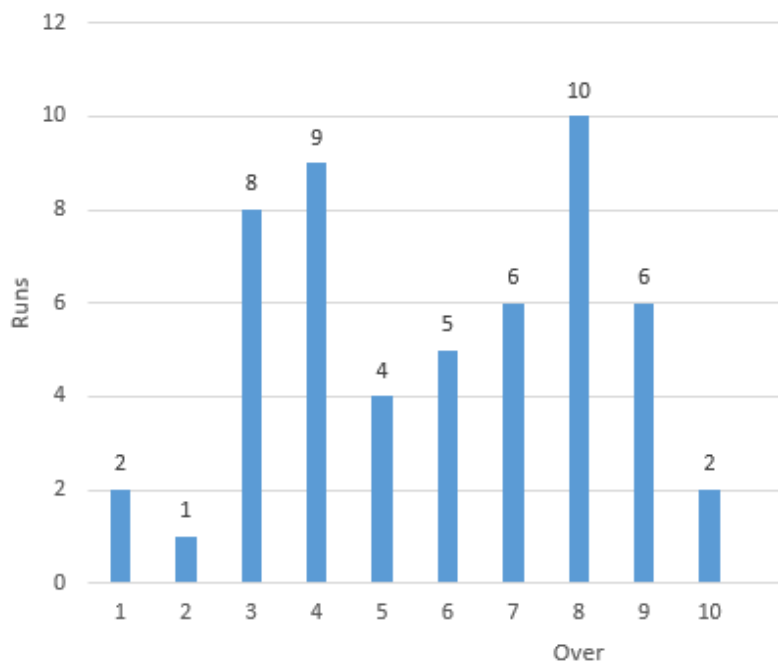
Scale:

On x axis: 1cm = 1 over

On y-axis: 1 cm = 2 runs



Now we draw bar graph.



9. Question

The runs scored by two teams A and B in first 10 overs are given below :

Overs	I	II	III	IV	V	VI	VII	VIII	IX	X
Team A :	2	1	8	9	4	5	6	10	6	2
Team B :	5	6	2	10	5	6	3	4	8	10

Draw a graph depicting the data, making the graphs on the same axes in each case in two different ways as a graph and as a bar chart.

Answer

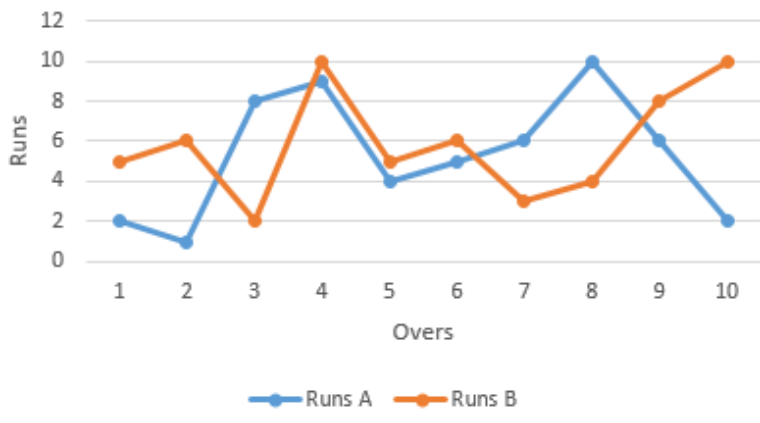
we take overs on x-axis and runs on y-axis.

Let us choose the following scale:

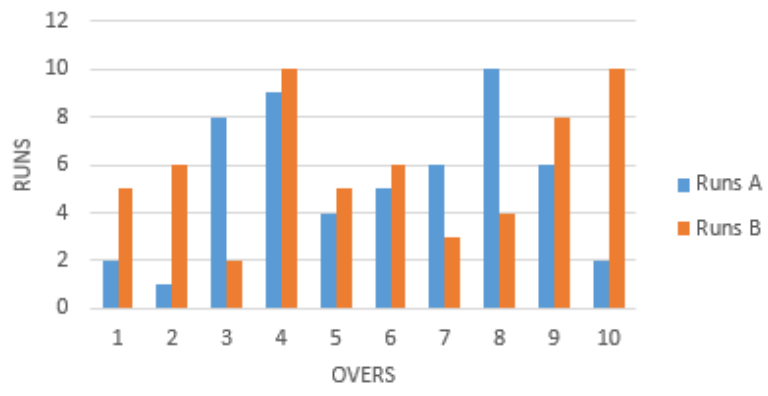
On x-axis: 1 cm = 1 over

On y-axis: 1 cm = 2 run

Now, let us plot given points for team A and for team B. These points are joined to get the graph representing the given information as shown in the figure below.



Now we plot bar graph



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