EXERCISE 23.2   PAGE: 23.18

**1. Explain the reading and interpretation of bar graphs.**
Solution:

A graph with its length proportional to the value it represents is called a bar graph. The bars can either be plotted horizontally or vertically. It is basically a visual display which is used to compare the amount of occurrence of various characteristics of data.
Bar graph help us to
(i) Compare the groups of data
(ii) Generalize the data

2. Read the following bar graph and answer the following questions:
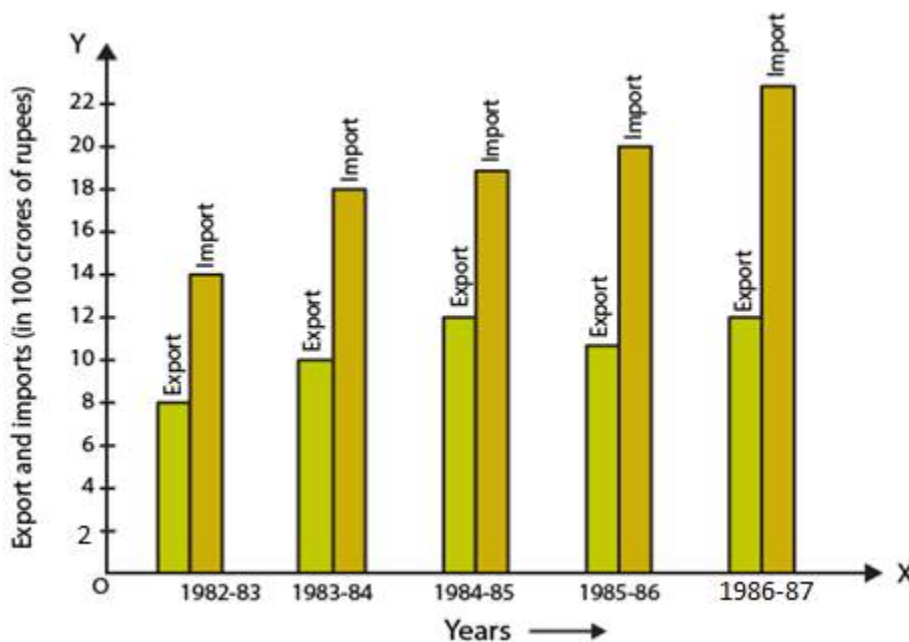
(i) What information is given by the bar graph?
(ii) In which year the export is minimum?
(iii) In which year the import is maximum?
**(iv) In which year the difference of the values of export and import is maximum?**
Solution:

Consider a chart by using data from the bar graph:

Years	Export (in 100 crores of Rs)	Imports (in 100 crores of Rs)	Difference of import and export (in 100 crores of Rs)
1982 – 83	8	14	6
1983 – 84	10	18	8
1984 – 85	12	19	7
1985 – 86	11	20	9
1986 – 87	12	22	10

(i) The bar graph gives us information regarding import and export from 1982-83 to 1886-87.

(ii) The export is minimum in the year 1982-83.

(iii) The import is maximum in the year 1986-87.

(iv) The difference of the values of import and export is maximum in the year 1986-87.

3. The following bar graph shows the results of an annual examination in a secondary school. Read the bar graph (Fig.23.22) and choose the correct option in each of the following:
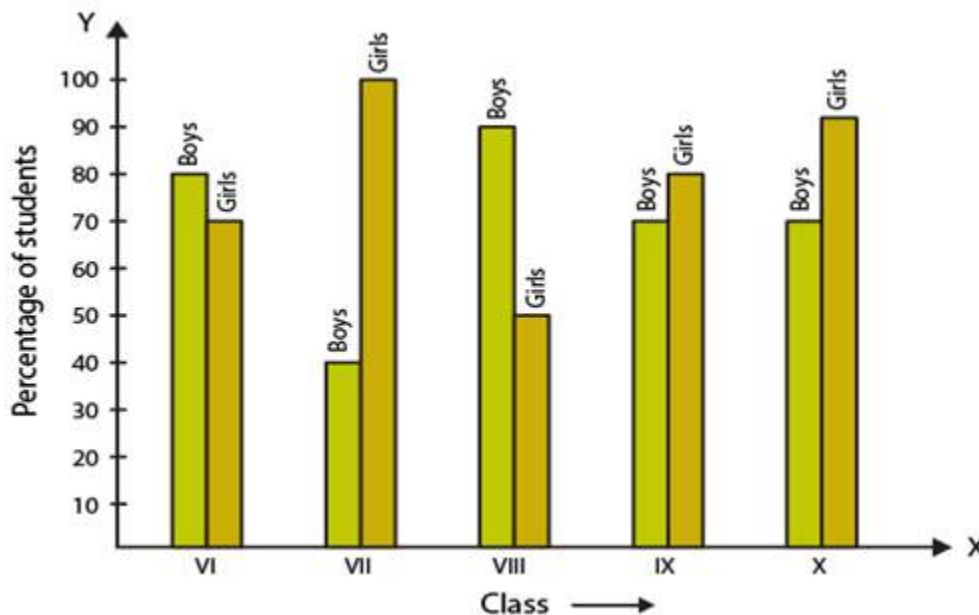
(i) The pair of classes in which the results of boys and girls are inversely proportional are:
(a) VI, VIII
(b) VI, IX
(c) VIII, IX
(d) VIII, X

(ii) The class having the lowest failure rate of girls is:
(a) VII
(b) X
(c) IX

(d) VIII

(iii) The class having the lowest pass rate of student is:
(a) VI
(b) VII
(c) VIII
(d) IX
Solution:

Consider a chart by using data from the bar graph:

Class	Percentage of boys	Percentage of girls
VI	80	70
VII	40	100
VIII	90	50
IX	70	80
X	70	90

(i) The option (b) is the correct answer.
The pair of classes in which the results of boys and girls are inversely proportional are VI, IX.
We know that
In class VI
% of boys = 80
% of girls = 70
In class IX
% of boys = 70
% of girls = 80

(ii) The option (a) is the correct answer.
The class having the lowest failure rate of girls is VII.
We know that the passing percentage of girls in Class VII is 100%.
So 0% of girls have failed in this class.

(iii) The option (b) and (c) are the correct answers.
The class having the lowest pass rate of student is VII and VIII.
We know that the sum of vertical heights of % of boys and girls in class VII and VIII is same i.e. 140 units and
the sum is least compared to other classes.

**4. The following bar graph shows the number of persons killed in industrial accidents in a country for some
years (Fig.23.23).**
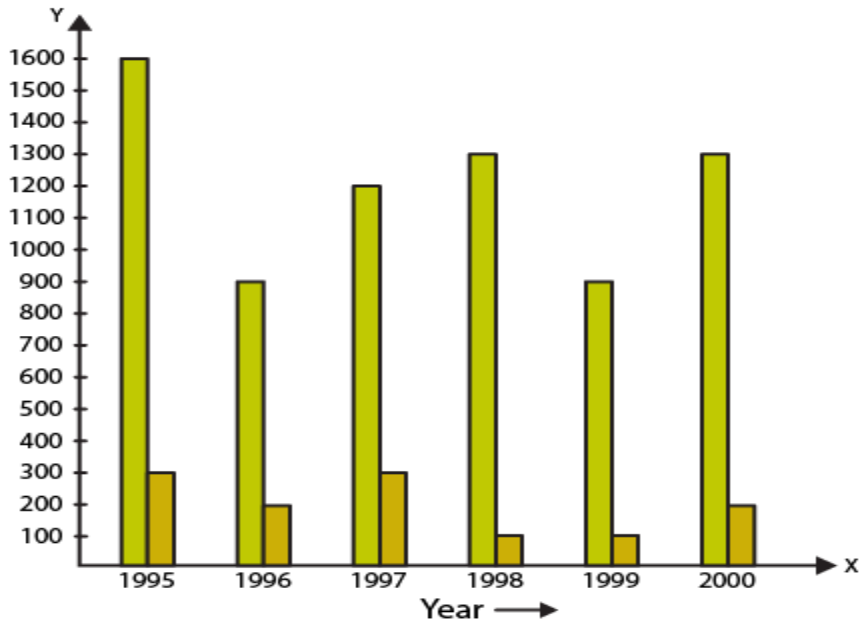
Read the bar graph and choose the correct alternative in each of the following:

(i) The year which shows the maximum percentage increase in the number of persons killed in coal mines over the preceding year is:
(a) 1996
(b) 1997
(c) 1999
(d) 2000

(ii) The year which shows the maximum decrease in the number of persons killed in industrial accidents over the preceding year is:
(a) 1996
(b) 1997
(c) 1998
(d) 1999

(iii) The year in which the maximum number of persons were killed in industrial accidents other than those killed in coal mines is:
(a) 1995
(b) 1997
(c) 1998
(d) 1999
Solution:

Consider a chart by using data from the bar graph:

Year	Persons killed in industries accidents	Persons killed in coal mines
1995	1600	300
1996	900	200
1997	1200	300
1998	1300	100
1999	900	100
2000	1300	200

(i) The options (b) and (d) are the correct answer.
The year which shows the maximum percentage increase in the number of persons killed in coal mines over the preceding year is 1997 and 2000.

In the year 1997 the death increased to 300 from 200 and in the year 2000 increased to 200 from 100.
% increase in death in 1997 = 100%
% increase in death in 2000 = 100%

(ii) The option (a) is the correct answer.
The year which shows the maximum decrease in the number of persons killed in industrial accidents over the preceding year is 1996.

The year 1996 and 1999 shows the decrease in the amount of persons killed by industrial accidents.
% decrease in the death in 1996 = 43.75%
% decrease in the death in 1999 = 30.77%

(iii) The option (a) is the correct answer.
The year in which the maximum number of persons were killed in industrial accidents other than those killed in coal mines is 1995.

1600 persons were killed in the year 1995 due to industrial accidents which is higher when compared to other years.

5. The production of saleable steel in some of the steel plants of our country during 1999 is given below:

Plant	Bhilai	Durgapur	Rourkela	Bokaro
Production (in thousand tonnes)	160	80	200	150

Construct a bar graph to represent the above data on a graph paper by using the scale 1 big divisions = 20 thousand tonnes.
Solution:

Construct two mutually perpendicular lines OX and OY.
Let us mark plants along the horizontal line OX and mark production along the vertical line OY.
Take equal width for each bar on the axis OX.
Now let us take a suitable scale to find the heights of the bar.
Take 1 division = 20 thousand tonnes

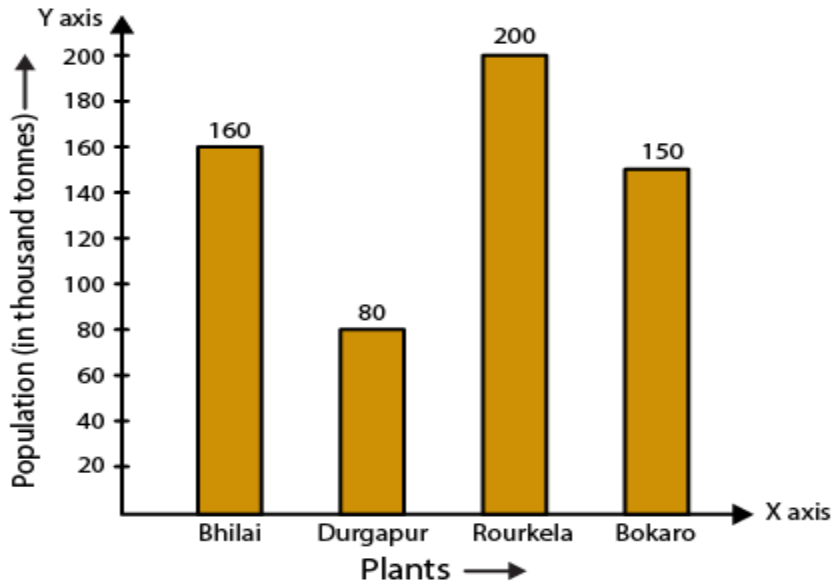So the heights of the bars are as given below:
Bhilai = 160/20 = 8 units
Durgapur = 80/20 = 4 units
Rourkela = 200/20 = 10 units
Bokaro = 150/20 = 7.5 units

Using the above calculation, the graph is as given below:

6. The following data gives the number (in thousands) of applicants registered with an Employment Exchange during 1995-2000:

Year	1995	1996	1997	1998	1999	2000
Number of applicants (in thousands)	18	20	24	28	30	34

Construct a bar graph to represent the above data.
Solution:

Construct two mutually perpendicular lines OX and OY.
Let us mark years along the horizontal line OX and mark number of applicants registered along the vertical line OY.
Take equal width for each bar on the axis OX.
Now let us take a suitable scale to find the heights of the bar.
Take 1 division = 4 thousand applicants
So the heights of the bars are as given below:
1995 = 18/4 = 4.5 units
1996 = 20/4 = 5 units
1997 = 24/4 = 6 units
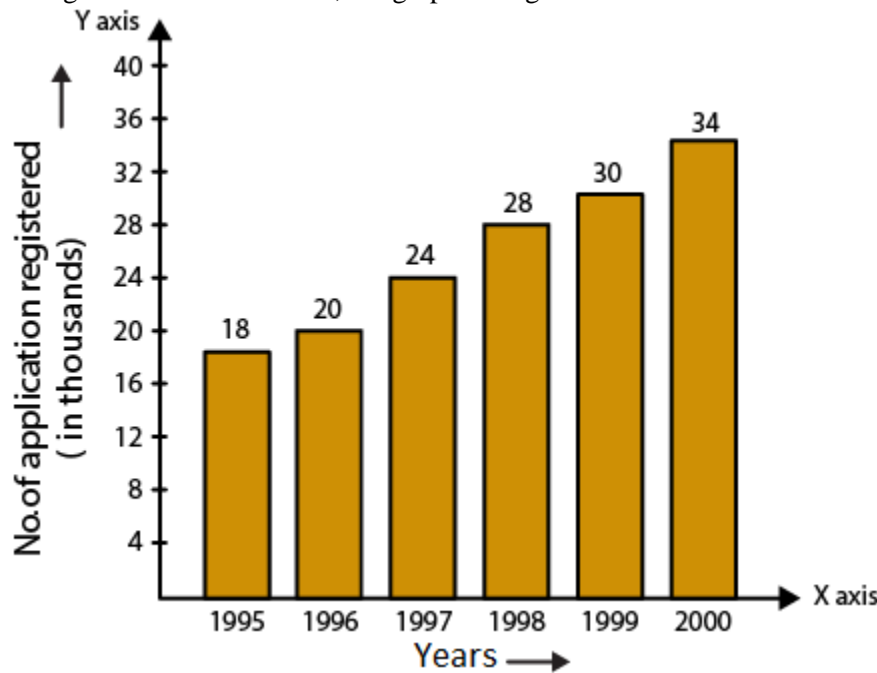1998 = 28/4 = 7 units
1999 = 30/4 = 7.5 units
2000 = 34/4 = 8.5 units

Using the above calculation, the graph is as given below:

7. The following table gives the route length (in thousand kilometres) of the Indian Railways in some of the years:

Year	1960–61	1970–71	1980–81	1990–91	2000–2001
Route length(in thousand kilometres)	56	60	61	74	98

Represent the above data with the help of a bar graph.
Solution:

Construct two mutually perpendicular lines OX and OY.
Let us mark years along the horizontal line OX and mark route length along the vertical line OY.
Take equal width for each bar on the axis OX.
Now let us take a suitable scale to find the heights of the bar.
Take 1 big division = 10 thousand kilometres
So the heights of the bars are as given below:
1960-61 = 56/10 = 5.6 units
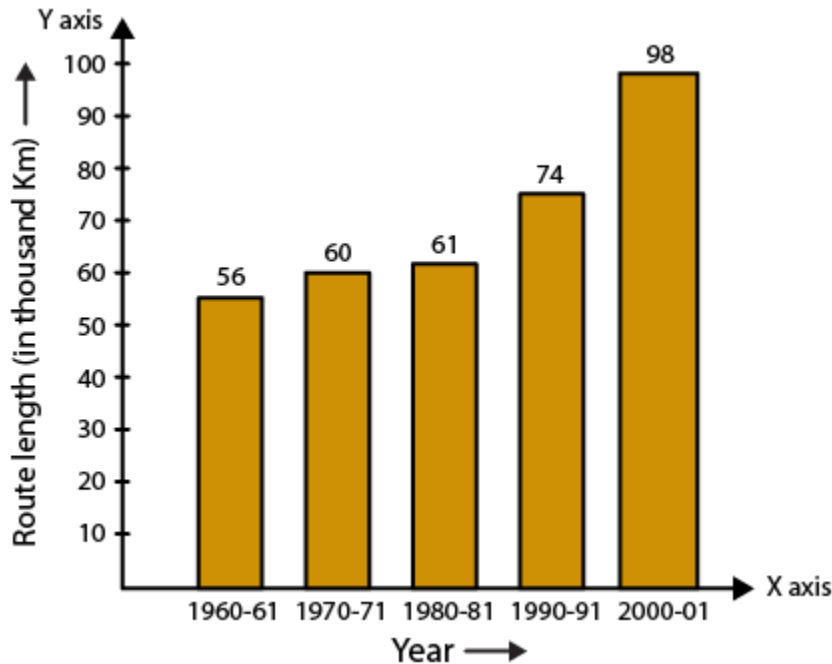1970-71 = 60/10 = 6 units
1980-81 = 61/10 = 6.1 units
1990-91 = 74/10 = 7.4 units
2000-2001 = 98/10 = 9.8 units
Using the above calculation, the graph is as given below:

8. The following data gives the amount of loans (in crores of rupees) disbursed by a bank during some years:

Year	1992	1993	1994	1995	1996
Loan (in crores of rupees)	28	33	55	55	80

(i) Represent the above data with the help of a bar graph.
(ii) With the help of the bar graph, indicate the year in which amount of loan is not increased over that of the preceding year.
Solution:
(i) Construct two mutually perpendicular lines OX and OY.
Let us mark years along the horizontal line OX and mark loans in crores along the vertical line OY.
Take equal width for each bar on the axis OX.
Now let us take a suitable scale to find the heights of the bar.
Take 1 big division = 10 crores of loan
So the heights of the bars are as given below:
1992 = 28/10 = 2.8 units
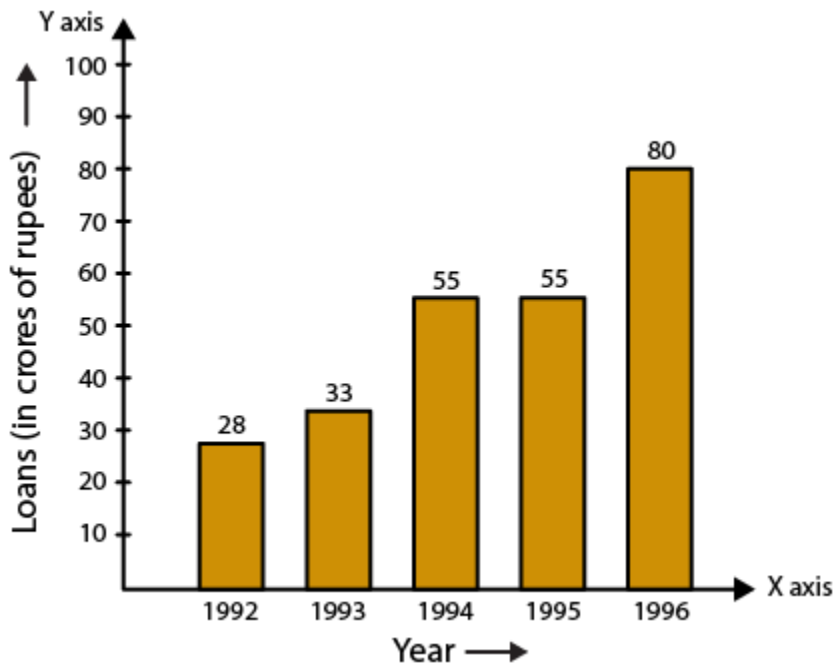1993 = 33/10 = 3.3 units
1994 = 55/10 = 5.5 units
1995 = 55/10 = 5.5 units
1996 = 80/10 = 8.0 units

Using the above calculation, the graph is as given below:

(ii) 1995 is the year where the loan amount has not increased than its previous year.

9. The following table shows the interest paid by a company (in lakhs):

Year	1995-96	1996-97	1997-98	1998-99	1999-2000
Interest (in lakhs of rupees)	20	25	15	18	30

Draw the bar graph to represent the above information.
Solution:

Construct two mutually perpendicular lines OX and OY.
Let us mark years along the horizontal line OX and mark amount of interest paid by the company along the vertical line OY.
Take equal width for each bar on the axis OX.
Now let us take a suitable scale to find the heights of the bar.
Take 1 big division = 5 lakhs of rupees paid as interest by the company
So the heights of the bars are as given below:
1995-96 = 20/5 = 4 units
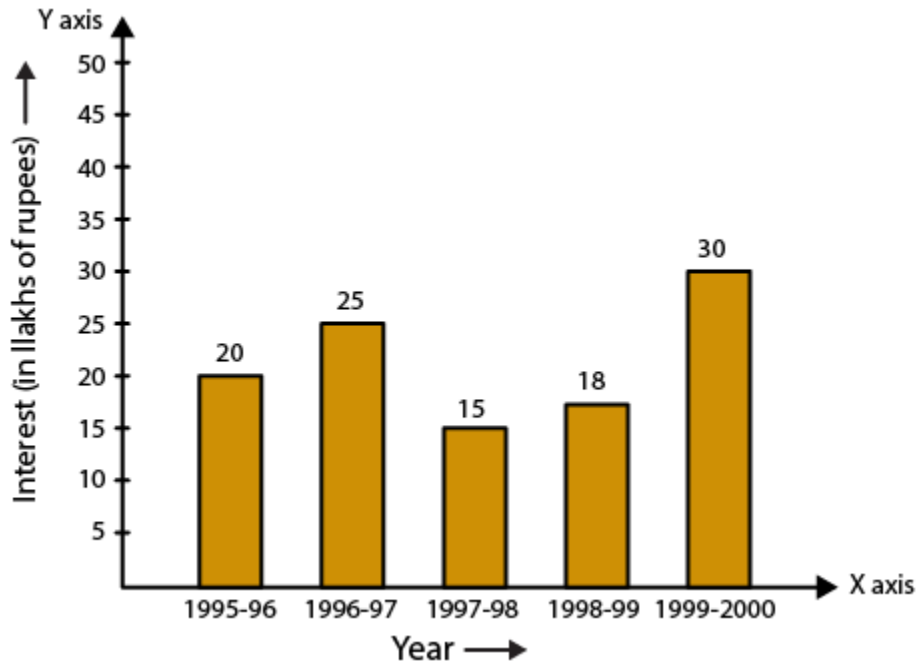1996-97 = 25/5 = 5 units
1997-98 = 15/5 = 3 units
1998-99 = 18/5 = 3.6 units
1999-2000 = 30/5 = 6 units

Using the above calculation, the graph is as given below:

10. The following data shows the average age of men in various countries in a certain year:

Country	India	Nepal	China	Pakistan	U.K.	U.S.A.
Average age (in years)	55	52	60	50	70	75

Represent the above information by a bar graph.
Solution:

Construct two mutually perpendicular lines OX and OY.
Let us mark countries along the horizontal line OX and mark average age for men along the vertical line OY.
Take equal width for each bar on the axis OX.
Now let us take a suitable scale to find the heights of the bar.
Take 1 big division = 10 years
So the heights of the bars are as given below:
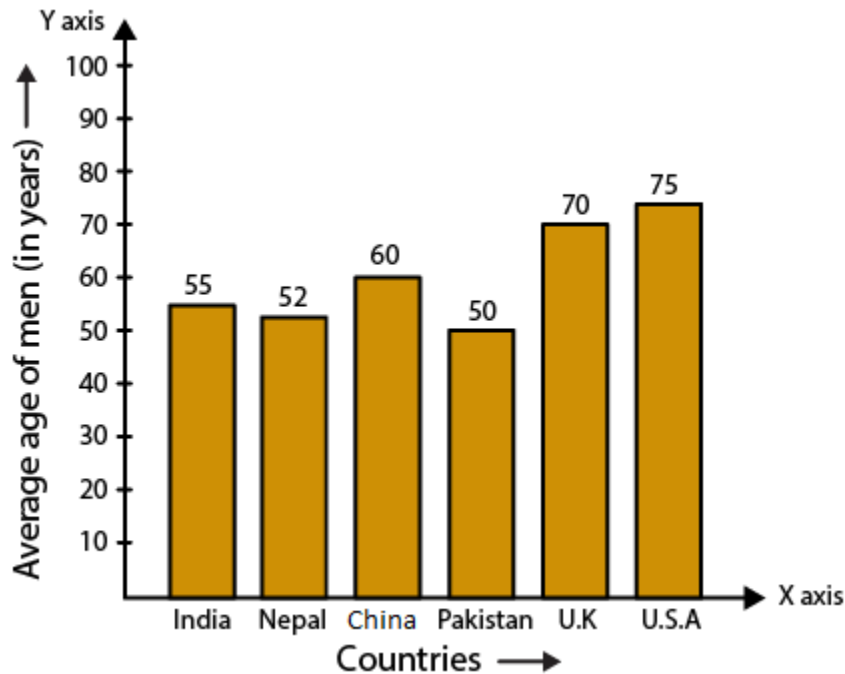India = 55/10 = 5.5 units
Nepal = 52/10 = 5.2 units
China = 60/10 = 6.0 units
Pakistan = 50/10 = 5.0 units
UK = 70/10 = 7 units
USA = 75/10 = 7.5 units

Using the above calculation, the graph is as given below:

11. The following data gives the production of foodgrains (in thousand tonnes) for some years:

Year	1995	1996	1997	1998	1999	2000
Production (in thousand tonnes)	120	150	140	180	170	190

Represent the above data with the help of a bar graph.
Solution:

Construct two mutually perpendicular lines OX and OY.
Let us mark years along the horizontal line OX and mark production of food grains in tonnes along the vertical line OY.
Take equal width for each bar on the axis OX.
Now let us take a suitable scale to find the heights of the bar.
Take 1 big division = 20 thousand tonnes
So the heights of the bars are as given below:
1995 = 120/20 = 6 units
1996 = 150/20 = 7.5 units
1997 = 140/20 = 7 units
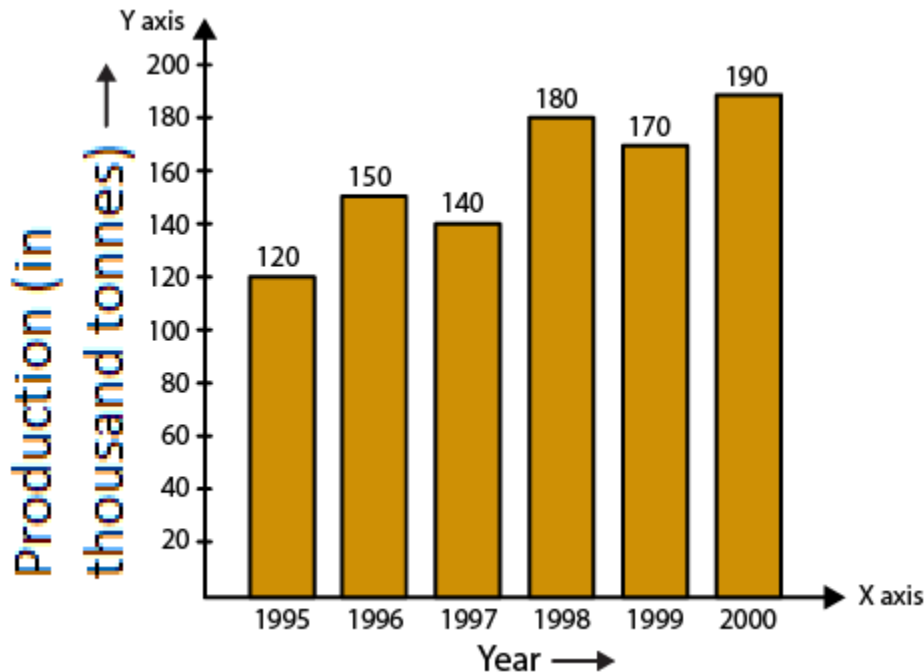1998 = 180/20 = 9 units
1999 = 170/20 = 8.5 units
2000 = 190/20 = 9.5 units

Using the above calculation, the graph is as given below:

12. The following data gives the amount of manure (in thousand tonnes) manufactured by a company during some years:

Year	1992	1993	1994	1995	1996	1997
Manure(in thousand tonnes)	15	35	45	30	40	20

(i) Represent the above data with the help of a bar graph.
(ii) Indicate with the help of the bar graph the year in which the amount of manure manufactured by the company was maximum.
(iii) Choose the correct alternative:

The consecutive years during which there was maximum decrease in manure production are:
(a) 1994 and 1995
(b) 1992 and 1993
(c) 1996 and 1997
(d) 1995 and 1996
Solution:

(i) Construct two mutually perpendicular lines OX and OY.
Let us mark years along the horizontal line OX and mark amount of manure in tonnes along the vertical line OY.
Take equal width for each bar on the axis OX.
Now let us take a suitable scale to find the heights of the bar.
Take 1 big division = 5 thousand tonnes of manure
So the heights of the bars are as given below:
1992 = 15/5 = 3 units
1993 = 35/5 = 7 units
1994 = 45/5 = 9 units
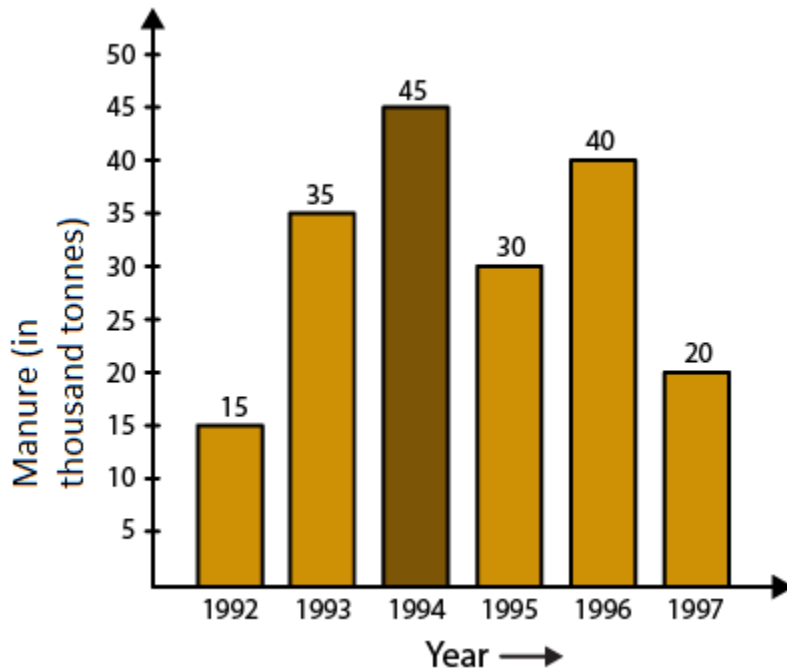1995 = 30/5 = 6 units
1996 = 40/5 = 8.0 units
1997 = 20/5 = 4 units
Using the above calculation, the graph is as given below:

(ii) Maximum amount of manure was manufactured by the company in the year 1994.

(iii) The option (c) is the correct answer.
The consecutive years during which there was maximum decrease in manure production are 1996 and 1997.
Production in the year 1996 and 1997 was decreased by 20 thousand tonnes.