

# Statistics

Statistics - It's a branch of mathematics that deals with collecting, organising, presenting, analysing, and interpreting numerical data.

Examples - 1) Average marks of a student  
2) Population data of a country

## \* Some important terms

- ① Data - Collection of numerical facts
- ② Frequency - No. of times an observation occurs, eg: If "21" appears twice, so, frequency = 2
- ③ Class Interval - A group into which data is divided, eg: 0-10, 10-20 etc.
- ④ Class size (h) - Upper limit - lower limit
- ⑤ Class Marks ( $x_i$ ) - Midpoint of a class interval

$$x_i = \frac{\text{Upper limit} + \text{lower limit}}{2}$$

# \* Types of Data

## Grouped

When data is large, it is divided into class-intervals to simplify analysis

Class interval	Frequency
0-10	3
10-20	5
20-30	7

## Ungrouped

When the data is small and can be written directly.  
eg: 5, 7, 8, 9, 10

## Types of Grouped Data

### Class Interval

0-10  
10-20  
20-30  
30-40

### Uneven Grouping

0-10 (10)  
10-15 (5)  
15-30 (15)  
30-45 (15)

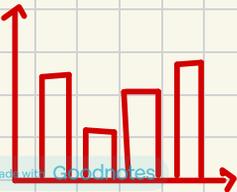
### Inclusive Grouping

1-10  
11-20  
21-30  
31-40

# \* Graphical representation of Data

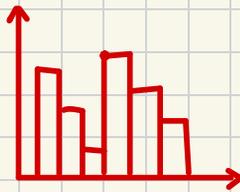
## Bar Graph

made with ungrouped data



## Histogram

made with grouped data

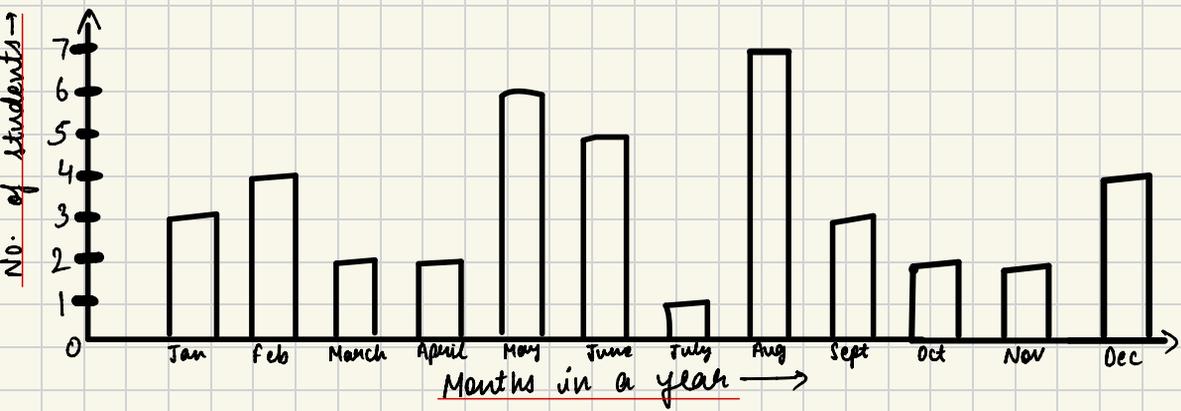


## Frequency Polygon

made with grouped data



Q1) In a section of class IX, 40 students were asked about the months of their birth and following graph was prepared from the data obtained



① No. of student born in the month of may?

Ans. 6

② In which month lowest no. of students were born?

Ans. July

③ In which months equal no. of students were born?

Ans. • Sept, Jan • Feb, Dec • March, April, Oct, Nov

④ Ratio of students born in the month of Jan & Dec?

Ans.  $\text{Ratio} = \frac{\text{Jan}}{\text{Dec}} = \frac{3}{4}$

Ratio = 3:4

⑤ Total no. of students born after July?

Ans.  $7 + 3 + 2 + 2 + 4 = 18$

⑥ Total no. of students in the class

Ans. 40

⑦ Percentage of students born in the month of June

$$\text{Percentage} = \frac{\text{Asked value}}{\text{Total value}} \times 100$$

$$= \frac{\text{No. of students born in June}}{\text{Total students}} \times 100$$

$$= \frac{5}{40} \times 100 = \frac{25}{2} = 12.5\%$$

⑧ Prepare the frequency table from the given graph

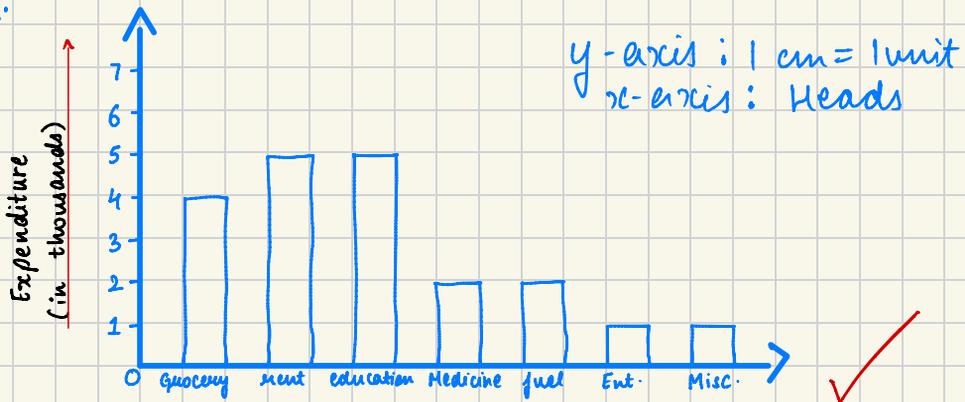
Ans.

MONTHS	No. of students
January	3
February	4
March	2
April	2
May	6
June	5
July	1
August	7
September	3
October	2
November	2
December	4

Q2) A family with monthly income of 20,000 has planned the following expenditure per month, under various heads:

Heads	Expenditure
Grocery	4
Rent	5
Education of Children	5
Medicine	2
Fuel	2
Entertainment	1
Miscellaneous	1

Solu:



Q3) The following table gives the life times of 400 neon lamps ;  
Draw the histogram

Life time (in hrs)	No. of lamps
300-400	14
400-500	56
500-600	60
600-700	86
700-800	74
800-900	62
900-1000	48

Answer on next slide

Solu.

Class Interval	Size (n)	Frequency
300-400	100	14
400-500	100	56
500-600	100	60
600-700	100	86
700-800	100	74
800-900	100	62
900-1000	100	48



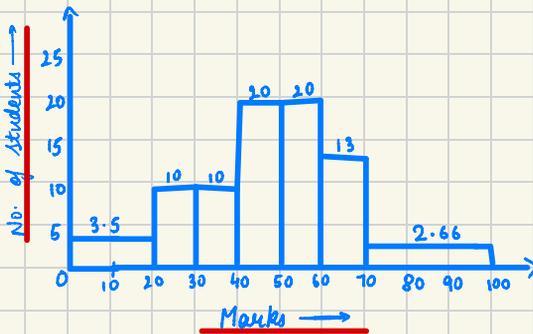
Q) Marks out of 100 in a class test is given as follows, draw a histogram out of this :

Marks	No. of Students
0-20	7
20-30	10
30-40	10
40-50	20
50-60	20
60-70	15
70-above	8

Solu. on next slide

Solu:

Class Interval	Frequencies	Size	Length of Rectangle
0-20	7	20	$\frac{7}{20} \times 10 = 3.5$
20-30	10	10	$\frac{10}{10} \times 10 = 10$
30-40	10	10	$\frac{10}{10} \times 10 = 10$
40-50	20	10	$\frac{20}{10} \times 10 = 20$
50-60	20	10	$\frac{20}{10} \times 20 = 20$
60-70	15	10	$\frac{15}{10} \times 10 = 15$
70-above	8	30	$\frac{8}{30} \times 10 = 2.66$



$$\text{Length of Rectangle} = \frac{\text{frequency}}{\text{class size}} \times \text{Smallest size}$$

Q5) Draw the histogram of the given data.

Length (in mm)	No. of Leaves
118 - 126	3
127 - 135	5
136 - 144	9
145 - 153	12
154 - 162	5
163 - 171	4
172 - 180	2

Soln: Here, gap =  $127 - 126 = 1$

$$\text{Head} = \frac{\text{gap}}{2} = \frac{1}{2} = 0.5$$

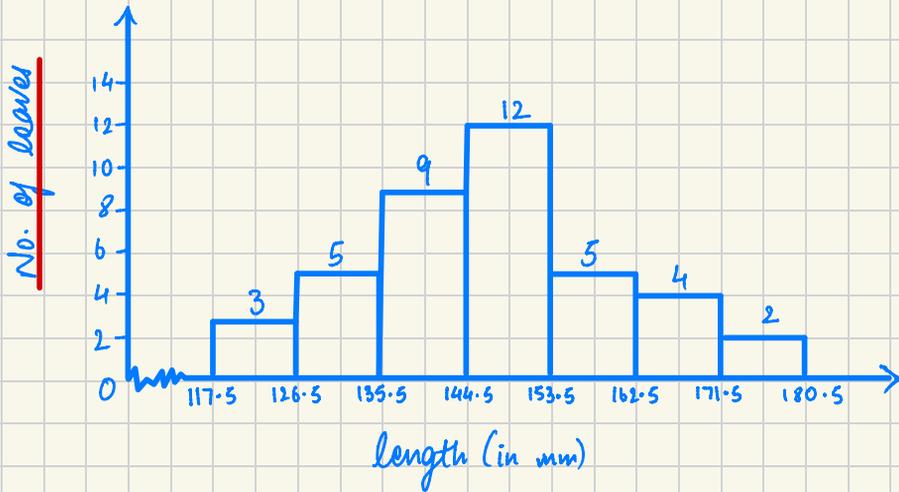
We'll add and subtract 0.5 from the intervals

upper limit - 0.5 and lower limit + 0.5

$$\begin{aligned} \text{eg: } & 118 - 0.5 \text{ to } 126 + 0.5 \\ & = 117.5 - 126.5 \end{aligned}$$

$$\begin{aligned} & 127 - 0.5 \text{ to } 135 + 0.5 \\ & = 126.5 \text{ to } 135.5 \end{aligned}$$

Modified Class-Interval	FREQUENCY
117.5 - 126.5	3
126.5 - 135.5	5
135.5 - 144.5	9
144.5 - 153.5	12
153.5 - 162.5	5
162.5 - 171.5	4
171.5 - 180.5	2

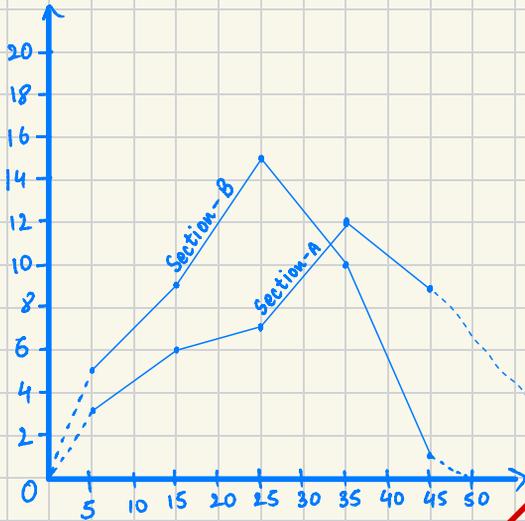


Q6) The following given table gives the distribution of students of two sections according to the marks obtained by them. Represent the marks obtained by them. Represent the marks of the students of both the sections on the same graph by frequency polygon.

SECTION - A		SECTION - B	
Marks	Frequency	Marks	Frequency
0-10	3	0-10	5
10-20	6	10-20	19
20-30	7	20-30	15
30-40	12	30-40	10
40-50	9	40-50	1

Tip: Always find Class Marks in case of frequency polygon & draw graph as per class marks not class interval.

SECTION-A			SECTION-B		
class interval	Frequency	class Marks $\rightarrow \frac{UL+LL}{2}$	Class Interval	Frequency	Class Marks
0-10	3	$\frac{0+10}{2} = 5$	0-10	5	5
10-20	6	15	10-20	9	15
20-30	7	25	20-30	15	25
30-40	12	35	30-40	10	35
40-50	9	45	40-50	1	45



# Homework Ques



- Q1) A teacher wanted to analyse the performance of two sections of students in a mathematics test of 100 marks. Looking at their performances, she found that a few students got under 20 marks and a few got 70 marks or above. So she decided to group them into intervals as follows.

Marks	No. of students
0-20	7
20-30	10
30-40	10
40-50	20
50-60	20
60-70	15
70-above	8
	90

Draw a histogram for this

- Q2) The following table shows the no. of illiterate persons in the age group (10-44 yrs) in a town.

Age Group	10-16	17-23	24-30	31-37	38-44
No. of illiterate person	175	325	100	150	250

Draw a histogram to represent the above data.

Q3) Draw a histogram for the following data

Class Interval	600-640	640-680	680-720	720-760	760-780
Frequency	18	45	153	288	171

Using the histogram, draw the frequency polygon

Q4) Draw the frequency polygon for the following frequency distribution.

Class Interval	1-10	11-20	21-30	31-40	41-50	51-60
Frequency	8	3	6	12	2	7

Imp.

Q5) In a frequency distribution, the mean value of a class is 10 and the width of the class is 6. The lower limit of the class is? Ans  $\rightarrow 7$

Q6) The weight (in kg) of 7 students of a class are 44, 52, 54, 60, 50, 49, 45. Find the median weight.

Formula used for odd observations  $\Rightarrow$

$$\text{Median} = \frac{(n+1)^{\text{th}}}{2} \text{ observation}$$

Q7) The runs scored by two teams A & B on the first 60 balls in a cricket match are given below:

No. Of Balls	Team A	Team B
1-6	2	5
7-12	1	6
13-18	8	2
19-24	9	10
25-30	4	5
31-36	5	6
37-42	6	3
43-48	10	4
49-54	6	8
55-60	2	10

Represent the data of both the teams on the same graph by frequency polygon.

Q8) If the mean of the observations  $x, x+3, x+5, x+7, x+10$ , is 9, find the mean of the last three observations

Hint:  $\text{Mean} = \frac{\text{Sum of all observations}}{\text{No. of all observations}}$