Chapter 23: Line Graphs and Linear Graphs
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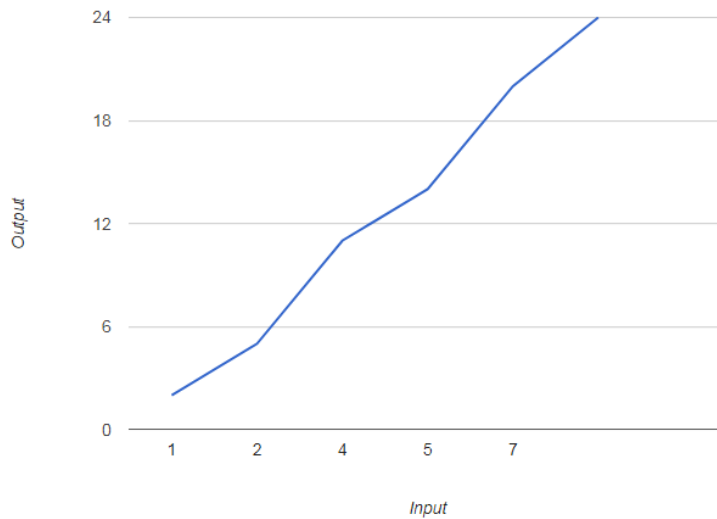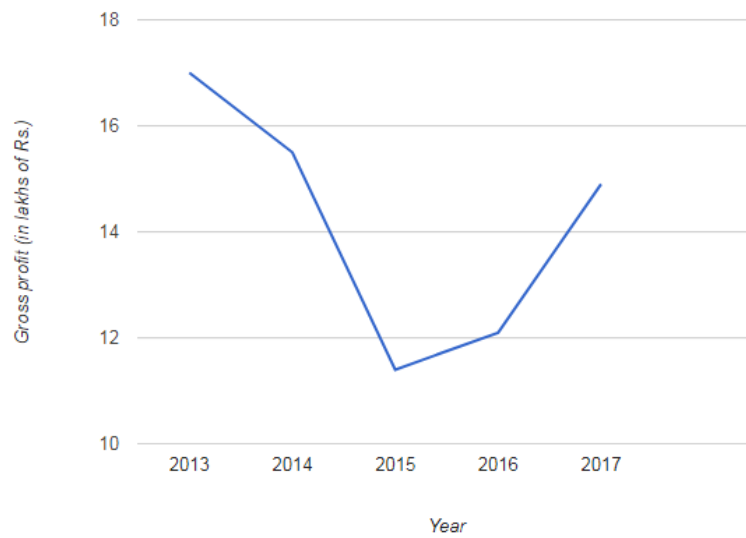**Exercise 23**
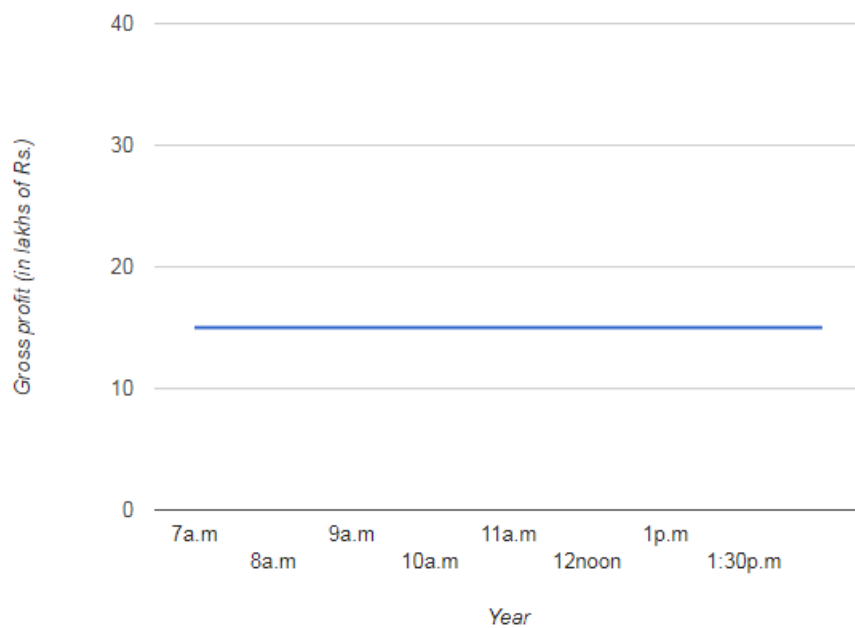
Question 1:
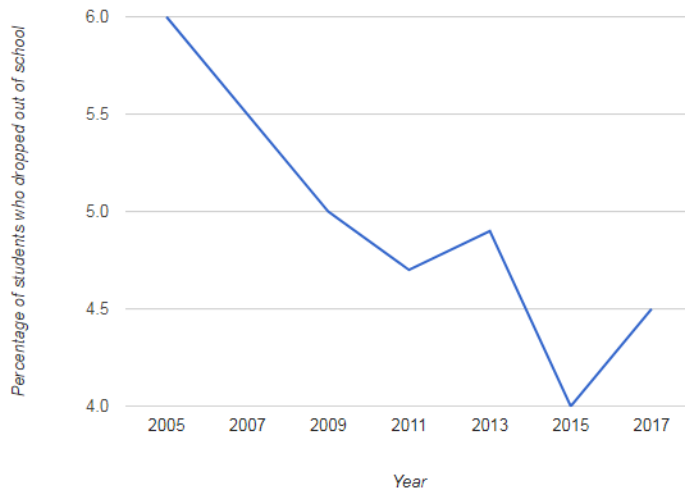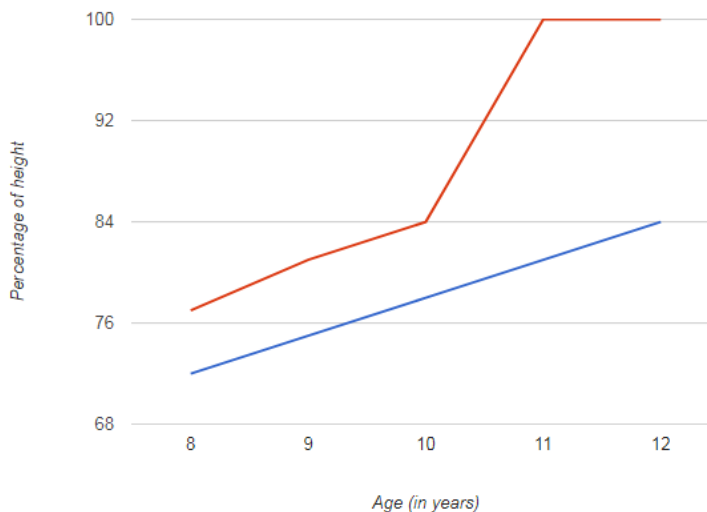**Solution:**
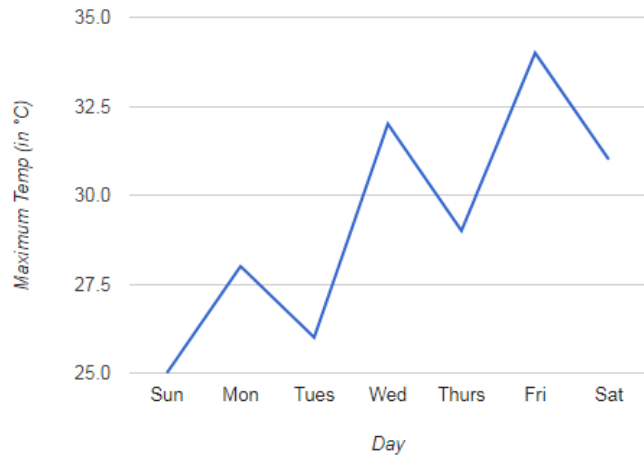
Question 2:
Solution:

For the inputs of 3 and 8, the outputs will be respectively 8 and 23.

Question 3:
Solution:

Question 4:
Solution:

We know that speed = distance / time
So, distance = speed * time = 30 * 0.5 = 15.

Question 5:
Solution:

Question 6:
Solution:

(i) Both the boys and the girls achieve their maximum height at the age of 18 years.

(ii) Boys grows faster at puberty (14 years to 16 years of age).

Question 7:
Solution:

    (i)   The x-axis shows the time and the y-axis shows the distance of the car from city P.

    (ii)   The car began its journey from city P at 8 a.m.

    (iii)   The car went 50 kms in the first hour.

    (iv)   (a) During the 2nd hour, the car went 100 kms.

              (b) During the 3rd hour, the car went 50 kms.

    (v)   No, the speed was not the same during first three hours as the distance covered per hour was not uniform during this period.

    (vi)   Yes, the car stopped for a duration of one hour between 11 a.m and 12 noon as it is indicated by a horizontal line segment during this time period.

(vii)   The car reached city Q at 2 p.m.

Question 8:
Solution:
  (i)   The scale taken for the time-axis is given by 1 unit = 15 minutes.
  (ii)   The person took 3 hours 30 minutes for the travel.
  (iii)   The place of the merchant is 22 kms away from the town.
  (iv)   Yes, the person stopped between 10 a.m and 11 a.m on his way as is indicated by the horizontal line in the graph.
  (v)   He rode the fastest between 8 a.m and 9 a.m.

Question 9:
Solution:
  (i)   He started his journey at 5:30 am and ended his journey at 6 p.m.
  (ii)   The total duration of the journey was 12 hours 30 minutes.
  (iii)   The onward journey was of longer duration.
  (iv)   He did not move for about 6 hours.
  (v)   He had the fastest speed between 2 p.m and 5:30 p.m.

Question 10:
Solution:
  (i)   The sales in
           (a) 2013 was 7 crores.
           (b) 2015 was 10 crores.
           (c) 2016 was 8 crores.
  (ii)   The difference between the sales in 2012 and 2016 was 8 – 4 = 4 crores.
  (iii)   There was the greatest difference between the sales as compared to its previous year in the year 2015.

Question 11:
Solution:
  (i)   Amit made the least progress between 25 minutes and 40 minutes as the slope of the graph is least during this period.
  (ii)   His average speed is 2.18 km/hr as he has travelled 2 kms in 55 minutes => 2.18 kms in an hour.

Question 12:
Solution:
  (i)   The plant A was (a) 7 cms after 2 weeks (b) 9 cms after 3 weeks.
  (ii)   The plant B was (a) 7 cms after 2 weeks (b) 10cms after 3 weeks.
  (iii)   The plant A grew 2 cms during the 3rd week.
  (iv)   The plant B grew 3 cms from the end of the 2nd week to the end of the 3rd week.
  (v)   The plant A grew the most in the 2nd week.

(vi)   The plant B grew the least in the 1st week.

(vii)   At the end of the second week, both the two plants were of the same height as the two lines in the graph meet at that point.

Question 13:

Solution:

(i)   The ice block did not have any change in temperature for 20 seconds.

(ii)   There was a change in temperature for 30 seconds.

(iii)   After 50 seconds of heating, the temperature became constant at 100°C.

(iv)   The temperature after 25 seconds 18°C.

(v)   The temperature after 1.5 minutes would be 100°C as this is the boiling point of water.

Question 14:

Solution:

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

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

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

(iv)   The actual temperature differed the most from the forecast temperature on Thursday as the gap is larger on that day.

Question 15:

Solution:

(i)   The car traveled 180 kms in $4\frac{1}{2}$ hours.

(ii)   The car takes 5 hours to reach R

(iii)   The car takes 2 hours to cover 80 km.

(iv)   Q is 120 kms away from the starting point.

(v)   The car reaches the place S after 6 hours after starting.

Question 16:

Solution:

(i)   The cyclist II rested at 8:45 a.m for about 15 minutes.

(ii)   The cyclist II was cycling faster after the rest.

(iii)   The two cyclists met at 9 a.m.

(iv)   The cyclist II had travelled 10 kms when he met cyclist I.

(v)   When cyclist II reached town B, the cyclist I was 10 kms away from town A.

Question 17:
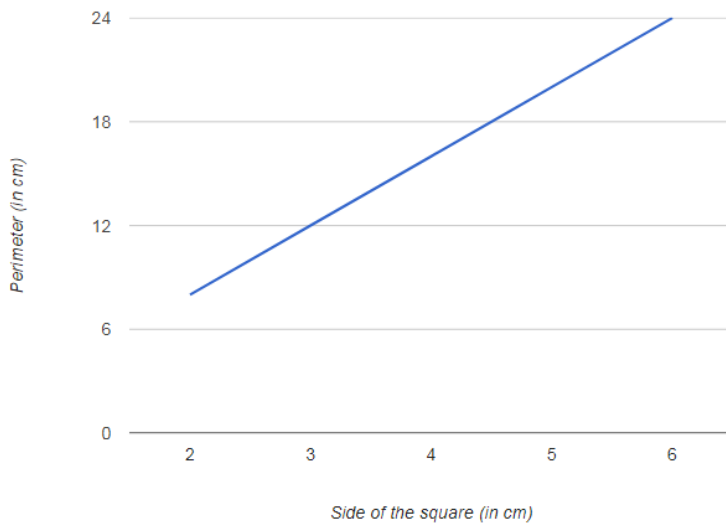
Solution:

The linear graph is as follows:
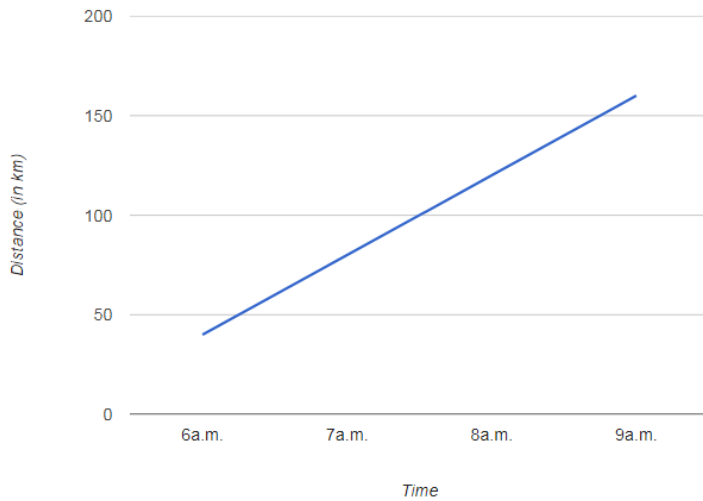
(i)   The car covered 20 kms during the period from 7.30 a.m. to 8 a.m.

(ii)   The time when the car had covered a distance of 100 km since it started is 7:30 a.m.

(iii)   The car had covered a distance of 140 kms by 8.30 a.m.

Question 18:
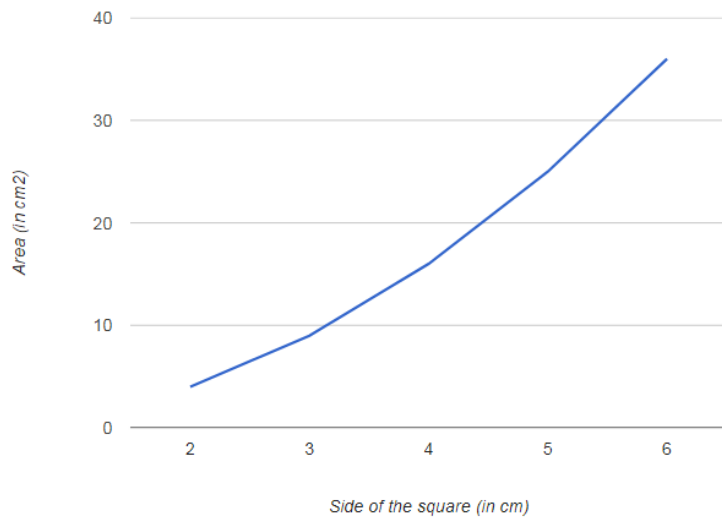**Solution:**

The graph is as follows:

From the graph it is obvious that it is a linear graph.

Question 19:
Solution:
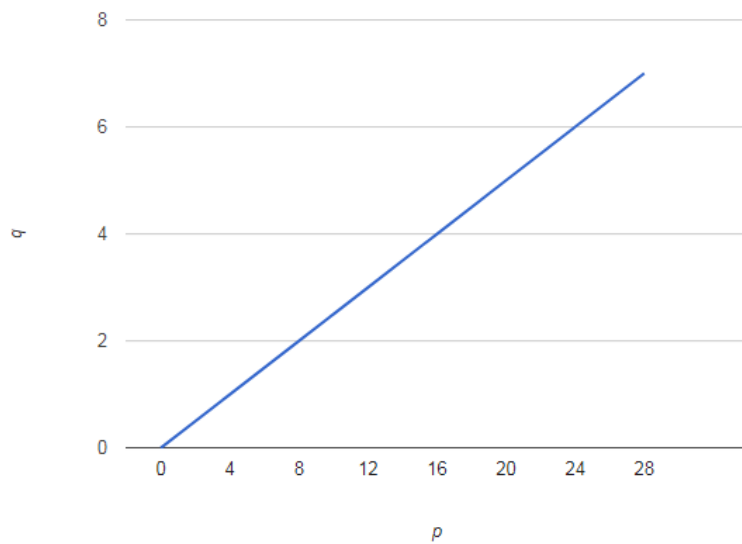
The graph of the given data is as follows:

From the graph, it is obvious that this is not a linear graph.

Question 20:
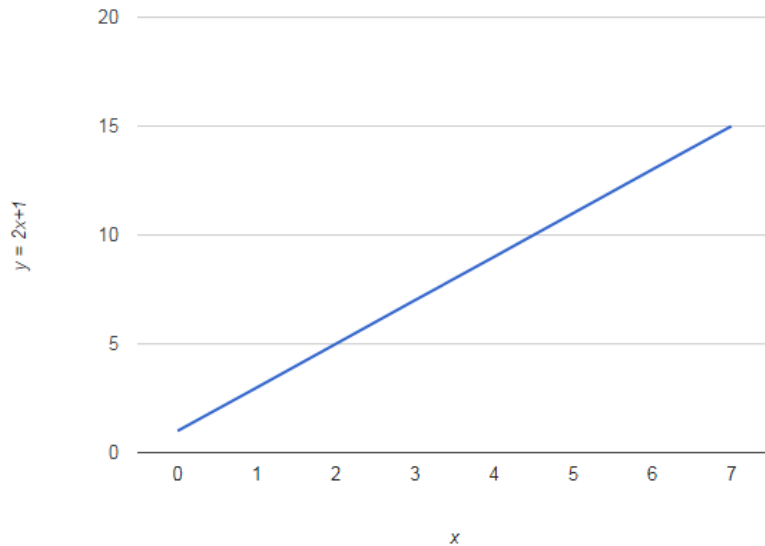**Solution:**
The plot of the graph is as follows:

The value of (i) p = 24, when q = 6.
The value of (ii) q = 5, when p = 20.
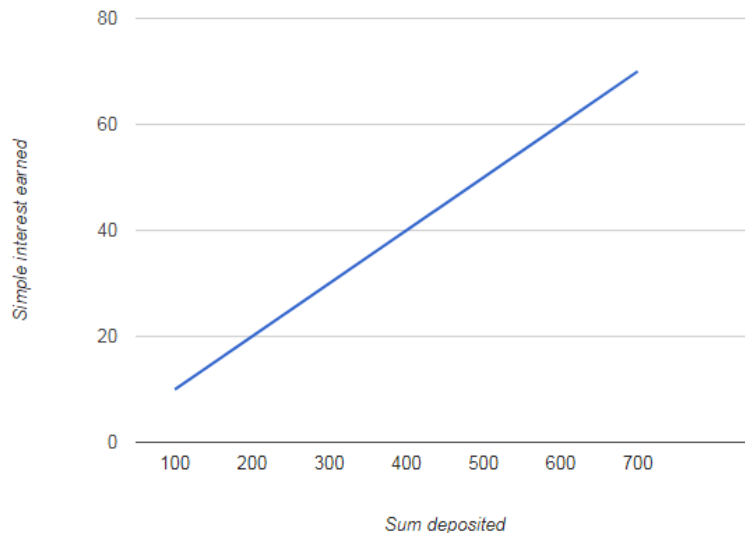
Question 21:
Solution:
The graph is as follows:

(i) When x = 5, the value of y is 11.
(ii) The value of x = 6 when the value of y = 13.

Question 22:
Solution:
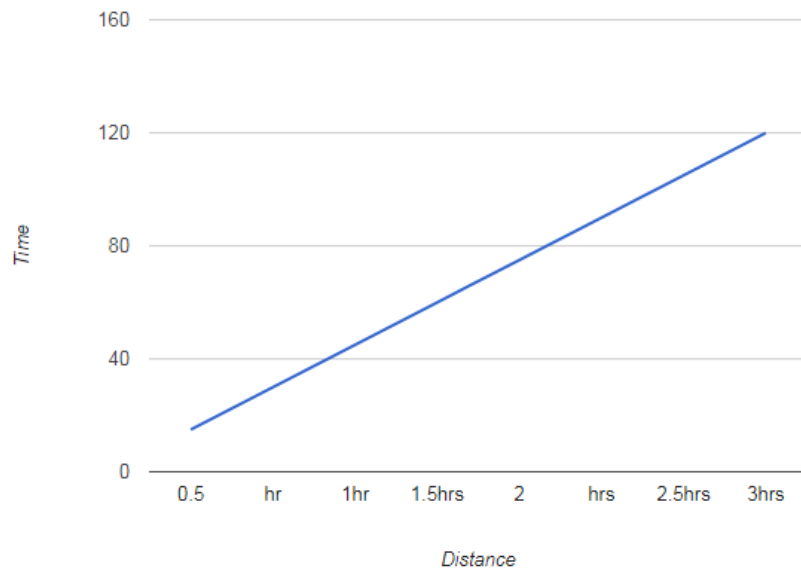The graph of the given situation is as follows:

(i)   The annual interest obtainable for an investment of Rs. 250 is Rs. 25 as 10% of 250 is 25.
(ii)   The investment one has to make in order to get an annual simple interest of Rs. 70 is Rs. 700 as 10% of 700 is 70.

Question 23:
Solution:
The graph is as follows:

(i) The time taken by Sajal to ride 75 km is 2.5 hours.

(ii) The distance covered by Sajal in $3\dfrac{1}{2}$ hours is 105 kms.

Question 24:
Solution:

    (a) Distance increases uniformly with time which means the speed is uniform.
    (b) The speed is uniform till a particular time after which it comes to rest.
    (c) The speed is non-uniform initially after which it slows comes to rest.

Question 25:
Solution:

Among the graphs given, only (iii) is not possible as the temperature cannot increase to such an extent at a particular time.