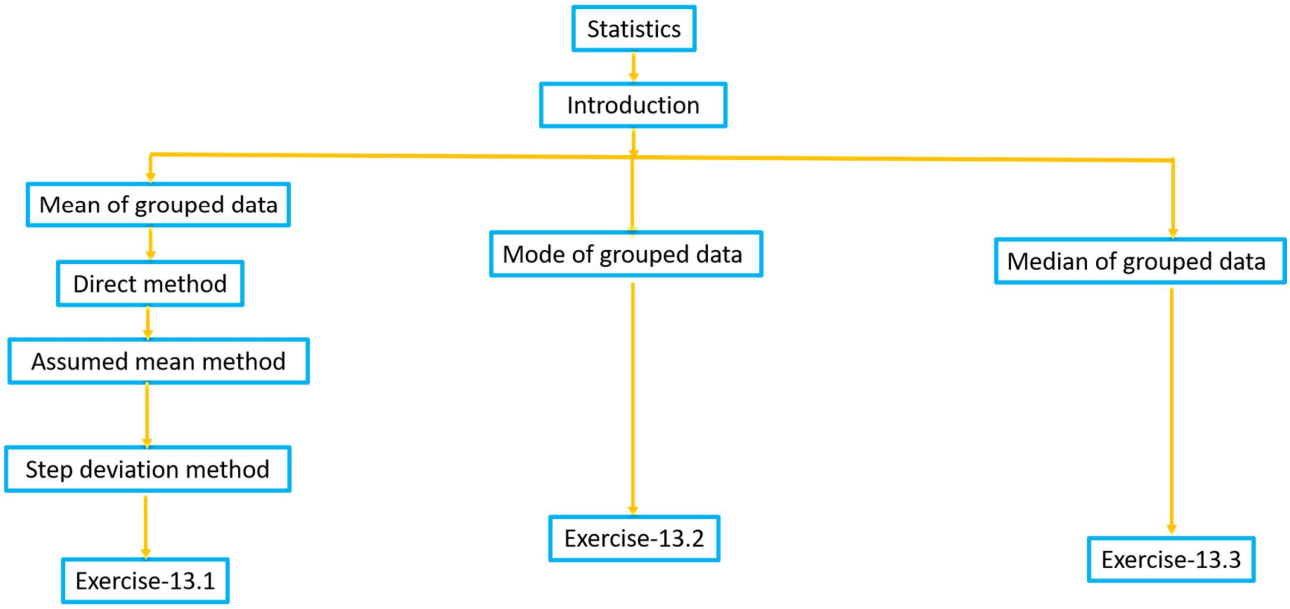
STATISTICS

MIND MAPPING



Basic facts and formulae:

1. Class mark = (Upper Class Limit + Lower Class Limit)/2
2. **Mean [Ungrouped Data]:** Mean of n observations, x1, x2, x3 … xn, is

$$\overline{X} = \frac{x_1 + x_2 + x_3 + \ldots + x_n}{n} = \frac{1}{n}\sum x \qquad \therefore \qquad \overline{X} = \frac{\sum x}{n}$$

3. **MEAN [Grouped Data]:** The mean for grouped data can be found by the following three methods:

(i) **Direct method:** $\overline{X} = \dfrac{\sum f_i x_i}{\sum f_i}$

(ii) **Assumed Mean Method:** In this, an arbitrary mean 'a' is chosen which is called, 'assumed mean', somewhere in the middle of all the values of *x*.

$\overline{X} = a + \dfrac{\sum f_i d_i}{\sum f_i}$ … [where $d_i = (x_i - a)$]

(iii) **Step Deviation Method:** $\overline{x} = a + \left(\dfrac{\sum f_i u_i}{\sum f_i}\right) \times h$ where $u_i = \dfrac{x_i - a}{h}$; 'a' is the assumed mean and h is the class size.

4. Median is a measure of central tendency which gives the value of the middle-most observation in the data.

(i) **Ungrouped data:** If n is odd; Median = $\left(\frac{n+1}{2}\right)^{th} observation$

If n is even; Median = $\frac{\left(\frac{n}{2}\right)^{th} observation + \left(\frac{n}{2}+1\right)^{th} observation}{2}$

(ii) **Grouped data:** Median = $l + \left(\frac{\frac{n}{2} - c.f}{f}\right) \times h$

Where [l = Lower limit of median class; n = Number of observations; f = Frequency of median class; c.f. = Cumulative frequency of preceding class; h = Class size].

5. **Mode of Ungrouped Data:** The value of the observation having maximum frequency is the mode.

6. **Mode of Grouped Data:** $Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$

Where [l = Lower limit of modal class; f_1 = Frequency of modal class; f_0 = Frequency of the class preceding the modal class; f_2 = Frequency of the class succeeding the modal class; h = Size of class interval. c.f. = Cumulative frequency of preceding class]

7. Mode = 3 Median – 2 Mean

LEVEL_1

MCQ:

1. If the mode of a data is 45, mean is 27, then the value of median is:

(a) 30 (b) 27 (c) 33 (d) All of these

2. The mean $(\bar{x})$ of a frequency distribution is 45. If the value of $\sum f_i = 20$ then the value of $\sum f_i x_i$ is:

(a) 800 (b) 900 (c) 2.25 (d) 4/9

3. The mean of first five prime numbers is:

(a) 5 (b) 5.6 (c) 6.5 (d) 7.8

4. What is the class mark of the class 10-25?

(a) 17.5 (b) 17 (c) 19.5 (d) 18.5

5. If the mean of five observations $x, x+2, x+4, x+6, x+8$ is 11, then find the value of x.

(a) 6 (b) 5 (c) 8 (d) 7

6. In the formula $\bar{x} = a + \frac{\sum f_i d_i}{\sum f_i}$, for finding the mean of grouped data d_i's are deviation from 'a' is:

(a) lower limits of the classes (b) upper limits of the classes

(c) mid-points of the classes (d) frequencies of the class marks

7. If the mean of the following distribution is 6, then find the value of a.

x_i	2	4	6	10	a+5
f_i	3	2	3	1	2

(a) 4 (b) 3 (c) 5 (d) 9

8. If the mean of the following distribution is 2.6, then find the value of y.

Variable	1	2	3	4	5
Frequency	4	5	y	1	2

(a) 3 (b) 8 (c) 13 (d) 24

9. In the following distribution, find the number of families having income range 16000-19000 (in Rs).

Monthly income range in (Rs.)	**Number of families**
Income more than Rs. 10000	100
Income more than Rs. 13000	85
Income more than Rs. 16000	69
Income more than Rs. 19000	50
Income more than Rs. 22000	33
Income more than Rs. 25000	15

(a) 31 (b) 26 (c) 13 (d) 19

10. For the following distribution:

Class	0-5	5-10	10-15	15-20	20-25
Frequency	10	15	12	20	9

The sum of lower limits of the median class and modal class is:

(a) 15 (b) 25 (c) 30 (d) 35

2-MARKS:

1. Find the mean of the following data:

x	10	20	30	40	50
f	2	3	2	3	1

2. Mean of the following data is 20 then, find p.

x	15	17	19	20 + p	23
f	2	3	4	5p	6

3. The mean of the following data is 50. Find the missing frequencies.

x	10	30	50	70	90	Total
f	2	f_1	32	f_2	19	120

4. The median of the following distribution is 24, then find the missing frequency.

x	0-10	10-20	20-30	30-40	40-50
f	5	25	p	18	7

5. A survey was conducted by a group of students as a part of their environment awareness programme in which they collected the following data regarding the number of plants in 20 houses in a locality. Find the mean number of plants per house.

Number of plants	0-2	2-4	4-6	6-8	8-10	10-12	12-14
Number of houses	1	2	1	5	7	2	3

6. The following are the ages of 300 patients getting medical treatment in a hospital on a particular day:

Age (in years)	10-20	20-30	30-40	40-50	50-60	60-70
Number of students	1	2	1	5	7	2

Form the "Less than type" cumulative frequency distribution table.

7. Convert the following distribution to more than type cumulative frequency distribution.

Class	50-60	60-70	70-80	80-90	90-100
Frequency	1	2	1	5	5

8. Write the frequency distribution table for the data given below.

Marks	0 or more	100 or more	200 or more	300 or more	400 or more	500 or more	600 or more	700 or more	800 or more	900 or more
No.of students	100	98	93	84	72	55	35	20	11	4

9. In the following data, find the values of p and q. Also find the median class and modal class.

Class	**Frequency (f)**	**Number of families**
100-200	11	11
200-300	12	p
300-400	10	33
400-500	q	46
500-600	20	66
600-700	14	80

10. Find the mean of the following frequency distribution by direct method.

Marks	2-4	4-6	6-8	8-10
No.of students	2	5	5	3

11. The mean of 10 observations is 15.3. If two observations 6 and 9 are replaced by 8 and 14 respectively. Find the new mean.

12. The median of the following observations given in order 16, 18, 20, 24-x, 22 + 2x, 28, 30, 32 is 24. Find the value of x.

3-MARKS:

1. The daily income of a sample of 50 employees are tabulated as follows:

Marks	1-200	201-400	401-600	601-800
No.of students	14	15	14	7

Find the mean daily income of employees.

2. Find the median for the given frequency distribution.

Class	40-45	45-50	50-55	55-60	60-65	65-70	70-75
Frequency	2	3	8	6	6	3	2

3. A class teacher has the following absentee record of 40 students of a class for the whole team. Find the mean number of days a student was absent.

Class	0-6	6-12	12-18	18-24	24-30	30-36	36-42
Frequency	10	11	7	4	4	3	1

4. The table below shows the salaries of 280 persons.

Salary (in thousands)	**No.of persons**
5-10	49
10-15	133
15-20	63
20-25	15
25-30	6
30-35	7
35-40	4
40-45	2
45-50	1

Calculate the median salary of the data.

5. The lengths of 40 leaves of a plant are measured correct to the nearest millimeter, and the data obtained is represented in the following table. Find the median length of leaves.

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

6. The table shows the daily expenditure on food of 25 household in the locality.

Daily expenditure	100-150	150-200	200-250	250-300	300-350
No.of house holds	10	11	7	4	4

Find the mean daily expenditure on food by a suitable method.

7. Find the mode of the following distribution of student marks.

Marks	Below 10	Below 20	Below 30	Below 40	Below 50
No.of Students	8	20	45	58	70

8. Calculate the median for the following distribution:

Marks obtained	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60
No.of students	6	15	29	41	60	70

9. Find the mean of the following data:

Class	Less than 20	Less than 40	Less than60	Less than80	Less than 100
Frequency	15	37	74	99	120

10. The mean of the following table is 50. Find the missing frequencies f_1 and f_2.

Class	10-30	30-50	50-70	70-90	90-110	Total
Frequency	90	f_1	30	f_2	40	200

5-MARKS:

1. The mean of the following given distribution is 18. Find the frequency f of the class 19 – 21.

Class	11-13	13-15	15-17	17-19	19-21	21-23	23-25
Frequency	3	6	9	13	f	5	4

2. The median of the following data is 525. Find the values of x and y, if the total frequency is 100.

Class-interval	**Frequency**
0-100	2
100-200	5
200-300	x
300-400	12
400-500	17
500-600	20
600-700	y
700-800	9
800-900	7
900-1000	4

3. The following table shows the ages of the patient admitted in a hospital during a year. Find the mean by step deviation method.

Age (in years)	5-15	15-25	25-35	35-45	45-55	55-65
No.of patients	6	11	21	23	14	5

4. Find the mean of the following frequency distribution using assumed mean method.

Classes	2-8	8-14	14-20	20-26	26-32
Frequency	6	3	12	11	8

5. Find the mean of children per family from the data given below.

No.of children	0	1	2	3	4	5
No.of families	5	11	25	12	5	2

(i) Which mathematical concept is used in this problem?

(ii) What is its value?

6. Find the median for the following data.

Profit (in lakh of rupee)	**No.of shops**
More than or equal to 5	30
More than or equal to 10	28
More than or equal to 15	16
More than or equal to 20	14
More than or equal to 25	10
More than or equal to 30	7
More than or equal to 35	3

7. The mean of the following frequency distribution is 62.8 and the sum of all the frequencies is 50. Compute the missing frequencies f_1 and f_2.

Class interval	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	5	f_1	10	f_2	7	8

8. Calculate the mode from the following data.

Monthly salary (in Rs)	**No.of employees**
Less than 5000	90
Less than 10000	240
Less than 15000	340
Less than 20000	420
Less than 25000	490
Less than 30000	500

9. Calculate the mode of the following frequency distribution table.

Marks	No.of Students
25 or more than 25	52
35 or more than 35	47
45 or more than 45	37
55 or more than 55	17
65 or more than 65	8
75 or more than 75	2
85 or more than 85	0

CASE STUDY QUESTIONS

CASE STUDY_1

Transport department of a Jaipur wants to buy some Electric buses for the city. For which they wants to analyse the distance travelled by existing public transport buses in a day.

Daily distance travelled (in km)	200-209	210-219	220-229	230-239	240-249
No.of buses	4	14	26	10	6

The following data shows the distance travelled by 60 existing public transport buses in a day.

Based on the above information, answer the following questions.

(i) Find the median class of daily distance travelled? 1

(ii) What is the cumulative frequency of the class preceding the median class? 1

(iii) Find the median of the distance travelled. 2

OR

If the mode of the distance travelled is 223.78 km, find the mean of the distance travelled by the bus. 2

CASE STUDY_2

The Kendriya Vidyalaya Sangathan is a system of premier central government schools in India that are instituted under the aegis of the Ministry of Education (MHRD), Government of India. As of October 2020, it has a total of 1239 schools. It is one of the world's largest chains of schools. The system came into being in 1963 under the name 'Central Schools'. Later, the name was changed to Kendriya Vidyalaya. Its schools are all affiliated to the Central Board of Secondary Education (CBSE). The objective of KVS is to cater to the educational needs of the children of transferable Central Government employees including Defence and Para-Military personnel by providing a common programme of education.

Commissioner of Regional office Jaipur prepare a table of the marks obtained of 100 students which is given below:

Marks obtained	0-20	20-40	40-60	60-80	80-100
No.of students	15	18	21	29	p

He was told that mean marks of a student is 53.

Based on the above information, answer the following questions:

(i) What is the value of p? 1

(ii) What is the lower limit of modal class? 1

(iii) What is the value of modal marks? 2

OR

What is the value of median marks? 2

CASE STUDY_3

Amul, is an Indian dairy cooperative society, based at Anand in the Gujarat. Formed in 1946, it is a cooperative brand managed by a cooperative body, the Gujarat Co-operative Milk Marketing Federation Ltd. (GCMMF), which today is jointly owned by 36 lakh (3.6 million) milk producers in Gujarat. Amul spurred India's White Revolution, which made the country the world's largest producer of milk and milk products.

Survey manager of Amul dairy has recorded monthly expenditures on milk in 100 families of a housing society. This is given in the following frequency distribution:

Monthly expenditure (in Rs)	Number of families
0-175	10
175-350	14
350-525	15
525-700	x
700-875	28
875-1050	7
1050-1225	5

Based on the above information, answer the following questions:

(i) How many families spend between Rs 350- 700 on milk? 1

(ii) What is the upper limit of median class? 1

(iii) What is the median expenditure on milk? 2

OR

What is the modal expenditure on milk? 2

LEVEL_2

MCQ:

1. The median of the following data:

x:	10	20	30	40	50
y:	2	3	2	3	1

(a) 20 (b) 30 (c) 40 (d) 50

2. Consider the following distribution:

Marks obtained	0 or more	10 or more	20 or more	30 or more	40 or more	50 or more
No.of students	63	58	55	51	48	42

Find the frequency of the class 30-40.

(a) 3 (b) 4 (c) 5 (d) 6

3. What is the median in the arranged series of an even number of 2n terms?

(a) $\left(\frac{n^{th}term+(n+1)^{th}\ term}{2}\right)$ (b) $\left(\frac{n^{th}term-(n+1)^{th}\ term}{2}\right)$

(c) $\left(\frac{2n^{th}term+(2n+1)^{th}\ term}{2}\right)$ (d) $\left(\frac{2n^{th}term+(2n+1)^{th}\ term}{3}\right)$

4. Consider the following frequency distribution:

Class	0-5	6-11	12-17	18-23	24-29
Frequency	13	10	15	8	11

The upper limit of the median class is:

(a) 7 (b) 17.5 (c) 18 (d) 18.5

5. Consider the following frequency distribution of the height of 60 students of a class.

Height (in cm)	150-155	155-160	160-165	165-170	170-175	175-180
No.of students	15	13	10	8	9	5

Find the sum of the lower limit of the modal class and the upper limit of the median class.

(a) 165 (b) 160 (c) 325 (d) 235

6. For the following distribution,

Marks	No.of students
Below 10	3
Below 20	12
Below 30	27
Below 40	57
Below 50	75
Below 60	80

The modal class is:

(a) 10-20 (b) 20-30 (c) 30-40 (d) 40-50

7. If the median of the data 6, 7, x-2, x, 17, 20 written in ascending order is 16, then find the value of x.

(a) 15 (b) 16 (c) 17 (d) 18

8. If the mean of the frequency distribution is 8.1 and $\sum f_i x_i = 132 + 5k$, $\sum f_i = 20$ then find the value of k.

(a) 3 (b) 4 (c) 5 (d) 6

9. If the mean of n observations is $\bar{x}$. If the first observation is increased by 1, the second by 2, the third by 3, and so on, then find the new mean.

(a) $x + \left(\frac{n-1}{2}\right)$ (b) $x + \left(\frac{n+1}{2}\right)$ (c) $x + \frac{n(n-1)}{2}$ (d) $x + n$

10. If the difference of mode and median of a data is 24, then find the difference of median and mean.

(a) 12 (b) 24 (c) 8 (d) 36

2-MARKS

1. Sum of 12 observations is 256, if one of the observation 14 is deleted, find the mean of the remaining observations.

2. Find the modal class and the median class for the following distribution:

C.I	0-10	10-20	20-30	30-40	40-50
Frequency	6	10	12	8	7

3. Write the frequency distribution table for the following data:

Marks	Above 0	Above 10	Above 20	Above 30	Above 40	Above 50
No.of students	40	38	31	25	20	0

4. Find the sum of lower limit of median class and upper limit of the modal class.

Class	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	1	3	5	9	7	3

5. Find the mean of the following data and hence find the mode, given that the median of the data is 42.5.

Class	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	4	8	10	12	10	4	2

6. The monthly income of 100 families are given below:

Income (in Rs)	0 -5000	5000 -10000	10000 -15000	15000 -20000	20000 -25000
No.of families	4	8	10	12	10

Calculate the modal income.

7. The mean and median of 100 observations are 50 and 52 respectively. The value of the largest observation is 100. It was later found that it is 110 and 100. Find the true mean the median.

8. Find the unknown entries a, b, c, d, e, f in the following distribution of heights the students in a class.

Height (in cm)	**Frequency**	**Cumulative Frequency**
150–155	12	a
155–160	b	25
160–165	10	c
165–170	d	43
170–175	e	48
175–180	2	f
Total	50	

3-MARKS

1. If the mean of the following frequency distribution is 91, and sum of frequency is 150, find the missing frequency x and y:

Class	0-30	30-60	60-90	90-120	120-150	150-180
Frequency	12	21	x	52	y	11

2. Calculate the average daily income (in Rs.) of the following data about men working in a company:

Daily income (Rs)	< 100	< 200	< 300	< 400	< 500
Number of men	12	28	34	41	50

3. Find the mean of the following distribution:

Height (in cm)	Less than 75	Less than 100	Less than 125	Less than 150	Less than 175	Less than 200	Less than 225	Less than 250	Less than 275	Less than 300
No.of students	5	11	14	18	21	28	33	37	45	50

4. 100 surnames were randomly picked up from a local telephone directory and the frequency distribution of the number of letters in the English alphabets in the surnames was obtained as follows:

No.of letters	1-4	4-7	7-10	10-13	13-16	16-19
No.of surnames	6	30	40	16	4	4

5. Calculate the median for the following distribution:

Marks obtained	**Number of students**
Less than 10	14
Less than 20	22
Less than 30	37
Less than 40	58
Less than 50	67
Less than 60	75

6. The median of the distribution given below is 35. Find the value of x and y, if the sum of all the frequencies is 170.

Variable	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	10	20	x	40	y	25	15

7. The annual profits earned by 60 shops of a shopping complex in a given locality is described in the following distribution: Calculate median profit.

Profit (in thousands)	**Class Frequency**
More than 10	60
More than 20	56
More than 30	32
More than 40	28
More than 50	20
More than 60	14
More than 70	6

8. The median class of a frequency distribution is 125-145. The frequency and cumulative frequency of the class preceding to the median class are 20 and 22, respectively. Find the sum of the frequencies, if its median is 137.

5-MARKS

1. Find the mean, median and mode of the following data:

Class interval	0-6	6-12	12-18	18-24	24-30
Frequency	3	2	4	5	14

2. A health officer took an initiative organizing a medical camp in a remote village. The medical checkup of 35 students of the age group of 10 year and their weights were recorded as follows:

Weight (in Kg)	38-40	40-42	42-44	44-46	46-48	48-50	50-52
No.of Students	3	2	4	5	14	4	3

(i) Find the mean weight of the students using assumed mean method.

(ii) Calculate the median of the given data.

3. The median of the distribution given below is 14.4. Find the values of x and y, if the sum of the frequency is 20.

Class interval	0-6	6-12	12-18	18-24	24-30
Frequency	5	y	4	x	1

4. The distribution of heights (in cm) of 96 children is given below: Calculate the median.

Height (in cm)	**No.of children**
124-128	5
128-132	8
132-136	17
136-140	24
140-144	16
144-148	12
148-152	6
152-156	4
156-160	3
160-164	1

5. The following is the cumulative frequency distribution (of less than type) of 1000 persons each of age 20 years and above. Determine the mean age.

Age below(in years)	30	40	50	60	70	80
No.of persons	100	220	350	750	950	1000

CASE STUDY QUESTIONS

CASE STUDY_1

Formula one Portuguese Grand Prix technical team at the Algarve International Circuit are analysing last year data of drivers' performance to provide valuable inferences to commentators on how the drivers can improve this year.

The length of time taken by 80 drivers to complete a journey is given in the table below:

Time (in mins)	70-80	80-90	90-100	100-110	110-120	120-130
No.of drivers	4	10	14	20	24	8

(i) What is the estimate of the mean time taken to complete the journey? 2

OR

What is the median time taken to complete journey? 2

(ii) In which interval does the median of the distribution lie? 1

(iii) In which interval does the mode of the distribution lie? 1

LEVEL_3

MCQ:

1. Observations of some data are $\frac{x}{5}, x, \frac{x}{3}, \frac{2x}{3}, \frac{x}{4}, \frac{2x}{5} and \frac{3x}{4}$ where $x>0$. If the median of the data is 4, then what is the value of x?

   (a) 4 (b) 6 (c) 8 (d) 10

2. If the mean of the squares of first n natural numbers is 105, then find the first n natural numbers.

   (a) 8 (b) 9 (c) 10 (d) 11

3. A set of numbers consists of three 4's, five 5's, six 6's, eight 8's and seven 10's. What is the mode of this set of numbers?

   (a) 4 (b) 5 (c) 8 (d) 10

4. The mean weight of 9 students is 25 kg. If one more student is joined in the group the mean is unaltered, then find the weight of the 10th student (in kg).

   (a) 25 (b) 24 (c) 26 (d) 23

5. The mean and median of the data a, b and c are 50 and 35 respectively, where $a<b<c$. If $c-a=55$, then find the value of $(b-a)$.

   (a) 8 (b) 7 (c) 3 (d) 5

6. If median is 137 and mean is 137.05, then what is the value of the mode?

   (a) 136.90 (b) 135.75 (c) 134.70 (d) 135.79

7. If x_i's are the midpoints of the class intervals of grouped data, f_i's are the corresponding frequencies and $\bar{x}$ is the mean, then find $\sum\left(f_i x_i - \bar{x}\right)$.

   (a) 0 (b) -1 (c) 1 (d) 2

8. What is the modal class for the following distribution?

Marks	Number of Students	Marks	Number of students
Below 10	3	Below 40	57
Below 20	12	Below 50	75
Below 30	28	Below 60	80

(a) 40-50 (b) 30-40 (c) 50-60 (d) 20-30

2-MARKS

1. Convert the following data into more than type distribution:

Class interval	50-55	55-60	60-65	65-70	70-75	75-80
Frequency	2	8	12	24	38	16

2. Construct the cumulative frequency distribution of the following distribution and find the median class.

Class interval	12.5-17.5	17.5-22.5	22.5-27.5	27.5-32.5	32.5-27.5
Frequency	2	22	19	14	13

3. The marks obtained by 60 students, out of 50 in a Mathematics examination, are given below.

Marks	0-10	10-20	20-30	30-40	40-50
No.of Students	2	22	19	14	13

Write the above distribution as "Less than type cumulative frequency distribution".

4. The mean of ungrouped data and the mean calculated when the same data is grouped are always the same. Do you agree with this statement? Give reason for your answer.

5. The mean of the following data is 7.5. Find the value of p.

x_i	3	5	7	9	11	13
f_i	6	8	15	p	8	4

6. The median of ungrouped data and the median calculated when the same data is grouped are always the same. Do you agree with this statement? Give reason for your answer.

7. Is it true to say that the mean, mode and median of grouped data will always be different? Justify your answer.

8. Will the median class and modal class of grouped data always be different? Justify your answer.

3-MARKS:

1. 100 surnames were randomly picked up from a telephone directory, distribution of the number of letters of the English alphabet in the surnames are obtained as follows:

No.of letters	1-4	4-7	7-10	10-13	13-16	16-19
No.of surnames	6	30	40	16	4	4

Determine the median and mean number of letters in the surnames. Also, find the modal size of surnames.

2. The mean of the following distribution is 314. Determine the missing frequency x.

Class	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	5	x	10	12	7	8

3. Prove that $\sum\left(x_i-\overline{x}\right)=0$.

4. Find the mean of the following data:

Class	Less than 20	Less than 40	Less than 60	Less than 80	Less than 100
Frequency	15	37	74	99	120

5. Compute the median from the following data:

Mid-values	115	125	135	145	155	165	175	185	195
Frequency	6	25	48	72	116	60	38	22	3

6. The mode of a distribution is 55 and the modal class is 45-60 and the frequency preceding the modal class is 5 and the frequency after the modal class is 10. Find the frequency of the modal class.

7. The sum of deviations of a set of values $x_1,x_2,x_3,....x_n$ measured from 50 is -10 and the sum of deviations of the values from 46 is 70. Find the value of n and the mean.

8. The arithmetic mean of the following frequency distribution is 53. Find the value of k .

Class	0-20	20-40	40-60	60-80	80-100
Frequency	12	15	32	k	13

5-MARKS

1. A class teacher has the following absents record of 40 students of a class for the whole term. Find the mean number of days a student was absent (Solve it by Step deviation method).

No.of days	0-6	6-10	10-14	14-20	20-28	28-38	38-40
No.of students	11	10	7	4	4	3	1

2. The mean of the following frequency distribution is 62.8. Find the missing frequency f.

Class	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	5	8	f	12	7	8

3. The following distribution given the state-wise teacher-student ratio in higher secondary schools of India. Find the mode and mean of this data. Interpret the two measures.

No.of students per teacher	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55
No.of states/U.T	3	8	9	10	3	0	0	2

4. A survey was conducted to give the percentage distribution of doctors in hospitals of rural areas of various states and various Union Territories (UT) of India are given in the following table.

Percentage of doctors	**Number of states/UT**
15-25	6
25-35	11
35-45	7
45-55	4
55-65	4
65-75	2
75-85	1

(i) Find the mean percentage of doctors of rural areas of various states and union territories.

(ii) Suppose there are two persons Ram and Shyam. If Ram find out the mean by direct method and Shyam find out the mean by Assumed mean method, then whether both of them get the same value. Explain the reason.

5. Find the mean and median marks of the students for following distribution:

Marks	Number of Students
0 and above	80
10 and above	77
20 and above	72
30 and above	65
40 and above	55
50 and above	43
60 and above	28
70 and above	16
80 and above	10
90 and above	8
100 and above	0

6. Following is the cumulative frequency distribution of less than type of 1000 persons each of age 20 years and above. Determine the mean age.

Age (in years)	Number of persons
Below 30	100
Below 40	220
Below 50	350
Below 60	750
Below 70	950
Below 80	1000

CASE STUDY QUESTIONS

CASE STUDY_1

Apples are most widely planted and are commercially the most important fruit crop in Jammu and Kashmir. The cultivation of apple crop in Jammu and Kashmir shows particular interest for a number of reasons. In terms of both area and production, apple is very beneficial fruit crop. This provides a major source of income and employment in Jammu and Kashmir.

Horticultural department has tasked their statistical officer to create a model for farmers to be able to predict their produce output based on various factors.

A box containing 250 apples was opened and each apple was weighed. The distribution of the weight of the apples is given in the following table:

Weight (in grams)	No. of f_i Apples
80-100	20
100-120	60
120-140	70
140-160	40
160-180	60

Based on the above information, answer the following questions:

(i) How many apples are in the range 140-160 grams? 1

(ii) What is the upper limit of the median class? 1

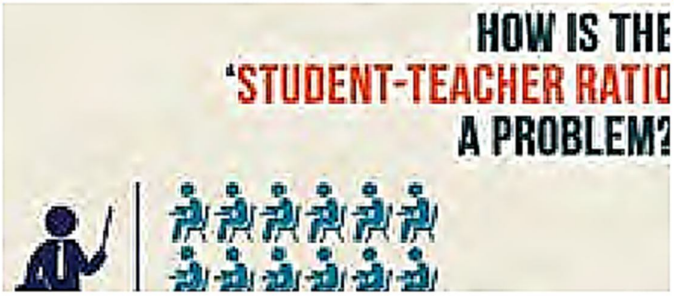
(iii) What is the modal mass of the apples? 2

OR

What is the median mass of the apples? 2

CASE STUDY_2

Student-teacher ratio expresses the relationship between the number of students enrolled in a school and the number teachers employed by the school. Student-teacher ratio is important for a number of reasons. It can be used as a tool to measure teacher workload as well as the allocation of resources. A low student-teacher ratio indicates the burden on a single teacher of teaching multiple students as well as the lack of time that each student gets.



A survey was conducted in the 100 secondary school of Rajasthan and following frequency distribution table was prepared:

Students per teacher	Number of School
20-25	5
25-30	15
30-35	25
35-40	30
40-45	15
45-50	10

Based on the above information, answer the following questions:

(i) What is the upper limit of median class? 1

(ii) What is the median value of students per teacher? 2

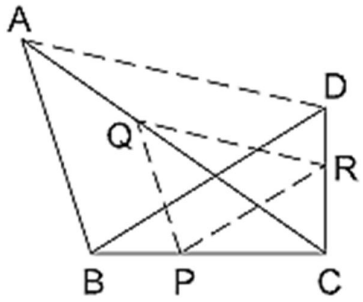
OR

What is the mean value of students per teacher? 2

(iii) What is the lower limit of modal class?

SKILL BASED QUESTIONS

1. ΔABC and ΔDBC lie on the same side of BC, as shown in the figure. From a point P on BC, $PQ \parallel AB$ and $PR \parallel BD$ are drawn, meeting AC at Q and CD at R respectively. Prove that $QR \parallel AD$.



2. Find the area of the segment AYB as shown in the below figure. If the radius of the circle is 21 cm and $\angle AOB = 120^0$ (Use $\pi = \frac{22}{7}$).