

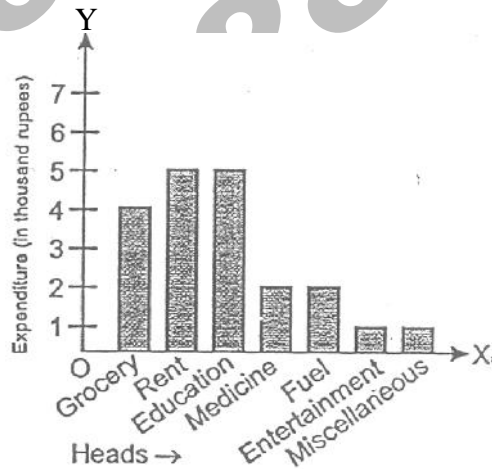
14.5 GRAPHICAL REPRESENTATION OF DATA

- (i) Bar graphs
- (ii) Histograms
- (iii) Frequency polygons
- (iv) Frequency curves
- (v) Cumulative frequency curves or Ogives.
- (vi) Pie Diagrams
- (a) Bar Graphs :

Ex.3 A family with monthly income of Rs. 20,000 had planned the following expenditure per month under various heads: Draw bar graph for the data given below :

Heads	Expenditure (in Rs. 1000)
Grocery	4
Rent	5
Education of children	5
Medicine	2
Fuel	2
Entertainment	1
Miscellaneous	1

Sol.



Histogram : Histogram is rectangular representation of grouped and continuous frequency distribution in which class intervals are taken as base and height of rectangles are proportional to corresponding frequencies. To draw the histogram class intervals are marked along x-axis on a suitable scale. Frequencies are marked along y-axis on a suitable scale, such that the **areas of drawn rectangles are proportional to corresponding frequencies.**

Now we shall study construction of histograms related with four different kinds of frequency distributions.

- (i) When frequency distribution is grouped and continuous and class intervals are also equal.
- (ii) When frequency distribution is grouped and continuous but class interval are not equal.
- (iii) When frequency distribution is grouped but not continuous.
- (iv) When frequency distribution is ungrouped and middle points of the distribution are given.

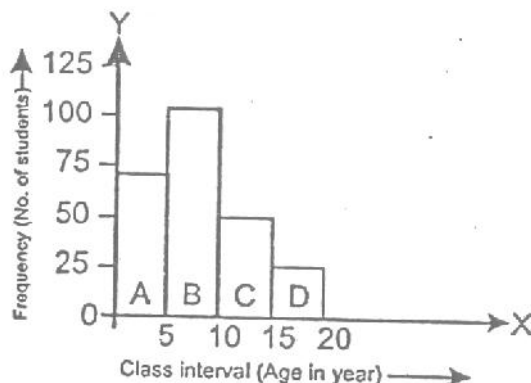
Now we try to make the above facts clear with some examples.

Ex.4 Draw a histogram of the following frequency distribution.

Clas (Age in year)	0 - 5	5 - 10	10 - 15	15 - 20
No. of students	72	103	50	25

Sol. Here frequency distribution is grouped and continuous and class intervals are also equal. So mark the class intervals on the x-axis i.e., age in year (scale 1 cm = 5 year). Mark frequency i.e., number of students (scale 1 cm = 25 students) on they y-axis.

Now, since the number of students in class interval 0 - 5 is 72, so draw a parallel line to x-axis in front of frequency to construct a rectangle on class interval 0 - 5. Repeating this procedure construct rectangle A, B, C and D.



Ex.5 The weekly wages of workers of a factory are given in the following table. Draw histogram for it.

Weekly wages	1000 - 2000	2000 - 2500	2500 - 3000	3000 - 5000	5000 - 5500
No. of workers	26	30	20	16	1

Sol. Here frequency distribution is grouped and continuous but class intervals are not same. Under such circumstances the following method is used to find heights of rectangle so that heights are proportional to frequencies.

(i) Write interval (h) of the least interval, here $h = 500$.

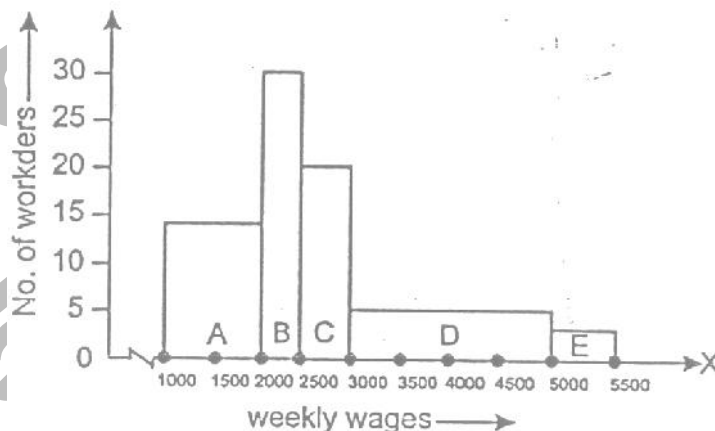
(ii) Redefine the frequencies of classes by the using the following formula.

Redefined frequency of class = $\frac{h}{\text{class interval}} \times \text{frequency of class interval}$.

So here the redefined frequency table is obtained as follows :

Weekly wages (in Rs.)	No. of workers	Redefined of workers
1000 – 2000	26	$\frac{500}{1000} \times 26 = 13$
2000 – 2500	30	$\frac{500}{500} \times 30 = 30$
2500 – 3000	20	$\frac{500}{500} \times 20 = 20$
3000 – 5000	16	$\frac{500}{2000} \times 16 = 4$
5000 – 5500	1	$\frac{500}{500} \times 1 = 1$

Now mark class interval on x-axis (scale 1 cm = 500) and no. of workers on y-axis (scale 1 cm = 5). On the basis of redefined frequency distribution construct rectangle A, B, C D and E.



This is the required histogram of the given frequency distribution

(a) Difference Between Bar Graph and Histogram

- (i) In histogram there is no gap in between consecutive rectangle as in bar graph.
- (ii) The width of the bar is significant in histogram. In bar graph, width is not important at all.
- (iii) In histogram the areas of rectangles are proportional to the frequency, however if the class size of the frequencies are equal then height of the rectangle are proportional to the frequencies.

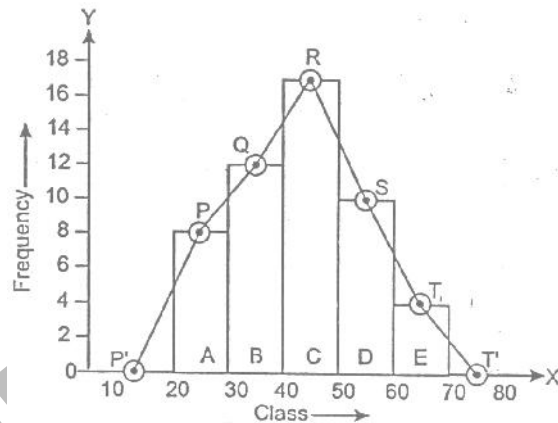
Frequency polygon : A frequency polygon is also a form a graphical representation of frequency distribution. Frequency polygon can be constructed in two ways :

- (i) With the help of histogram
- (ii) Without the help of histogram
 - (A) Following procedure is useful to draw a frequency polygon with the help of histogram.
 - (a) Construct the histogram for the given frequency distribution.
 - (b) Find the middle point of each upper horizontal line of the rectangle.
 - (c) Join these middle points of the successive rectangle by straight lines.
 - (d) Join the middle point of the initial rectangle with the middle point of the previous expected class interval on the x-axis.

Ex.6 For the following frequency distribution, draw a histogram and construct a frequency polygon with it.

Class	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
Frequency	8	12	17	9	4

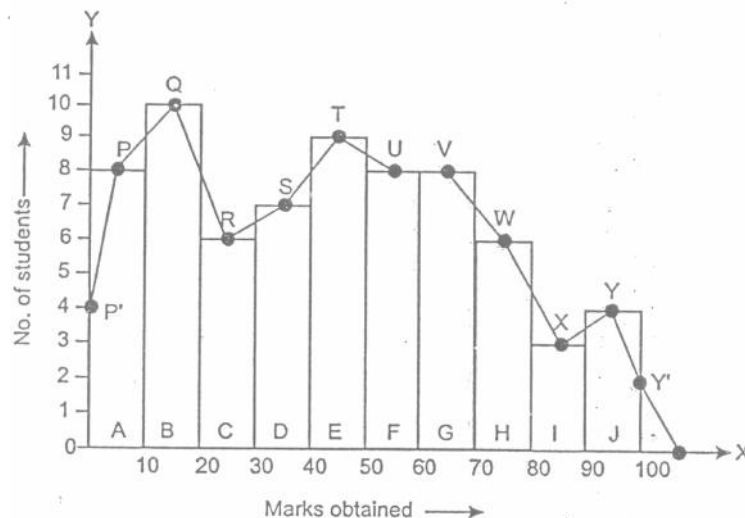
Sol. The given frequency distribution is grouped and continuous, so we construct a histogram by the method given earlier. Join the middle points P,Q,R,S,T of upper horizontal line of each rectangles A,B,C,D,E by straight lines.



Ex.7 Draw a frequency polygon of the following frequency distribution table.

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100
Frequency	8	10	6	7	9	8	8	6	3	4

Sol. Given frequency distribution is grouped and continuous. So we construct a histogram by using earlier method. Join the middle points of P,Q,R,S,T,U,V, W,X, Y of upper horizontal lines of each rectangle A,B,C,D,E,F,G,H,I,J by straight line in successions.



Ex.8 Draw a frequency polygon of the following frequency distribution.

Age (in years)	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Frequency	15	12	10	4	11	14

Sol. Here frequency distribution is grouped and continuous so here we obtain following table on the basis of class.

Age (in years)	0 – 10	10 – 20	20 – 20	30 – 40	40 – 50	50 – 60
Class mark	5	15	25	35	45	55
Frequency	15	12	10	4	11	14

Now taking suitable scale on graph mark the points (5, 15), (15, 12), (25, 10) (35, 4), (45, 11), (55, 14). Since age can not be negative so instead of joining corner (5, 15) with middle point of zero frequency of earlier assumed class, we draw vertical line from the lower limit of this class i.e., 0 and point of half frequency of this lie i.e., (0, 7.5) is joined by the end point. Join the last point (55, 14) with the points of zero frequency of the next assumed class i.e, with (65, 0).

