Introduction to Graphs

13 Chapter

EXERCISE 13.1

Question 1:

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

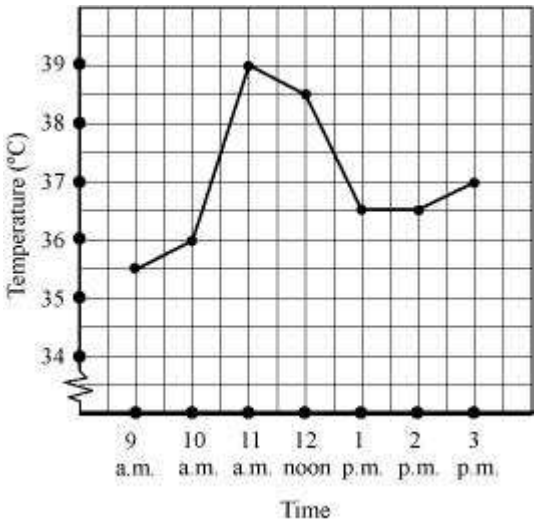
(a) What was the patient's temperature at 1 p.m.?

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

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

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

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



Answer:

(a) At 1 p.m., the patient's temperature was 36.5°C.

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

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

(d) The graph between the times 1 p.m. and 2 p.m. is parallel to the *x*-axis. The temperature at 1 p.m. and 2 p.m. is 36.5°C. So, the temperature at 1:30 p.m. is 36.5°C.

(e) During the following periods, the patient's temperature showed an upward trend.

9 a.m. to 10 a.m., 10 a.m. to 11 a.m., 2 p.m. to 3 p.m.

Question 2:

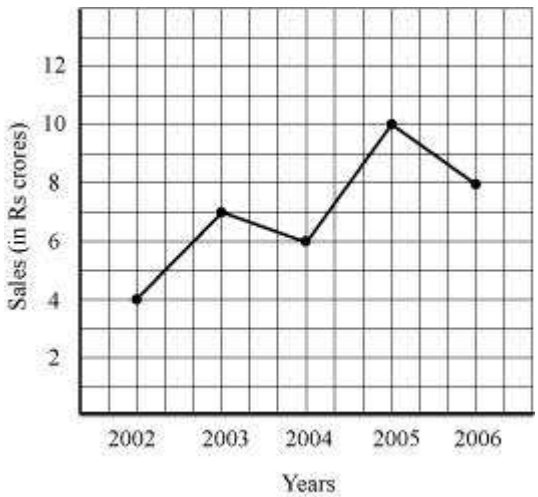
The following line graph shows the yearly sales figure for a manufacturing company.

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

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

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

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



Answer:

(a)

(i) In 2002, the sales were Rs 4 crores.

(ii) In 2006, the sales were Rs 8 crores.

(b)

(i) In 2003, the sales were Rs 7 crores.

(ii) In 2005, the sales were Rs 10 crores.

(c)

(i) In 2002, the sales were Rs 4 crores and in 2006, the sales were Rs 8 crores.

Difference between the sales in 2002 and 2006

= Rs (8 − 4) crores = Rs 4 crores

(d) Difference between the sales of the year 2006 and 2005

= Rs (10 − 8) crores = Rs 2 crores

Difference between the sales of the year 2005 and 2004

= Rs (10 − 6) crores = Rs 4 crores

Difference between the sales of the year 2004 and 2003

= Rs (7 − 6) crore = Rs 1 crore

Difference between the sales of the year 2003 and 2002

= Rs (7 − 4) crores = Rs 3 crores

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

Question 3:

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

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

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

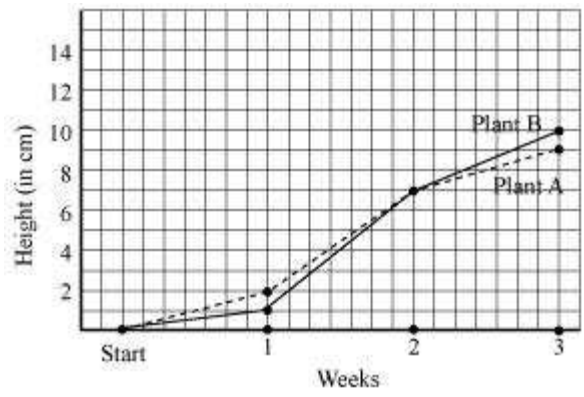
(c) How much did Plant A grow during the 3rd week?

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

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

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

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



Answer:

(a)

(i) After 2 weeks, the height of plant A was 7 cm.

(ii) After 3 weeks, the height of plant A was 9 cm.

(b)

(i) After 2 weeks, the height of plant B was 7 cm.

(ii) After 3 weeks, the height of plant B was 10 cm.

(c) Growth of plant A during 3^{rd} week = 9 cm − 7 cm = 2 cm

(d) Growth of plant B from the end of the 2^{nd} week to the end of the 3^{rd} week = 10 cm − 7 cm = 3 cm

(e) Growth of plant A during 1^{st} week = 2 cm − 0 cm = 2 cm

Growth of plant A during 2^{nd} week = 7 cm − 2 cm = 5 cm

Growth of plant A during 3^{rd} week = 9 cm − 7 cm = 2 cm

Therefore, plant A grew the most, i.e. 5 cm, during the 2^{nd} week.

(f) Growth of plant B during 1^{st} week = 1 cm − 0 cm = 1 cm

Growth of plant B during 2^{nd} week = 7 cm − 1 cm = 6 cm

Growth of plant B during 3^{rd} week = 10 cm − 7 cm = 3 cm

Therefore, plant B grew the least, i.e. 1 cm, during the 1^{st} week.

(g) At the end of the 2^{nd} week, the heights of both plants were same.

Question 4:

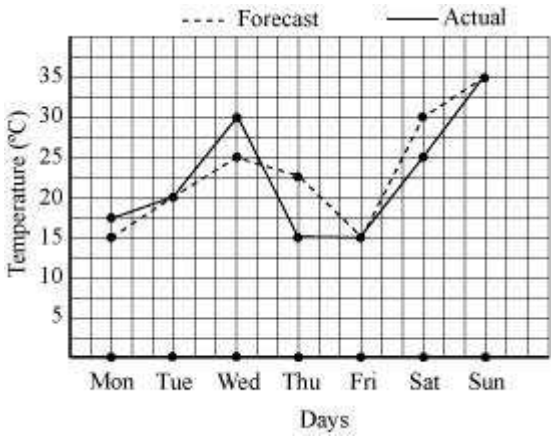
The following graph shows the temperature forecast and the actual temperature for each day of a week.

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

(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?



Answer:

(a) The forecast temperature was same as the actual temperature on Tuesday, Friday, and Sunday.

(b) The maximum forecast temperature during the week was 35°C.

(c) The minimum actual temperature during the week was 15°C.

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

Question 5:

Use the tables below to draw linear graphs.

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

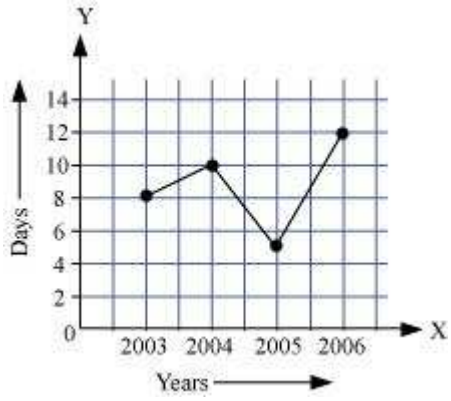
Year	2003	2004	2005	2006
Days	8	10	5	12

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

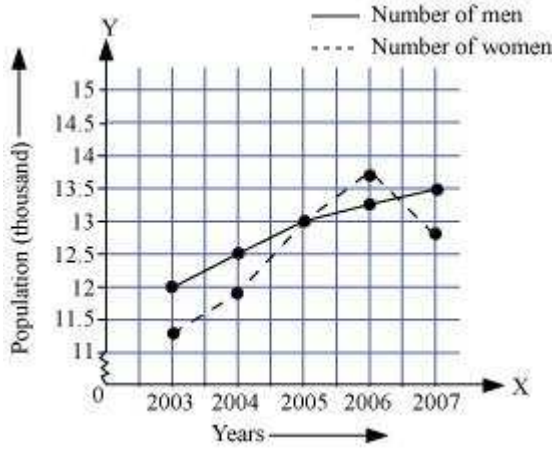
Year	2003	2004	2005	2006	2007
Number of men	12	12.5	13	13.2	13.5
Number of women	11.3	11.9	13	13.6	12.8

Answer:

(a) By taking the years on *x*-axis and the number of days on *y*-axis and taking scale as 1 unit = 2 days on *y*-axis and 2 unit = 1 year on *x*-axis, the linear graph of the given information can be drawn as follows.

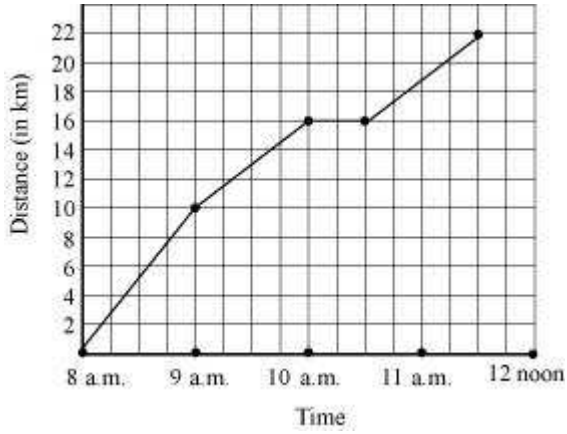


(b) By taking the years on *x*-axis and population on *y*-axis and scale as 1 unit = 0.5 thousand on *y*-axis and 2 unit = 1 year on *x*-axis, the linear graph of the given information can be drawn as follows.



Question 6:

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



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

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

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

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

(e) During which period did he ride fastest?

Answer:

(a) Scale taken for the time axis is 4 units = 1 hour

(b) The person travelled during the time 8 a.m. – 11:30 a.m.

Therefore, the person took $3\frac{1}{2}$ hours to travel.

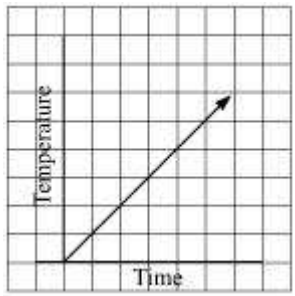
(c) The merchant is 22 km far from the town.

(d) Yes, the person stopped on his way from 10 a.m. to 10: 30 a.m. This is indicated by the horizontal part of the graph.

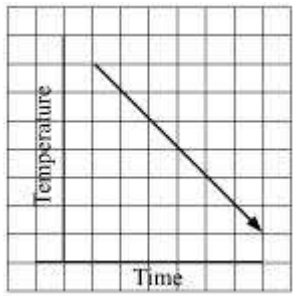
(e) From the graph, it can be observed that during 8 a.m. to 9 a.m., the person travelled the maximum distance. Thus, the person's ride was the fastest between 8 a.m. and 9 a.m.

Question 7:

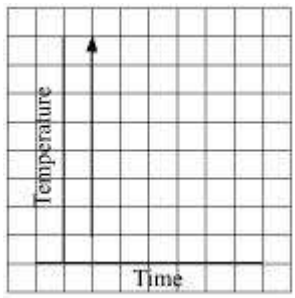
Can there be a time temperature graph as follows? Justify you're answer:



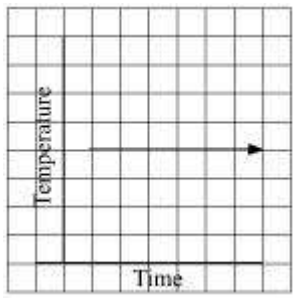
(i)



(ii)



(iii)



(iv)

Answer:

(i) This can be a time−temperature graph, as the temperature can increase with the increase in time.

(ii) This can be a time−temperature graph, as the temperature can decrease with the decrease in time.

(iii) This cannot be a time−temperature graph since different temperatures at the same time are not possible.

(iv) This can be a time−temperature graph, as same temperature at different times is possible.

Exercise 13.2

Question 1:

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

(a) Cost of apples

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

(b) Distance travelled by a car

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

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

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

(c) Interest on deposits for a year:

Deposit (in Rs)	1000	2000	3000	4000	5000
Simple interest (in Rs)	80	160	240	320	400

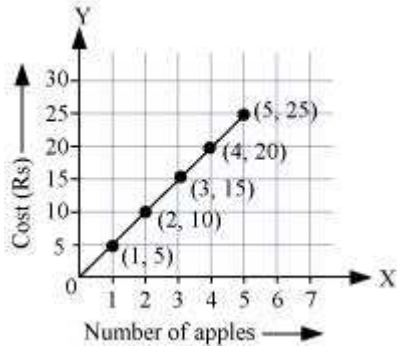
(i) Does the graph pass through the origin?

(ii) Use the graph to find the interest on Rs 2500 for a year:

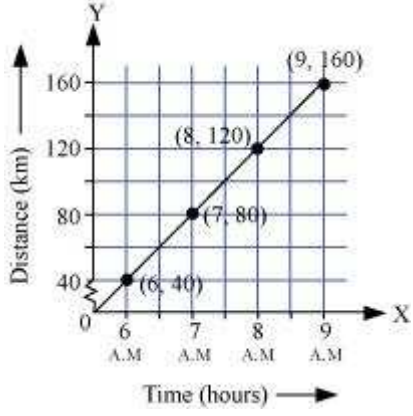
(iii) To get an interest of Rs 280 per year, how much money should be deposited?

Answer:

(a) Taking a suitable scale (for x-axis, 1 unit = 1 apple and for y-axis, 1 unit = Rs 5), we can mark the number of apples on x-axis and the cost of apples on y-axis. A graph of the given data is as follows.



(b) Taking a suitable scale (for x-axis, 2 units = 1 hour and for y-axis, 2 units = 40 km), we can represent the time on x-axis and the distance covered by the car on y-axis. A graph of the given data is as follows.



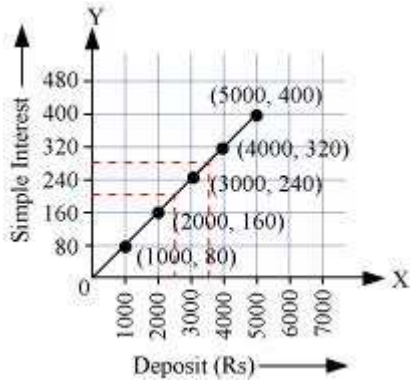
(i) During the period 7:30 a.m. to 8 a.m., the car covered a distance of 20 km.

(ii) The car covered a distance of 100 km at 7:30 a.m. since its start.

(c) Taking a suitable scale,

For x-axis, 1 unit = Rs 1000 and for y-axis, 1 unit = Rs 80

We can represent the deposit on x-axis and the interest earned on that deposit on y-axis. A graph of the given data is obtained as follows.



From the graph, the following points can be observed.

(i) Yes. The graph passes through the origin.

(ii) The interest earned in a year on a deposit of Rs 2500 is Rs 200.

(iii) To get an interest of Rs 280 per year, Rs 3500 should be deposited.

Question 2:

Draw a graph for the following.

(i)

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

Is it a linear graph?

(ii)

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

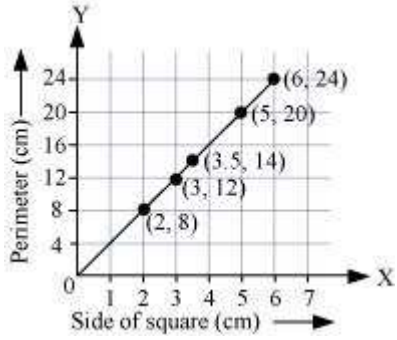
Is it a linear graph?

Answer:

(i) Choosing a suitable scale,

For *x*-axis, 1 unit = 1 cm and for *y*-axis, 1 unit = 4 cm

We can represent the side of a square on *x*-axis and the perimeter of that square on *y*-axis. A graph of the given data is drawn as follows.

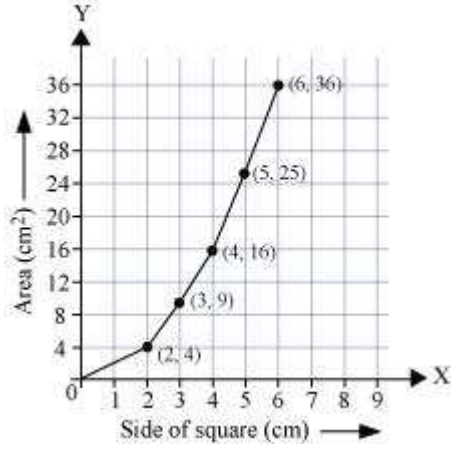


It is a linear graph.

(ii)Choosing a suitable scale,

For x-axis, 1 unit = 1 cm and for y-axis, 1 unit = 4 cm^2

We can represent the side of a square on the x-axis and the area of that square on y-axis. A graph of the given data is as follows.



It is not a linear graph.