



## **Government of Tamilnadu**

### **Department of Employment and Training**

Course : TNPSC Group II Exam  
Subject : Aptitude and Mental Ability  
Topic : **Data Handling**

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## DATA HANDLING

### Introduction

Everyday we come across different kinds of information in the form of numbers through newspapers and other media of communication.

This information may be about food production in our country, population of the world, import and export of different countries, dropouts of children from the schools in our state, the accidental deaths, etc.

In all these information, we use numbers. These numbers are called **data**. The data help us in making decisions. They play a vital part in almost all walks of life of every citizen. Hence, it is very important to know how to get relevant and exact information from such data.

The calculated data may not be suitable for reading, understanding and for analysing. The data should be carefully handled so that it can be presented in various forms. A common man should be able to understand and visualize and get more information on the data.

### Recalling the Formation of Frequency Table

We have learnt in seventh standard, how to form a frequency table. Let us recall it.

### Formation of frequency table for an ungrouped data

#### **Example**

Consider the following data:

15, 17, 17, 20, 15, 18, 16, 25, 16, 15,  
16, 18, 20, 28, 30, 27, 18, 18, 20, 25,  
16, 16, 20, 28, 15, 18, 20, 20, 20, 25. Form a frequency table.

#### **Solution**

The frequency table is given below:

Number ( $x$ )	Tally Mark	Frequency ( $f$ )
15		4
16		5
17		2
18		5
20		7
25		3
27		1
28		2
30		1
	<b>Total</b>	<b>30</b>

**Formation of frequency table for a grouped data****Example**

The marks obtained by 50 students in a Mathematics test with maximum marks of 100 are given as follows:

43, 88, 25, 93, 68, 81, 29, 41, 45, 87, 34, 50, 61, 75, 51, 96, 20, 13, 18, 35, 25, 77, 62, 98, 47, 36, 15, 40, 9, 25, 39, 60, 37, 50, 19, 86, 42, 29, 32, 61, 45, 68, 41, 87, 61, 44, 67, 30, 54, 8.

Prepare a frequency table for the above data using class interval.

**Solution**

$$\begin{aligned}\text{Total number of values} &= 50 \\ \text{Range} &= \text{Highest value} - \text{Lowest value} \\ &= 98 - 8 = 90\end{aligned}$$

Let us divide the given data into 10 classes.

$$\begin{aligned}\text{Length of the Class interval} &= \frac{\text{Range}}{\text{Number of class interval}} \\ &= \frac{90}{10} = 9\end{aligned}$$

The frequency table of the marks obtained by 50 students in a mathematics test is as follows:

Class Interval (C.I)	Tally Mark	Frequency (f)
0-5		2
10-20		4
20-30		6
30-40		7
40-50		9
50-60		4
60-70		8
70-80		2
80-90		5
90-100		3
	<b>Total</b>	<b>50</b>

Thus the given data can be grouped and tabulated as follows:

Class Interval (C.I)	0-10	10 -20	20-30	30-40	40 -50	50 -60	60 -70	70 -80	80-90	90 -100
Frequency (f)	2	4	6	7	9	4	8	2	5	3

### Drawing Histogram and Frequency Polygon for Grouped Data

The statistical data can be represented by means of geometrical figures or diagrams which are normally called “graphs”. The graphical representation of data makes itself interesting for reading, consuming less time and easily understandable. There are many ways of representing numerical data graphically. In this chapter, we will study the following two types of diagrams:

- (i) Histogram
- (ii) Frequency Polygon

### Histogram

A two dimensional graphical representation of a continuous frequency distribution is called a histogram.

In histogram, the bars are placed continuously side by side with no gap between adjacent bars. That is, in histogram rectangles are erected on the class intervals of the distribution. The areas of rectangle are proportional to the frequencies.

### **(a) Drawing a histogram for continuous frequency distribution**

#### **Procedure:**

- Step 1 :** Represent the data in the continuous (exclusive) form if it is in the discontinuous (inclusive) form.
- Step 2 :** Mark the class intervals along the X-axis on a uniform scale.
- Step 3 :** Mark the frequencies along the Y-axis on a uniform scale.
- Step 4 :** Construct rectangles with class intervals as bases and corresponding frequencies as heights.

The method of drawing a histogram is explained in the following example.

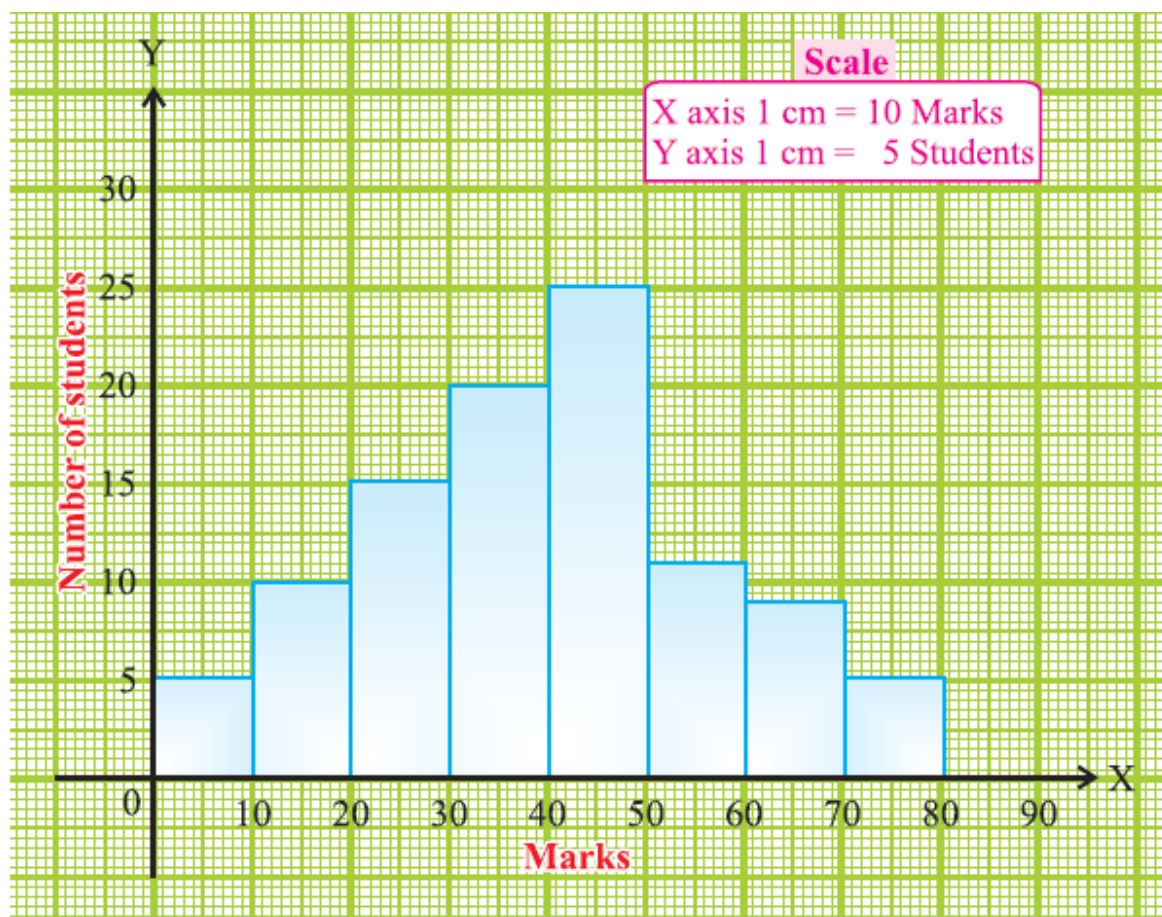
### **Example**

Draw a histogram for the following table which represent the marks obtained by 100 students in an examination:

Marks	0-10	10 -20	20-30	30-40	40 -50	50 -60	60 -70	70 -80
Number of Students	5	10	15	20	25	12	8	5

**Solution**

The class intervals are all equal with length of 10 marks. Let us denote these class intervals along the X-axis. Denote the number of students along the Y-axis, with appropriate scale. The histogram is given below.



**Note:** In the above diagram, the bars are drawn continuously. The rectangles are of lengths (heights) proportional to the respective frequencies. Since the class intervals are equal, the areas of the bars are proportional to the respective frequencies.

**(b) Drawing a histogram when class intervals are not continuous****Example**

The heights of trees in a forest are given as follows. Draw a histogram to represent the data.

Heights in metre	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55
Number of trees	10	15	25	30	45	50	35	20

**Solution**

In this problem, the given class intervals are discontinuous (inclusive) form. If we draw a histogram as it is, we will get gaps between the class intervals. But in a histogram the bars should be continuously placed without any gap. Therefore we should make the class intervals continuous. For this we need an adjustment factor.

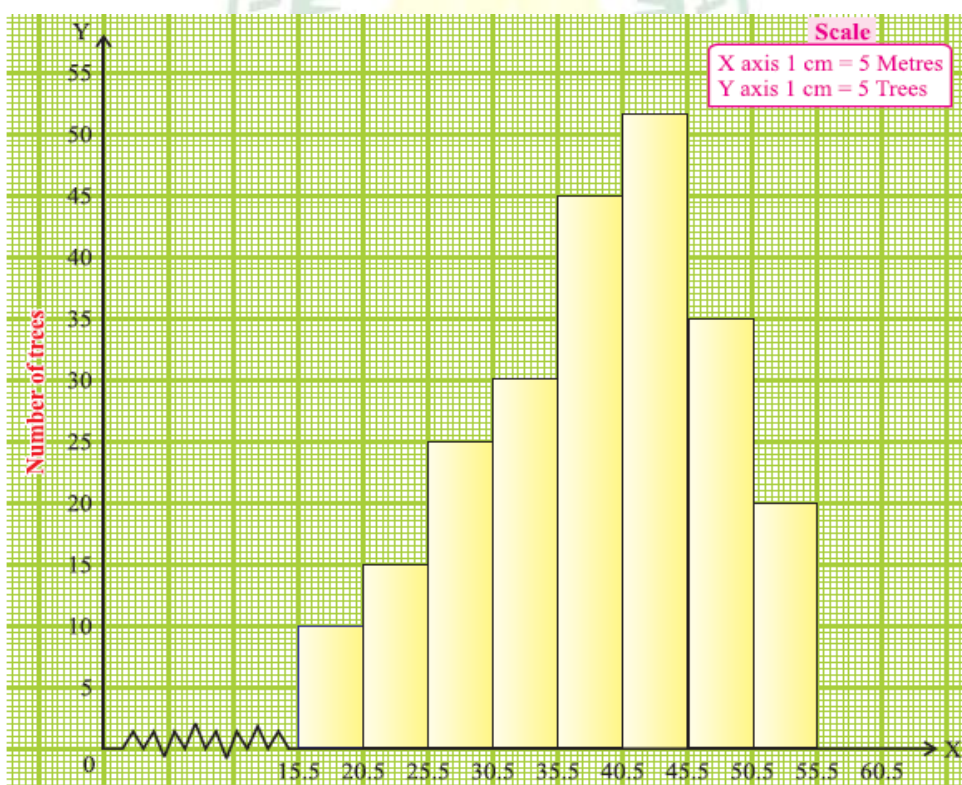
$$\text{Adjustment Factor} = \frac{1}{2} [(\text{lower limit of a class interval}) - (\text{upper limit of the preceding class interval})]$$

$$= \frac{1}{2} (21-20) = 0.5$$

In the above class interval, we subtract 0.5 from each lower limit and add 0.5 in each upper limit. Therefore we rewrite the given table into the following table.

Heights in metre	15.5-20.5	20.5-25.5	25.5-30.5	30.5-35.5	35.5-40.5	40.5-45.5	45.5-50.5	50.5-55.5
Number of trees	10	15	25	30	45	50	35	20

Now the above table becomes continuous frequency distribution. The histogram is given below



**Note:** In the histogram (Fig. 3.2) along the X-axis the first value starts from 15.5, therefore a break (kink) is indicated near the origin to signify that the graph is drawn beginning at 15.5 and not at the origin.

### Frequency polygon

Frequency Polygon is another method of representing frequency distribution graphically.

Draw a histogram for the given continuous data. Mark the middle points of the tops of adjacent rectangles. If we join these middle points **successively** by line segment, we get a polygon. This polygon is called the **frequency polygon**. It is customary to bring the ends of the polygon down to base level by assuming a lower class of a frequency and highest class of a frequency.

Frequency Polygon can be constructed in two ways:

- (i) Using histogram
- (ii) Without using histogram.

#### (a) To draw frequency polygon using histogram

##### **Procedure:**

**Step 1 :** Obtain the frequency distribution from the given data and draw a histogram.

**Step 2 :** Join the mid points of the tops of adjacent rectangles of the histogram by means of line segments.

**Step 3 :** Obtain the mid points of two assumed class intervals of zero frequency, one adjacent to the first bar on its left and another adjacent to the last bar on its right. These class intervals are known as **imagined class interval**.

**Step 4 :** Complete the polygon by joining the mid points of first and the last class intervals to the mid point of the imagined class intervals adjacent to them.

#### **Example**

Draw a frequency polygon imposed on the histogram for the following distribution.

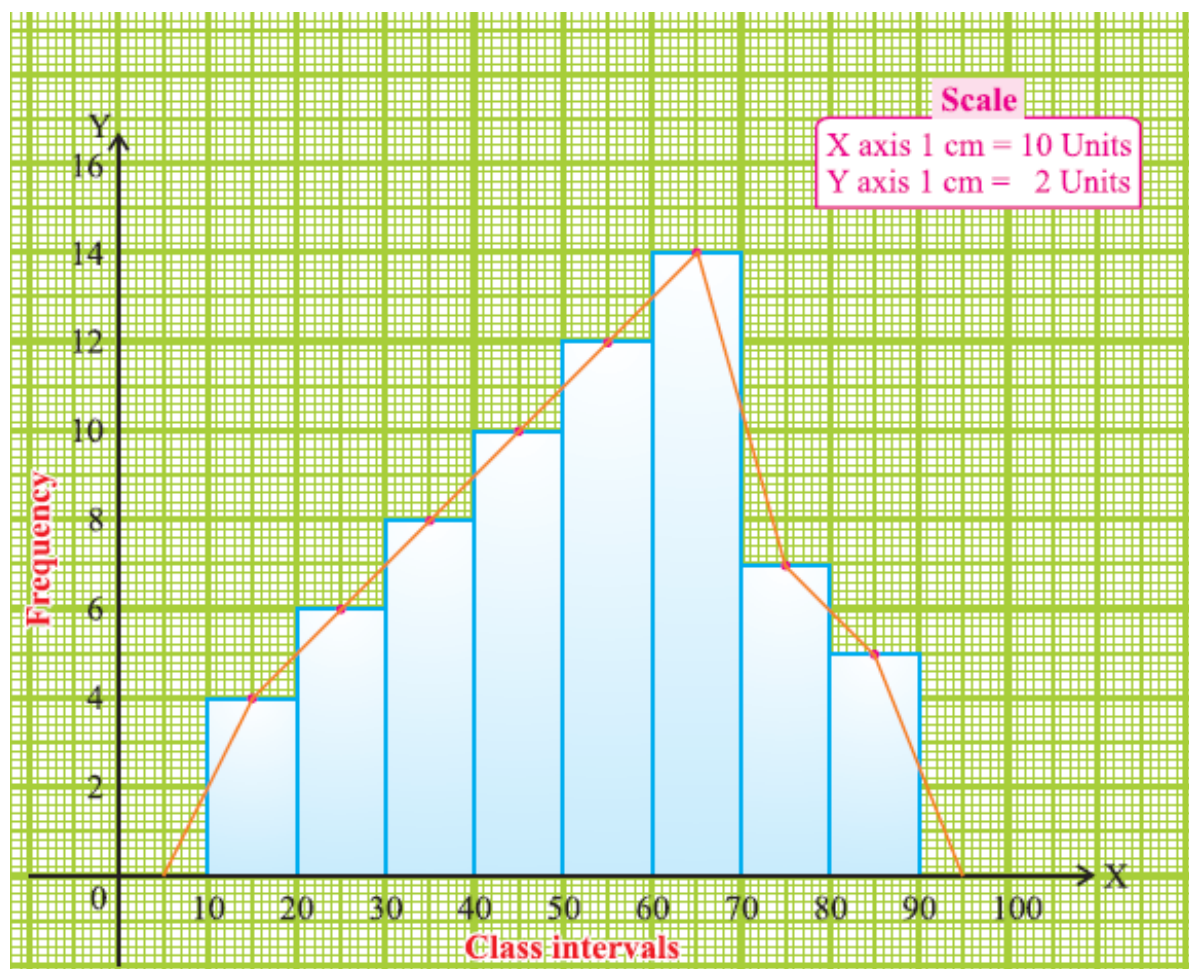
Class interval	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	4	6	8	10	12	14	7	5

#### **Solution**

Take the class-intervals along the X-axis and frequencies along the Y-axis with appropriate scale as shown in the Fig.

Draw a histogram for the given data. Now mark the mid points of the upper sides of the consecutive rectangles. We also mark the midpoints of the assumed class intervals 0-10 and 90-100. The mid points are joined with the help of a ruler. The ends of the polygon are joined with the mid points of 0-10 and 90-100. Now, we get the frequency polygon. Refer Fig.





### Example

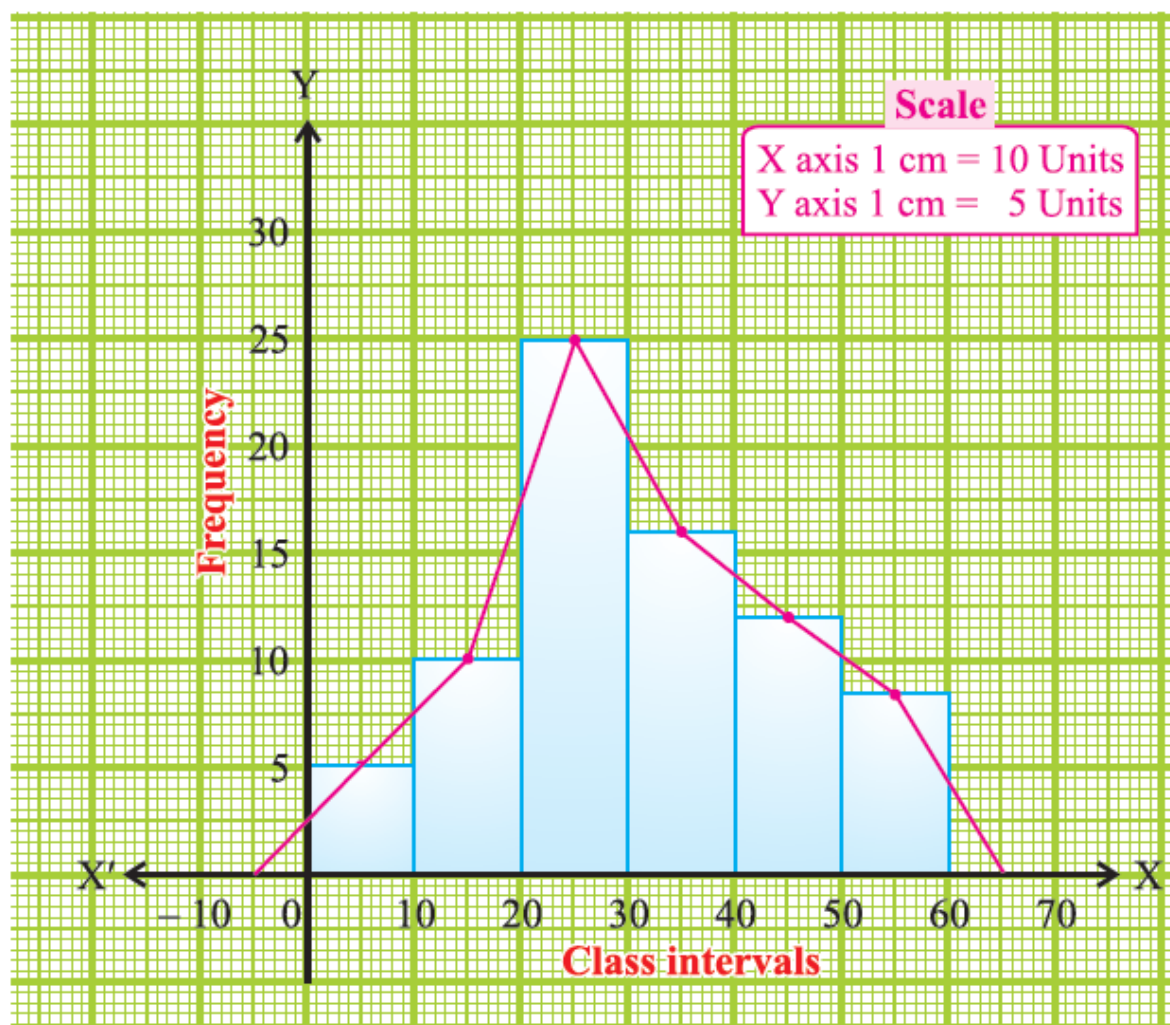
Draw a frequency polygon of the following data using histogram

Class interval	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	5	10	25	16	12	8

### Solution

Mark the class intervals along the X-axis and the frequencies along the Y-axis with appropriate scale shown in Fig.

Draw a histogram for the given data. Now, mark the mid points of the upper sides of the consecutive rectangles. Also we take the imagined class interval  $(-10) - 0$  and  $60 - 70$ . The mid points are joined with the help of a ruler. The ends of the polygon are joined with the mid points of the imagined class intervals  $(-10) - 0$  and  $60 - 70$ . Now we get the frequency polygon.



**Note:** Sometimes imagined class intervals do not exist. **For example**, in case of marks obtained by the students in a test, we cannot go below zero and beyond maximum marks on the two sides. In such cases, the extreme line segments are only partly drawn and are brought down vertically so that they meet at the mid points of the vertical left and right sides of first and last rectangles respectively.

Using this note, we will draw a frequency polygon for the following example:

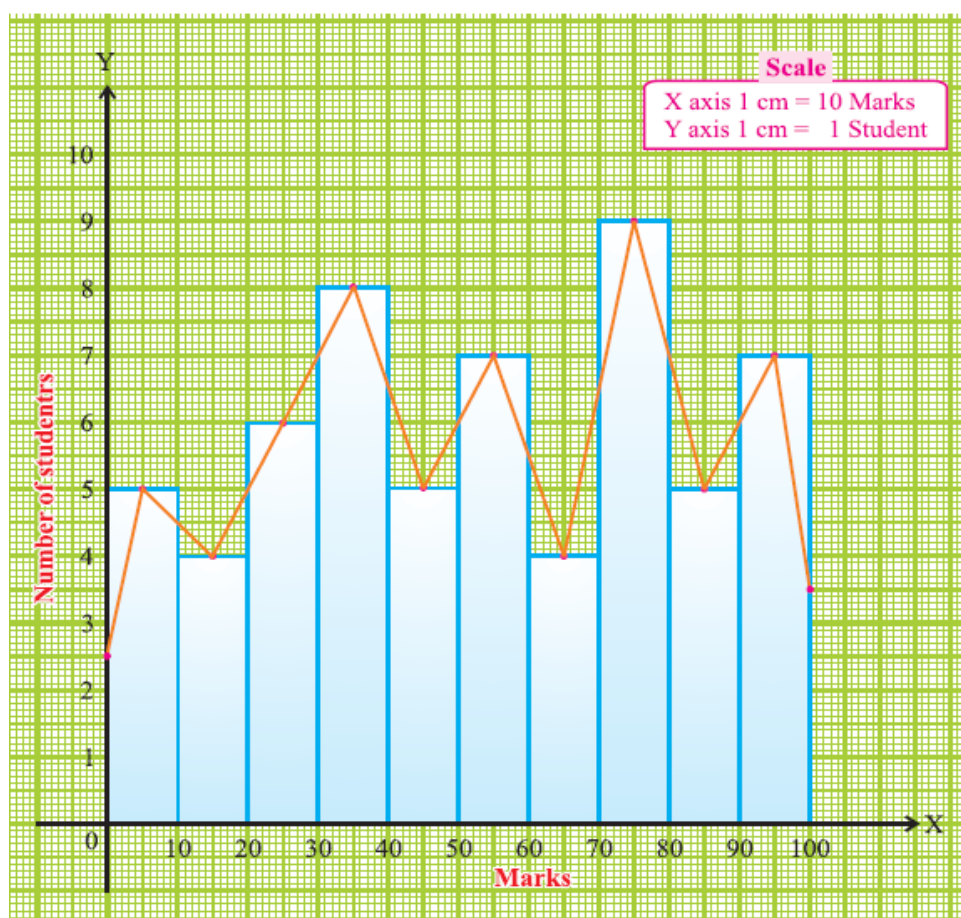
### Example

Draw a frequency polygon for the following data using histogram.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Number of Students	5	4	6	8	5	7	4	9	5	7

## Solution

Mark the class intervals along the X-axis and the number of students along the Y-axis. Draw a histogram for the given data. Now mark the mid points of the upper sides of the consecutive rectangles. The mid points are joined with the help of a ruler. Note that, the first and last edges of the frequency polygon meet at the mid point of the vertical edges of the first and last rectangles.



(b) To draw a frequency polygon without using histogram.

### Procedure:

**Step 1 :** Obtain the frequency distribution from the given data and draw a histogram.

**Step 2 :** Join the mid points of the tops of adjacent rectangles of the histogram by means of line segments.

**Step 3 :** Obtain the mid points of two assumed class intervals of zero frequency, one adjacent to the first bar on its left and another adjacent to the last bar on its right. These class intervals are known as **imagined class interval**.

**Step 4 :** Complete the polygon by joining the mid points of first and the last class intervals to the mid point of the imagined class intervals adjacent to them.

**Example**

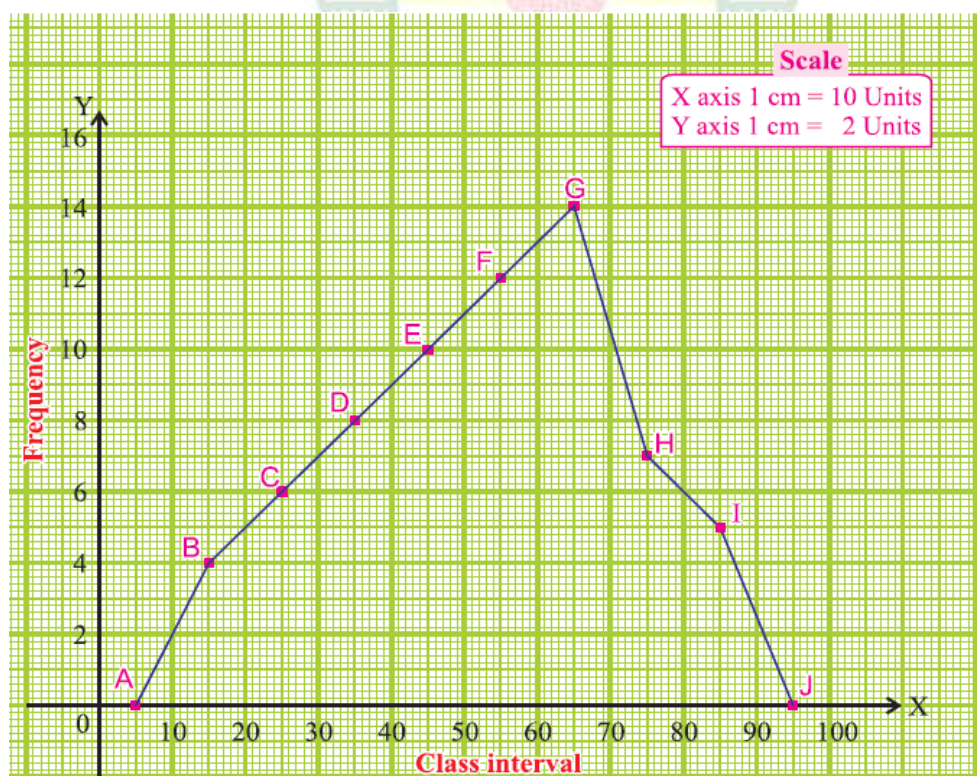
Draw a frequency polygon for the following data without using histogram.

**Solution:**

Mark the class intervals along the X-axis and the frequency along the Y-axis. We take the imagined classes 0-10 at the beginning and 90-100 at the end, each with frequency zero. We have tabulated the data as shown. Using the adjacent table, plot the points A (5, 0), B(15,4), C (25, 6), D (35, 8), E (45, 10), F (55, 12), G (65, 14), H (75, 7), I (85, 5) and J (95, 0).

Class interval	Midpoints	Frequency
0-10	5	0
10-20	15	4
20-30	25	6
30-40	35	8
40-50	45	10
50-60	55	12
60-70	65	14
70-80	75	7
80-90	85	5
90-100	95	0

We draw the line segments AB, BC, CD, DE, EF, FG, GH, HI, IJ to obtain the required frequency polygon ABCDEFGHIJ, which is shown in Fig.



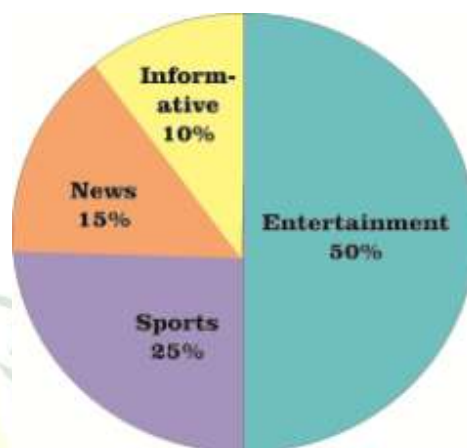
### Construction of Simple Pie Chart

Have you ever come across the data represented in a circular form as shown in Figure.

The time spent by a school student during a day (24 hours).



Viewers watching different types of channels on TV.



The figures similar to the above are called circle graphs. A **circle graph** shows the relationship between a whole and its parts. Here, the whole circle is divided into sectors. The size of each sector is proportional to the activity or information it represents. Since, the sectors resemble the slices of a pie, it is called a **pie chart**.

For example, in the pie chart

$$\left. \begin{array}{l} \text{The proportion of the sector} \\ \text{for hours spent in sleeping} \end{array} \right\} = \frac{\text{number of sleeping hours}}{\text{whole day}}$$

$$= \frac{8 \text{ hours}}{24 \text{ hours}} = \frac{1}{3}$$

So, this sector is drawn  $\frac{1}{3}$ rd part of the circle.

$$\left. \begin{array}{l} \text{The proportion of the sector} \\ \text{for hours spent in school} \end{array} \right\} = \frac{\text{number of school hours}}{\text{Whole day}}$$

$$= \frac{6 \text{ hours}}{24 \text{ hours}} = \frac{1}{4}$$

So, this sector is drawn  $\frac{1}{4}$ th of the circle.

$$\left. \begin{array}{l} \text{The proportion of the sector} \\ \text{for hours spent in homework} \end{array} \right\} = \frac{\text{number of home work hours}}{\text{whole day}}$$

$$= \frac{3 \text{ hours}}{24 \text{ hours}} = \frac{1}{8}$$



So, this sector is drawn  $\frac{1}{8}$  th of the circle

$$\left. \begin{array}{l} \text{The proportion of the sector} \\ \text{for hours spent in others} \end{array} \right\} = \frac{\text{number of others hours}}{\text{whole day}}$$

$$= \frac{4 \text{ hours}}{24 \text{ hours}} = \frac{1}{6}$$

So, this sector is drawn  $\frac{1}{6}$  th of the circle.

Adding the above fractions for all activities,

$$\begin{aligned} \text{We get the total} &= \frac{1}{3} + \frac{1}{4} + \frac{1}{8} + \frac{1}{8} + \frac{1}{6} \\ &= \frac{8+6+3+3+4}{24} = \frac{24}{24} = 1 \end{aligned}$$

**The sum of all fractions is equal to one.** Here the time spent by a school student during a day is represented using a circle and the whole area of the circle is taken as one. The different activities of the school student are represented in various sectors by calculating their proportion. This proportional part can also be calculated using the measure of angle. Since, the sum of the measures of all angles at the central point is  $360^\circ$ , we can represent each sector by using the measure of angle.

In the following example, we are going to illustrate how a pie chart can be constructed by using the measure of angle.

### Example

The number of hours spent by a school student on various activities on a working day, is given below. Construct a pie chart using the angle measurement.

Activity	Sleep	School	Play	Homework	Others
Number of hours	8	6	3	3	4

### Solution

Number of hours spent in different activities in a day of 24 hours are converted into component parts of  $360^\circ$ . Since the duration of sleep is 8 hours, it should be represented by  $\frac{8}{24} \times 360^\circ = 120^\circ$ .

Therefore, the sector of the circle representing sleep hours should have a central angle of  $120^\circ$ .

**EXAMPLE PROBLEMS:**

1.

Item	Expenditure
Food	300
Clothing	75
Education	40
House	75
Rent	110
Others	

When we represent the data on percentage diagram, the percentage of expenditure on clothing is

**SOLUTION:**

The percentage of expenditure on Clothing is,

$$= \frac{75}{600} \times 100$$

$$= 12.5\%$$

2. A man earns Rs. 24,000 as monthly Salary. His expenditure and Savings are given in the diagram. How much did he spend on rent?

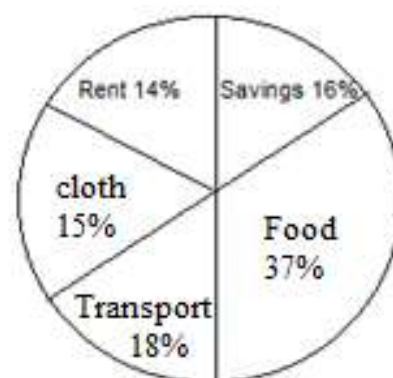
**SOLUTION:**

Spending on rent = 14%

$$\frac{14}{100} \times 24000$$

$$= 3360$$

**Ans : 3360.**



3. A pie diagram is drawn to the following data, then the angle of the sector corresponding to Mathematics is

Course	No.of Students
Engineering	440
Medicine	220
Agriculture	160
Economics	60
Mathematics	80

**SOLUTION:**

$$440 + 220 + 160 + 60 + 80 = 960$$

$$\text{Angle of Sector} = \frac{80}{960} \times 360^\circ$$

(Mathematics)

$$= 30^\circ$$

4. From the following graph, find the percentage of increase in the profit from 2004 to 2005.

Year	2004	2005
Profit	30	50

**SOLUTION:**

Percentage of increase in the profit from

$$2004 \text{ to } 2005 = \frac{50-30}{30} \times 100$$

$$= \frac{20}{30} \times 100$$

$$= \frac{200}{30}$$

$$\text{Ans} = 66\frac{2}{3} \%$$



5. From the following graph, the percentage of increase in sales from 2011 to 2013 is?

Year	2011	2012	2013
Sales	15	20	30

**SOLUTION:**

$$\text{Increase Percentage} = \frac{\text{New value} - \text{old value}}{\text{old value}} \times 100$$

$$= \frac{30 - 15}{15} \times 100 \quad \{2011 - 15 \text{ old value}\}$$

$$= \frac{15}{15} \times 100 \quad \{2013 - 30 \text{ New value}\}$$

**Ans = 100%**

6. Consider the following Table?

Year	1973 - 74	1987 - 88	1993 - 94	1999 - 2000
Number of poor in Indian ( in million)	321	307	320	260?

Which year is least number of poor in India?

**Ans : 1999 – 2000.**

7. The world – wide Tea product of 15

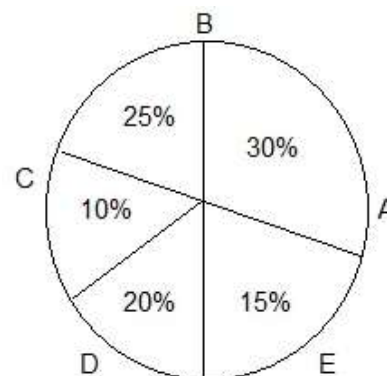
The angle subtended by E at the centre of the circle is

**SOLUTION:**

$$= \frac{15}{100} \times 360^\circ$$

$$= 18 \times 3 = 54^\circ$$

**Ans : 54°**



8. Yearly Profit of the Company XYZ

Change in profit from 50 to 60 of 2005 to 2006 is

**SOLUTION:**

$$\begin{aligned}
 \text{Change in profit} &= \frac{\text{New value} - \text{old value}}{\text{old value}} \times 100 \\
 &= \frac{50 - 60}{60} \times 100 \\
 &= \frac{-10}{60} \times 100 \\
 &= \frac{-100}{6} = -16\frac{2}{3}\%
 \end{aligned}$$

**Ans : Decreased by  $16\frac{2}{3}\%$**

9. The marks obtained by 10 students in a test are 15, 75, 33, 67, 76, 54, 39, 12, 78, 11, Find the arithnctic mean (or) Average.

**SOLUTION:**

Here, the number of observations,  $n = 10$

$$\begin{aligned}
 \therefore \text{Arithnctic Mean} = \bar{x} &= \frac{15 + 75 + 33 + 67 + 76 + 54 + 39 + 12 + 78 + 11}{10} \\
 &= \bar{x} = \frac{460}{10} = 46
 \end{aligned}$$

10. If the average of the values 9, 6, 7, 8, 5 and  $x$  is 8. Find the value of  $x$ ,

**SOLUTION:**

Here, the given values are 9, 6, 7, 8, 5 and  $x$ , also  $n = 6$

$$\begin{aligned}
 \text{By formula, Arithnctic mean} = \bar{x} &= \frac{9 + 6 + 7 + 8 + 5 + x}{6} \\
 &= \frac{35 + x}{6}
 \end{aligned}$$

$$\text{By data } \bar{x} = 8,$$

$$\text{so, } \frac{35 + x}{6} = 8$$

$$\text{ie, } 35 + x = 48$$

$$x = 48 - 35$$

$$x = 13.$$

11. Find the median of 17, 15, 9, 13, 21, 7, 32

**SOLUTION:**

Arrange the values in the ascending order as 7, 9, 13, 15, 17, 21, 32.

Here  $n = 7$ , (odd number)

Therefore, Median = Middle value

$$= \left(\frac{n+1}{2}\right)^{th} \text{ value} = \left(\frac{7+1}{2}\right)^{th} \text{ value} = 4^{th} \text{ value}$$

Hence, the Median is 15.

12. A cricket player has taken the runs 13, 28, 61, 70, 4, 11, 33, 9, 71, 92, Find the Median

**SOLUTION:**

Arrange the runs in ascending order as 0, 4, 11, 13, 28, 33, 61, 70, 71, 92

Here,  $n = 10$  (even number)

There are two middle values 28 and 33.

∴ Median = Average of the two middle values

$$= \frac{28 + 33}{2} = \frac{61}{2} = 30.5$$

13. Find the mode of 22, 25, 21, 22, 29, 25, 34, 37, 30, 22, 29, 25

**SOLUTION:**

Here 22 occurs 3 times, and 25 also occurs 3 times.

∴ Both 22 and 25 are the modes for this data, we observe that there are two modes for the given data.

14. Find the mode of 15, 25, 35, 45, 55, 65

**SOLUTION:**

Each value occurs exactly one time in the series.

Hence there is no mode for this data.

15. The circle graph given shows the spending of a family on various items and its savings during a year. If the total income of the family is Rs. 75000. Then the expenditure on Education was.

**SOLUTION:**

$$\begin{aligned}
 \text{Expenditure of education} &= 12\% \text{ of } 75000 \\
 &= \frac{12}{100} \times 75000 \\
 &= 12 \times 750 \\
 &= 9000
 \end{aligned}$$

**Ans = Rs. 9000**

16. Find the range of the following data:

25, 67, 78, 43, 21, 17, 49, 54, 76, 92, 20, 45, 86, 37, 35

**SOLUTION:**

To find Range, first arrange the given data in the ascending order

17, 20, 21, 25, 35, 37, 43, 45, 49, 54, 67, 76, 78, 86, 92

∴ Range = Last Term - First Term

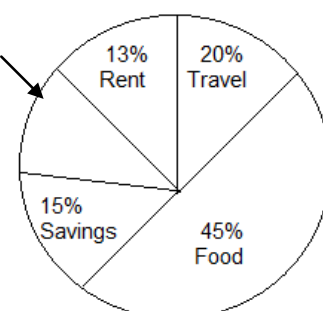
$$= 92 - 17$$

$$= 75$$

**EXERCISE PROBLEMS:**

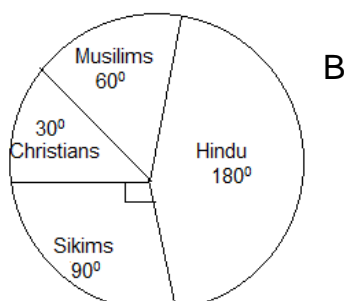
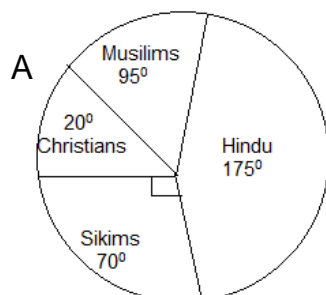
1. A histogram is used to depict a  
 (A) sample data (B) frequency distribution  
 (C) geographical data (D) time series data
2. A man earns Rs. 28,000 as monthly salary. His expenditure and savings are given in the diagram. How much did he spend on entertainment?

7% Entertainment



- (A) Rs. 1,950 (B) Rs. 1,960  
 (C) Rs. 1,970 (D) Rs. 1,980

3. Christian workers in A are how many per cent of Christian workers in B?



(A) 64%

(B) 65%

(C) 66.66%

(D) 67%

4. Consider the following table :

Year	2008	2009	2010	2011
Sales (crores)	15	25	32	54

The year in which the sales registered a sharp increase over that of the preceding year is

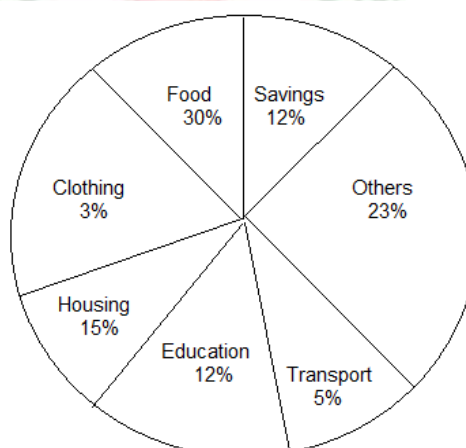
(A) 2008

(B) 2009

(C) 2010

(D) 2011

5. The circle graph given shows the spending of a family on various items and its savings during a year. If the total income of the family is Rs. 75,000. Then the expenditure on education was



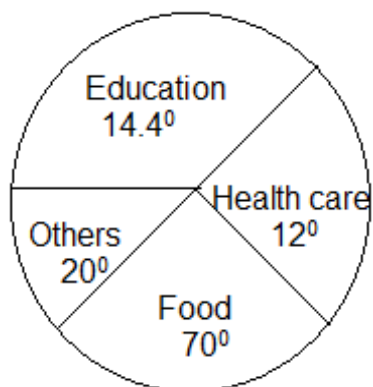
(A) Rs. 7,500

(B) Rs. 8,000

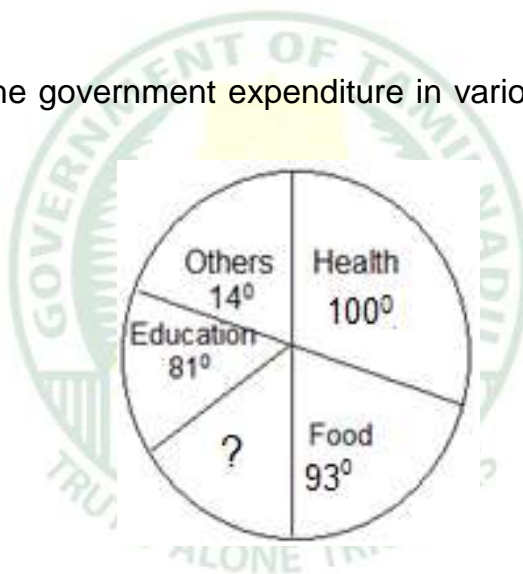
(C) Rs. 8,500

(D) Rs. 9,000

6. The pie diagram illustrates how income was spent. The percentage of income spent on health care is



- (A) 40%                      (B) 30%                      (C) 20%                      (D) 10%
7. Pie diagram represents the government expenditure in various sectors. The missing value is:



- (A) 48°                      (B) 36°                      (C) 72°                      (D) 108°

8.

Age in years	No of persons
10 - 20	8
20 - 30	24
30 - 40	40
40 - 50	22
50 - 60	6

The relative frequency of persons belonging to the class interval 30-40 is

- (A) 0.60 (B) 0.40 (C) 40 (D) 60

9.

Sector	Agriculture	Manu facturing	Services
Revenue collection	22%	40%	38%

When represented in a pie diagram, the angle that represents manufacturing is

- (A)  $72^{\circ}$  (B)  $96^{\circ}$  (C)  $144^{\circ}$  (D)  $216^{\circ}$

10.

Item	Expenditure
Food	1200
Clothing	320
Rent	480
Light & Fuel	160
MBC	240

When represented through a pie diagram, the angle that corresponds to rent is:

- (A)  $32^{\circ}$  (B)  $48^{\circ}$  (C)  $72^{\circ}$  (D)  $96^{\circ}$

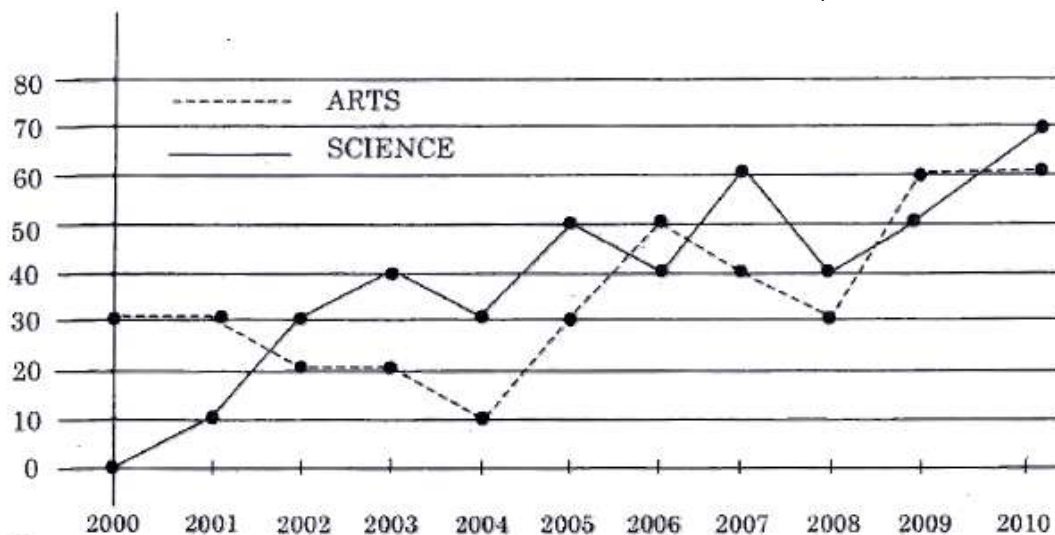
11.

Class	Frequency
0 - 10	5
10 - 20	8
20 - 30	15
30 - 40	6
40 - 50	4

For the class 20 - 30 cumulative frequency is:

- (A) 20                      (B) 13                      (C) 15                      (D) 28

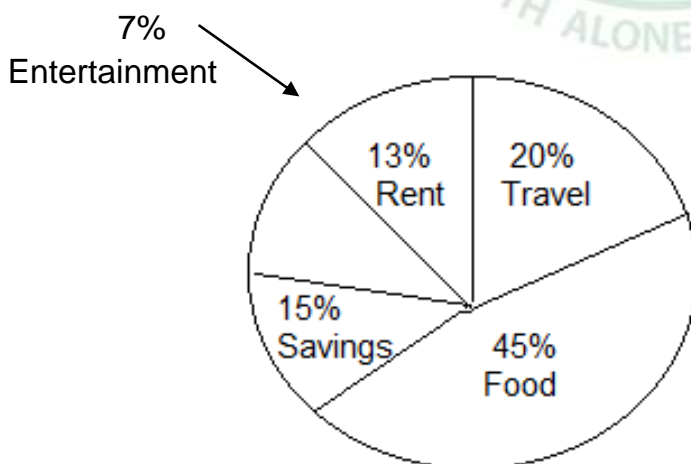
12. SALES BY TWO CATEGORY FOR ABC PRESS, 2000 - 2010 (in thousands of books).



In how many years did the sales of science books exceed the sales of arts books from 2000 to 2009?

- (A) 4 years                      (B) 5 years                      (C) 6 years                      (D) 7 years

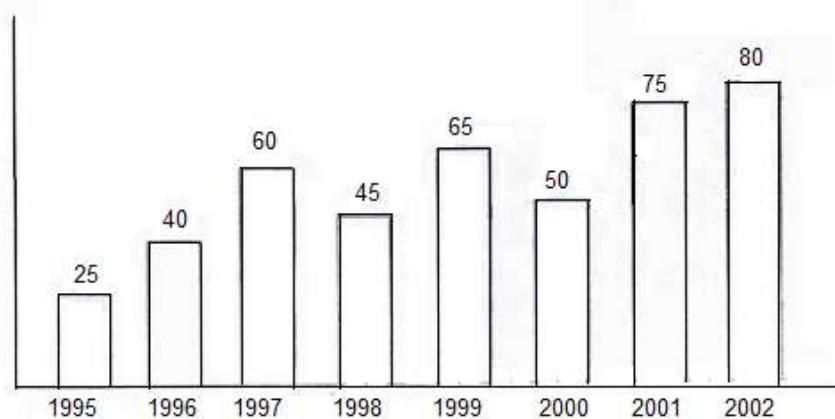
13. A man earns Rs. 28,000 as monthly salary. His expenditure and savings are given in the diagram. The percentage of savings compared to food



- (A) 33.1%                      (B) 33.7%                      (C) 33.2%                      (D) 33.3%

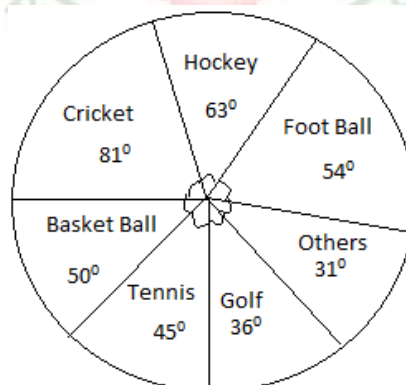


14. Study the following bar-graph and answer the question given below. A company in certain period of fertilizer production (10000 tonnes)



The average production of 1996 and 1997 was exactly equal to the average production of which of the following pairs of years?

- (A) 2000 and 2001  
(B) 1999 and 2000  
(C) 1995 and 1999  
(D) 1995 and 2001
15. The circle graph given here shows the spending of a country on various sports during a particular year. Study the graph and answer the question.

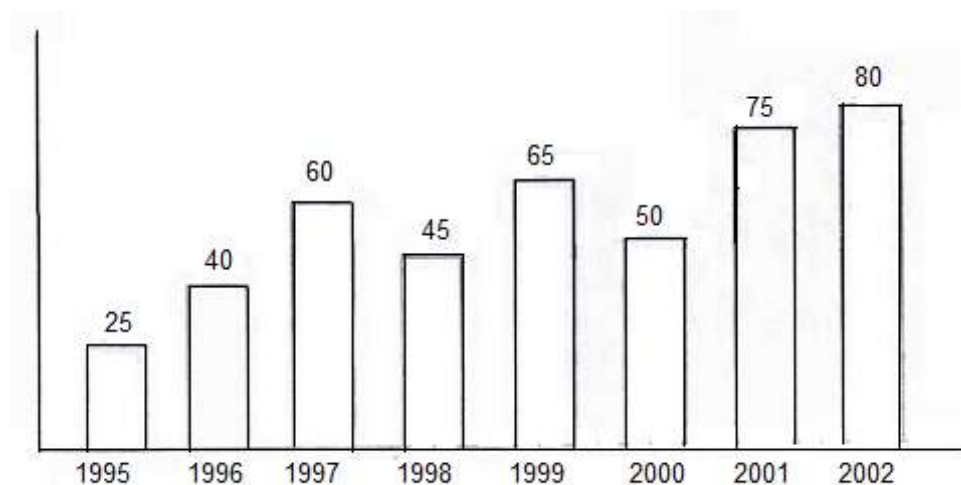


If the total amount spent on sports during the year be Rs. 1,80,00,000, the amount spent on Basket Ball exceeds that on Tennis by

- (A) Rs. 2,50,000  
(B) Rs. 3,60,000  
(C) Rs. 3,75,000  
(D) Rs. 4,10,000

16. Study the following graph and answer the question given below.

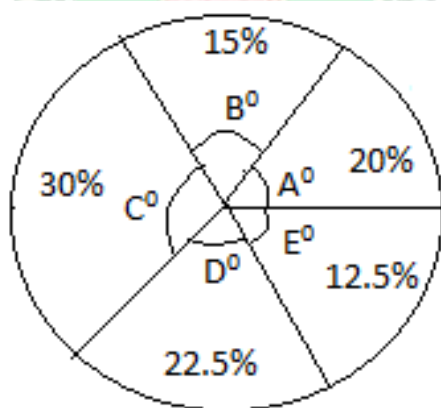
Production of fertilizers by a company (in 10000 tonnes) over the years.



What was the percentage decline in production of fertilizers from 1997 to 1998?

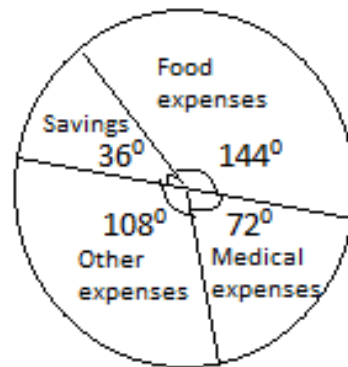
- (A) 25%                      (B) 20%                      (C) 30%                      (D) 50%

17. From the Pie Diagram given below find the central angle  $E^\circ$ .



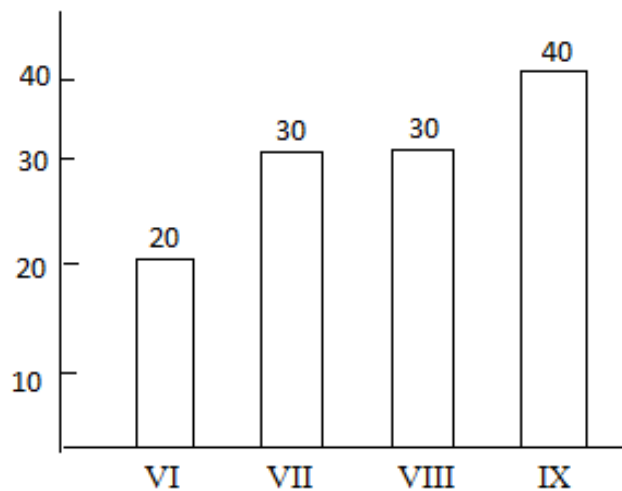
- (A)  $25^\circ$                       (B)  $45^\circ$                       (C)  $50^\circ$                       (D)  $60^\circ$

18. Monthly expenditure of a person whose monthly salary is 9000 is as shown in the diagram. The percentage of money spent for medical expenses is



- (A) 10%                      (B) 20%                      (C) 30%                      (D) 40%

19. The ratio of the number of students in the class VII to class IX is:



- (A) 2 : 3                      (B) 1 : 1                      (C) 3 : 4                      (D) 1 : 2

20. From the following table, find the number of students who have scored marks between 20 and 50.

Marks	No. of Students
10-19	10
20-30	7
31-40	13
41-50	18
51-60	12
61-100	24

(A) 20

(B) 31

(C) 30

(D) 38

21. Find the mean of 2, 4, 6, 8, 10, 12, 15, 16

(A) 9

(B) 8

(C) 7

(D) 4

**ANSWER KEYS:**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
B	B	C	D	D	B	D	B	C	C	D	C	D	D	A	A	B	B	C	D
21																			
A																			