UNIT – 6
STATISTICS

CHAPTER 25

INTRODUCTION AND GRAPHS

25.1 INTRODUCTION

Statistics is the science that deals with the collection, classification, tabulation, representation and interpretation of data.

In statistics, numerical facts are collected in the form of numbers.

If we have collected information about the heights of Class 6 children from ten different schools of Delhi, then this information in the form of numbers is called **statistics.**

25.2 DATA

Each number collected for giving required information is called **data**.

Suppose information is required about the number of members in different families of a certain locality. In order to do so, a certain number of families (say, 50 families) of that locality are visited and the information so collected is summarised in the form of a table as given below :

No. of members in a family	No. of families
1	3
2	5
3	12
4	22
5 and above	8

Whatever be the method adopted, once the data is collected, it should be put in a suitable form, such that it easily gives a fair idea of the necessary information contained in the data.

In statistics data is collected and used in many ways, by government departments, educational institutions, various companies, etc.

In particular, data on population, taxes, food, education, finances, post and telegraph, agriculture, etc. is of great use. In fact, there is hardly any field today where statistical data is not used.

25.3 REPRESENTATION OF DATA

Statistical data can be re-presented in many ways, e.g. in the form of a table (as shown above), pictures, graphs, figures, etc.

Graphs and figures have a more lasting effect on the mind compared to written statements.

In general, pictographs (pictures), bar graphs (column graphs), line graphs, pie charts, histograms, etc. are used for the representation of statistical data.

In this chapter, we shall confine our study to Bar graph, Pie graph and Line graph.

25.4 BAR GRAPH (Column graph)

A bar graph is the simplest form of presenting data. It consists of bars (usually vertical), all of the same width. The heights of these bars are drawn according to the number (value) they represent.

Example 1 :

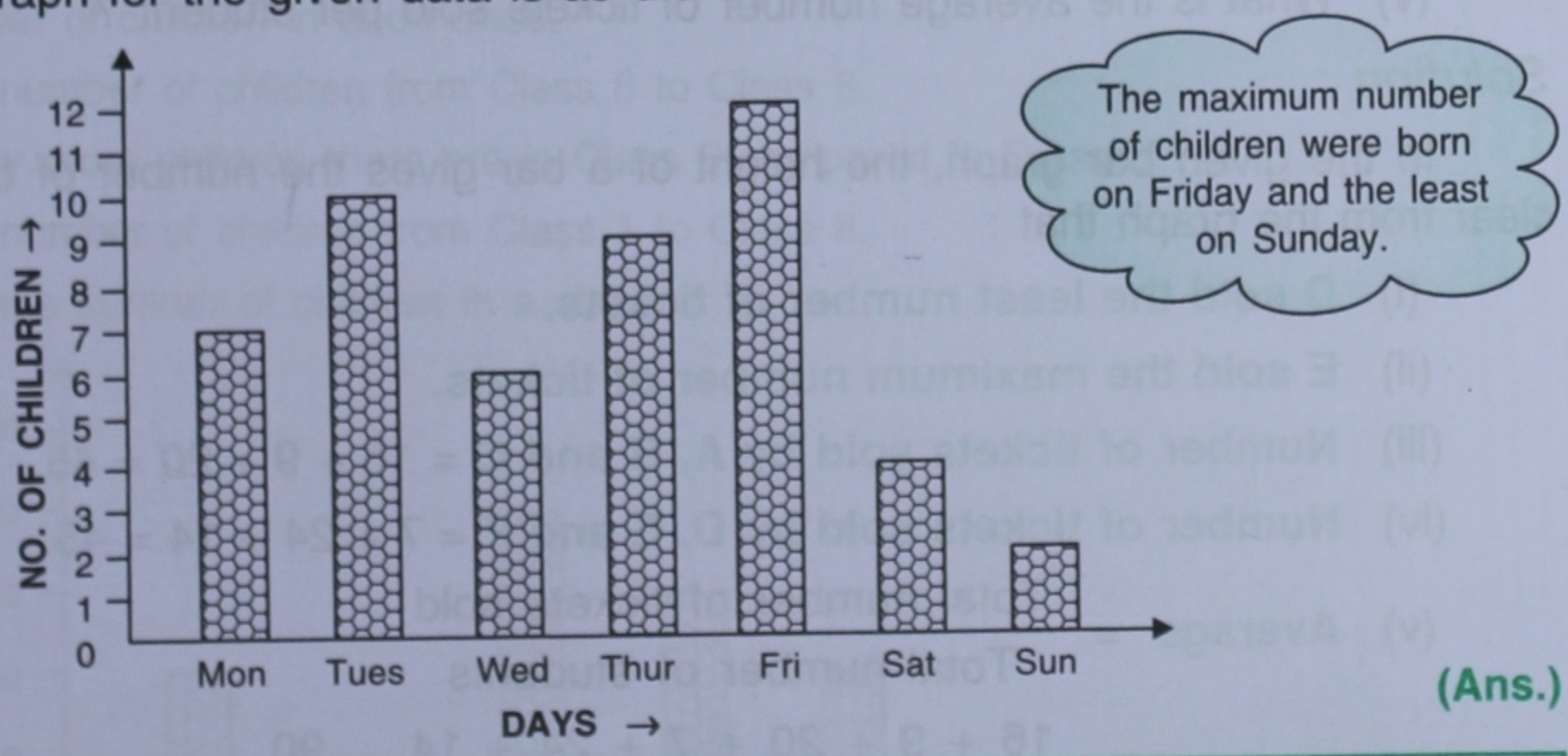
The following table gives the birthdays of 50 children in a class :

Days	No. of children
Monday	7
Tuesday	10
Wednesday	6
Thursday	9
Friday	12
Saturday	4
Sunday	2

Draw a bar graph to represent the given data.

Solution :

The bar graph for the given data is as drawn below :

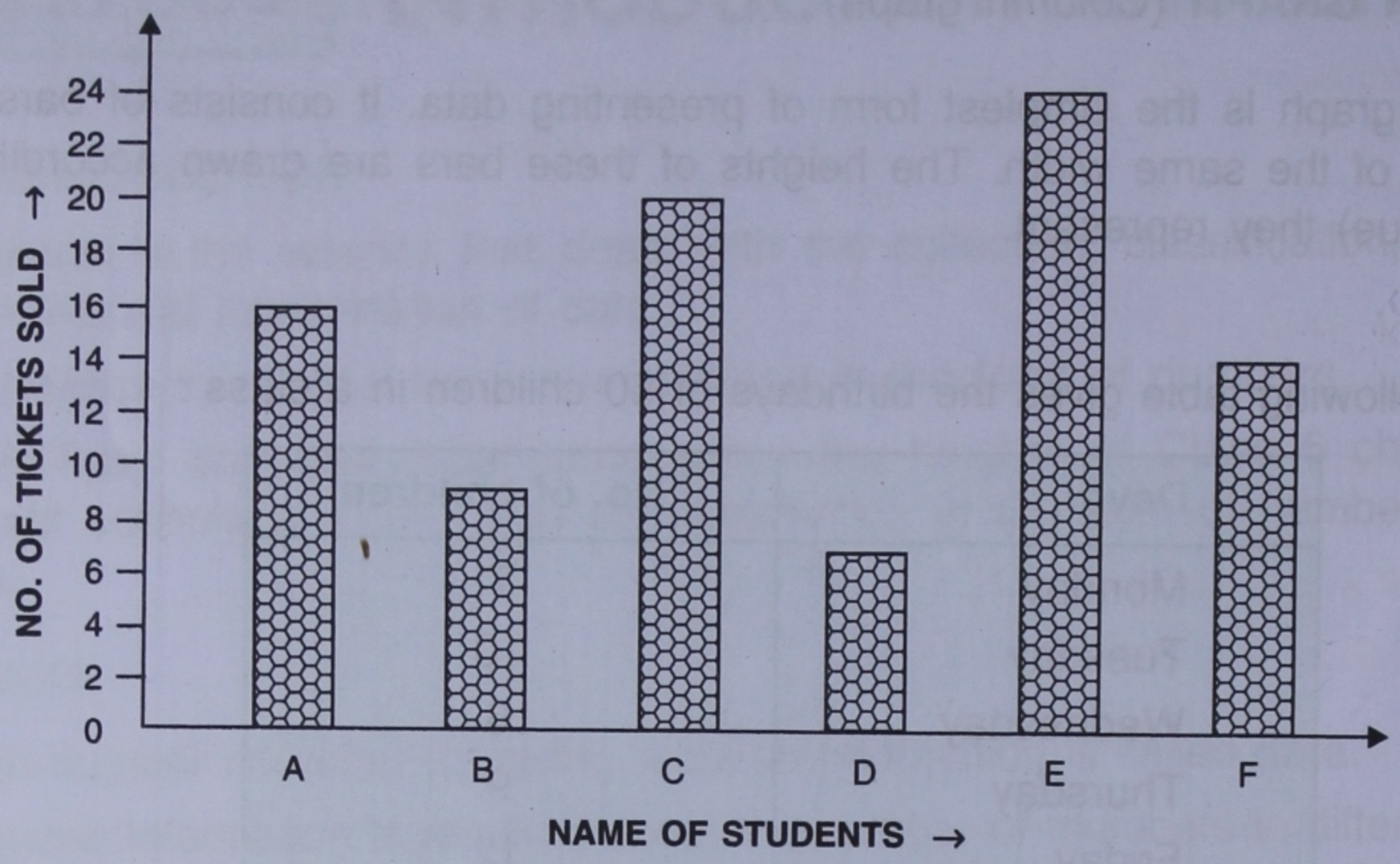


(Ans.)

1. *A bar graph may be drawn on a graph paper or on a plane paper.*
2. *In a bar graph, the bars are rectangles whose widths make the representation more eye catching.*
3. *The bars used in a bar graph may be of any suitable width, but the width of all the bars must be the same.*
4. *The height of a bar represents a quantity; whereas its width represents nothing.*
5. *The space between consecutive bars must be the same (equal).*

Example 2 :

The bar graph drawn below shows the number of tickets sold during a fair by 6 students, A, B, C, D, E and F.



Using the bar graph, answer the following questions :

(i) Who sold the least number of tickets ?

(ii) Who sold the maximum number of tickets ?

(iii) How many tickets were sold by A, B and C taken together ?

(iv) How many tickets were sold by D, E and F taken together ?

(v) What is the average number of tickets sold per student ?

Solution :

In the given bar graph, the height of a bar gives the number of tickets sold. It is clear from the graph that :

(i) **D sold the least number of tickets.** **(Ans.)**

(ii) **E sold the maximum number of tickets.** **(Ans.)**

(iii) **Number of tickets sold by A, B and C** = 16 + 9 + 20 = **45.** **(Ans.)**

(iv) **Number of tickets sold by D, E and F** = 7 + 24 + 14 = **45.** **(Ans.)**

(v) **Average** $= \dfrac{\text{Total number of tickets sold}}{\text{Total number of students}}$

$= \dfrac{16 + 9 + 20 + 7 + 24 + 14}{6} = \dfrac{90}{6} =$ **15** **(Ans.)**

EXERCISE 25(A)

1. The following table gives the family budget of Mr. Vijay.

Item :	Food	Rent	Clothing	Education	Others	Savings
Cost (in ₹) :	500	400	300	150	200	250

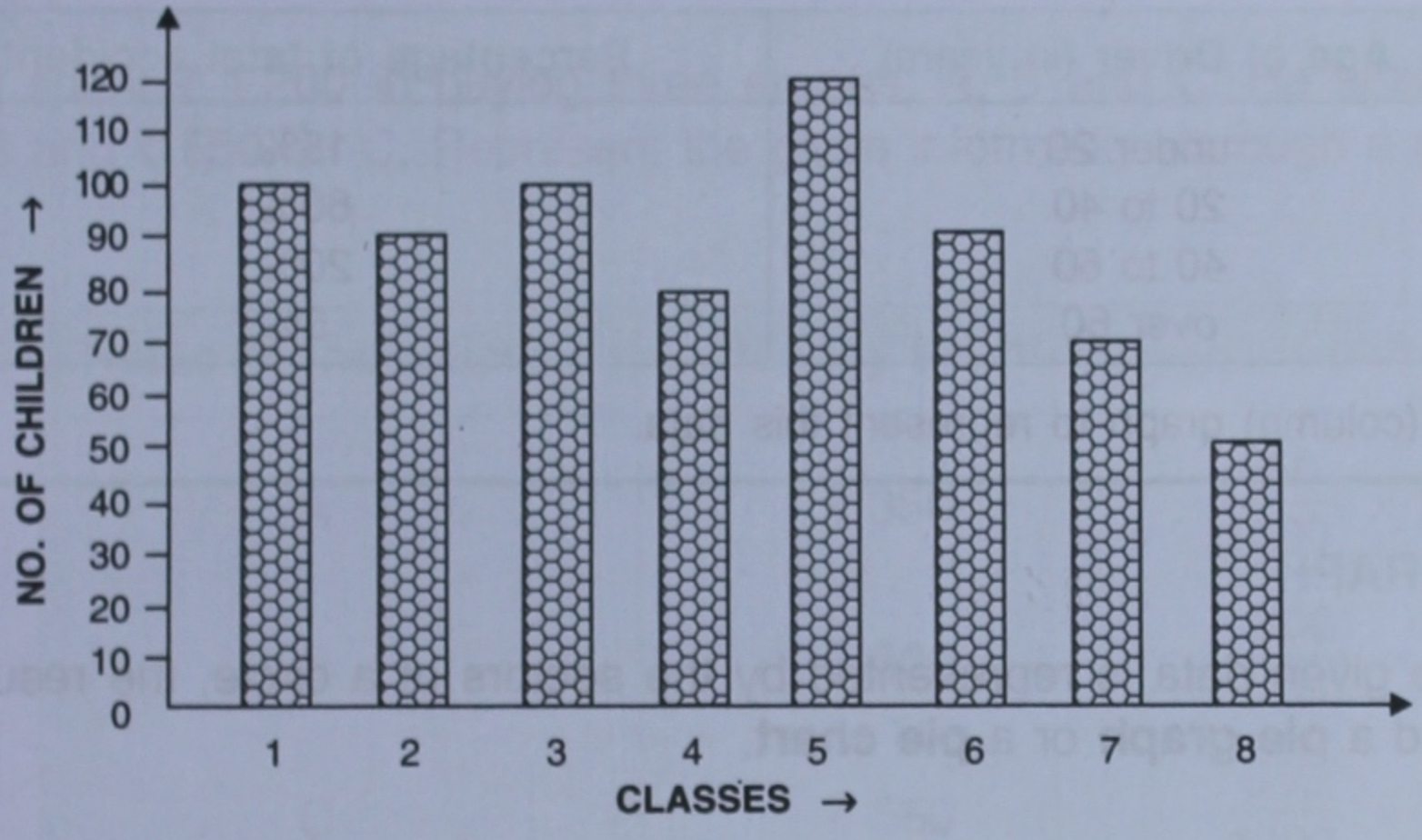
Represent the given data using a column (bar) graph.

2. The following table gives the number of children taking part in different games in a school.

Games :	Table Tennis	Badminton	Chess	Carom	Ludo
No. of children :	95	72	25	30	40

Draw a bar graph to represent this set of data.

3. The following bar graph shows the number of children in various classes, in a school in Delhi.



Using the given bar graph, find :

(i) the number of children in each class.

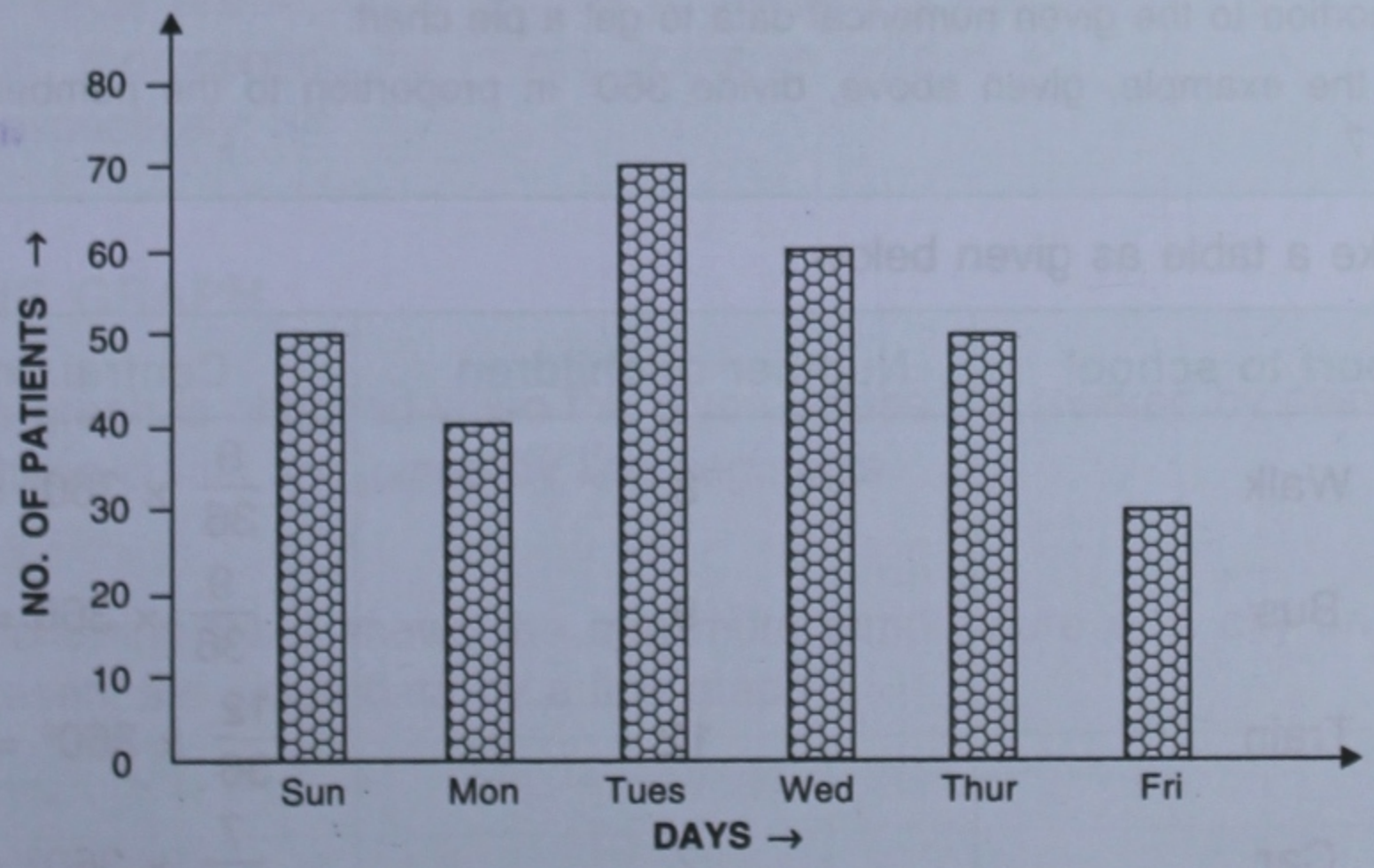
(ii) the total number of children from Class 6 to Class 8.

(iii) how many more children there are in Class 5 compared to Class 6 ?

(iv) the total number of children from Class 1 to Class 8.

(v) the average number of children in a class.

4.



The column graph given above shows the number of patients examined by Dr. V.K. Bansal on different days of a particular week. Use the graph to answer the following :

(i) On which day were the maximum number of patients examined ?
(ii) On which day were the least number of patients examined ?
(iii) On which days were an equal number of patients examined ?
(iv) What is the total number of patients examined in the week ?

5. A student spends his pocket money on various items, as given below :
Books : ₹ 380, Postage : ₹ 30, Toilet items : ₹ 240, Stationery : ₹ 220 and Entertainment : ₹ 120. Draw a bar graph to represent his expenses.

6. The table below gives the ages of the drivers of cars involved in fatal accidents during a certain year.

Age of Driver (in years)	**Percentage of fatal accidents**
under 20	15%
20 to 40	60%
40 to 60	20%
over 60	5%

Draw a bar (column) graph to represent this data.

25.5 PIE GRAPH

When the given data is represented by the sectors of a circle, the resulting figure (graph) is called a **pie graph** or a **pie chart**.

Example 3 :

Draw a pie graph to illustrate the following data :

Transport to School	**Walk**	**Bus**	**Train**	**Car**
Number of children	8	9	12	7

Solution :

1. Since the angle around the centre of a circle is 360°, the angle 360° is divided in proportion to the given numerical data to get a pie chart.
2. For the example, given above, divide 360° in proportion to the numbers 8, 9, 12 and 7.

Step 1 : Make a table as given below :

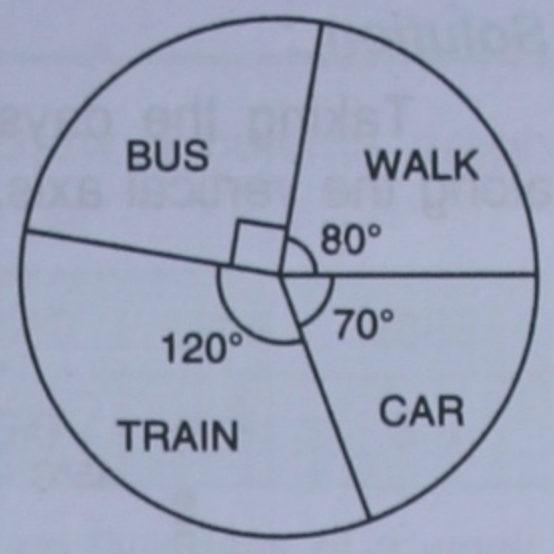
Transport to school	**Number of children**	**Central angle**
Walk	8	$\frac{8}{36} \times 360° = 80°$
Bus	9	$\frac{9}{36} \times 360 = 90°$
Train	12	$\frac{12}{36} \times 360° = 120°$
Car	7	$\frac{7}{36} \times 360° = 70°$
	36	360°

Step 2 : Draw a circle of any suitable radius.

Step 3 : For each central angle draw a sector.

In this example, draw sectors with angles 80°, 90°, 120° and 70° around the centre of the circle.

The final figure obtained is the required pie graph.



The graph drawn alongside is called a pie graph because its sectors resemble the slices of a pie.

(Ans.)

Example 4 :

Mohit spent ₹ 1,200 in buying three articles, A, B and C. He spent ₹ 350 on A, ₹ 300 on B and ₹ 550 on C. Represent the given information through a pie graph.

Solution :

Step 1 :

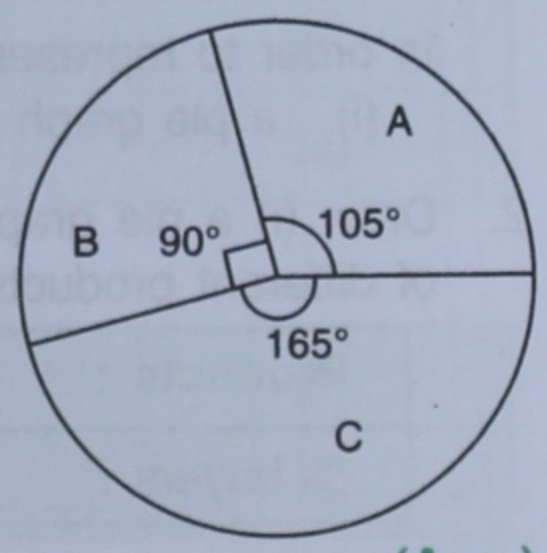
Name of the article	Money spent	Central angle
A	₹ 350	$\frac{350}{1200} \times 360° = 105°$
B	₹ 300	$\frac{300}{1200} \times 360° = 90°$
C	₹ 550	$\frac{550}{1200} \times 360° = 165°$
	₹ 1,200	360°

Step 2 :

Draw a circle of any suitable radius.

Step 3 :

In the circle drawn, draw sectors of measures 105°, 90° and 165° representing the money spent on articles A, B and C, respectively.



(Ans.)

25.6 LINE GRAPH

A line graph is obtained when the given values are marked by points (thick points) and then these points are joined by line segments.

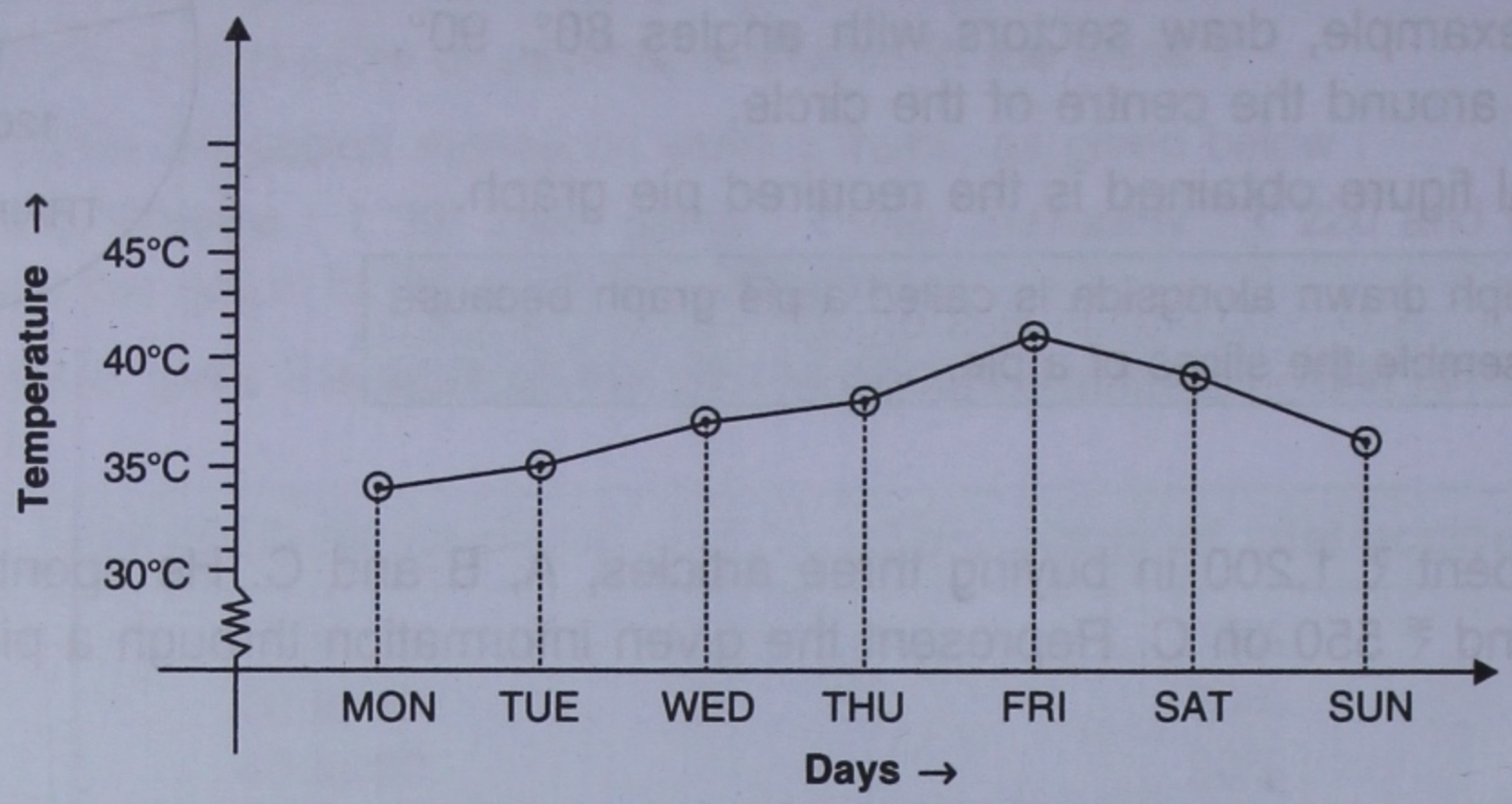
Example 5 :

The following table shows the maximum temperature of a city on each day of a week; represent the given data by a line graph :

Days	Mon.	Tue.	Wed.	Thur.	Fri.	Sat.	Sun.
Max. Temp. (in °C)	34	35	37	38	41	39	36

Solution :

Taking the days along the horizontal axis and the corresponding temperatures along the vertical axis, the required graph, a line graph, will be as follows :



(Ans.)

Since, the values of the different observations (temperatures) lie between 30°C and 45°C, the scale for temperature is drawn to scale only for 30°C to 45°C. A zig-zag line is drawn below 30°C to show that temperatures below 30°C are not taken into consideration.

EXERCISE 25(B)

1. Birth rate (per thousand) for different countries over a certain period is as follows :

Country	India	Germany	U.K.	China
Birth-rate :	35	15	25	45

In order to represent the given data, draw :

(i) a pie graph (ii) a line graph

2. Draw (i) a pie graph and (ii) a line graph for the following data showing the market shares of different products :

Products :	P	Q	R	S	Others
% buyers :	30	25	15	15	5

3. Mohit spends his pocket money on various items as under :

(i) Stationery = ₹ 32

(ii) Postage = ₹ 6

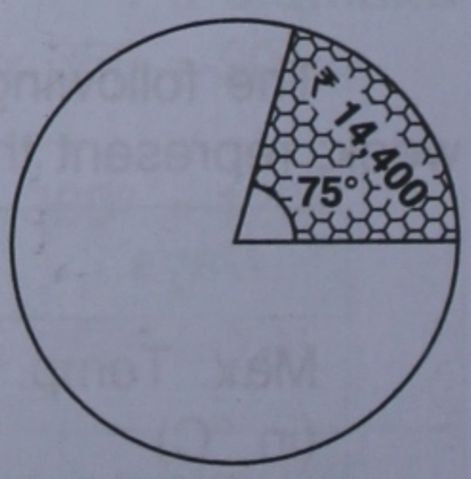
(iii) Entertainment = ₹ 22

(iv) Transportation = ₹ 15

(v) Others = ₹ 15

Draw a pie-chart to represent the given data

4. The given pie chart shows a sector of 75°, and this sector represents expenses of ₹ 14,400. If the whole circle represents the total income of a man, find his total income.



Revision Exercise (Chapter 25)

1. The population of a city in different years is given below. Draw a column graph (bar graph).

Year :	1960	1965	1970	1975	1980	1985	1988
Population in millions :	2·5	3·2	3·8	4·4	5·0	5·3	5·8

2. A seminar on career-orientation was organised by school authorities on five days of a week. The number of children present on each day is given below. Draw a bar diagram to represent the information.

Days	No. of Children
Monday	100
Tuesday	250
Wednesday	320
Thursday	150
Friday	120

3. Water is essential for life and for life processes. Water is usually used by organisms to transport soluble food material to various cells in the body. It regulates our body temperature and constitutes the major portion of our body.

   The approximate water content in percentage proportion and by weight in :

   (i) Human body = 70% (ii) Cucumber = 94% (iii) Tomato = 90% (iv) Potato = 78%

   Draw a suitable graph to represent this data.

4. Represent the following data by a pie graph :

A	B	C	D	E	F
30	18	15	25	12	80

5. For the following data draw a line graph :

A	B	C	D	E	F
48	52	51	40	38	43

6. Misha had ₹ 900 with her. She spent ₹ 100 on lunch, ₹ 400 on books, ₹ 250 on a gift for her friend and ₹ 150 on transportation. Draw a pie chart to represent the given information.

7. Six students of class 6 score marks in the first terminal examination as shown below. Draw a bar graph for the given data.

Name of the students	Riya	Mohit	John	Neetu	Udit	Kapil
Percentage score	78%	62%	93%	56%	70%	66%