

STATISTICS-PRACTICE WORKSHEET

IMPORTANT FORMULAS AND CONCEPTS

We will learn the three measures of central tendency namely, mean, median and mode of grouped data.

1. Mean or Average: - It is the sum of the values of all the observations divided by the total number of observations.

(a) Direct Method: - Mean of grouped data

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$$

(b) Assumed Mean Method: - Mean of grouped data

$$\bar{x} = a + \frac{\sum f_i d_i}{\sum f_i}$$

2. Mode of grouped data: - Mode is that values among the observations which occurs most often or the value of the observation having the maximum frequency.

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$$

Where l = lower limit of the modal class

h = size of the class interval

f_1 = frequency of the modal class

f_0 = frequency of the class preceding the modal class

f_2 = frequency of the class succeeding the modal class

3. Median of grouped data: - median is the measure of central tendency which gives the value of the middle-most observation in the data.

$$\text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f} \right) \times h$$

Where l = lower limit of median class

n = number of observations

cf = cumulative frequency of class preceding the median class

f = frequency of median class

h = class size

The empirical relationship between the three measures of central tendency is: -

$$\mathbf{3 \text{ Median} = \text{Mode} + 2 \text{ Mean}}$$

I. Case Study and Situation Based Questions: -

1. Under the physical and health education a medical checkup program was conducted in a Vidyalaya to improve the health and fitness conditions of the students. Reading of the heights of 50 students was obtained as given in the table below:



Hight (in cm)	Number of students
135 – 140	2
140 – 145	8
145 – 150	10
150 – 155	15
155 – 160	6
160 – 165	5
165 – 170	4

- (i) Identify the lower-class limit of the modal class and find the mode of the given data.
- (ii) Calculate the mean and median of the above data.

2. In a Vidyalaya there are two sections A and B. 39 students are there in section A and in section B there are 41 students. A periodic test was conducted to assess the performance of students thereafter analyze and plan the teaching learning process accordingly. The marks obtained out of 40 are given below in the table.



Marks obtained by the students	Number of students
Less than 5	3
Less than 10	12
Less than 15	22
Less than 20	35
Less than 25	42
Less than 30	60
Less than 35	71
Less than or equal to 40	80

(i) How many students have obtained more than or equal to 35 marks?

(iii) Arrange the given data in class interval and find the median of the marks obtained.

3. An international cricket tournament was organized. Ten teams participated in the tournament. All the players got opportunity to bat in their first match. The lowest and highest runs scored by an individual player in their first match are 0 and 99 respectively. Runs scored by the players in their first match are given below in the table: -



Runs scored in their first match	Number of players
More than or equal to 0	110
More than or equal to 10	105
More than or equal to 20	95
More than or equal to 30	81
More than or equal to 40	69
More than or equal to 50	51
More than or equal to 60	45
More than or equal to 70	30
More than or equal to 80	20
More than or equal to 90	8

- (i) How many players scored more than or equal to 50 runs and how many players scored less than 10 runs?
- (iii) Find the range of the runs scored by individual players.

II. Very Short Answer Type Questions: -

- Find the mean of first ten whole numbers.
- If the mode of a distribution is 9 and its mean is 6, then find its median.
- Write the modal class for the following frequency distribution.

Class Interval	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	5	7	4	10	4

- Write the empirical relationship between the three measures of central tendency.
- A data has 9 observations arranged in descending order. Which observation represents the median of the data?
- Find the class size of the given class intervals.

Class Interval	0 – 6	6 – 12	12 – 18	18 – 24	24 – 30	30 – 46
Frequency	3	5	7	4	9	2

7. Find the cumulative frequency of the class interval 20 – 25 in the given frequency distribution.

Class Interval	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30
Frequency	4	12	8	3	3	2

8. Find the class mark of the class interval 30 – 40 in a frequency distribution.

III. Short Answer Type Questions: -

1. Find the mean of 20 numbers, such that if the mean of 8 of them is 10 and the mean of 10 of them is 12. The last two numbers are 8 and 12.

2. Find the mean of first 15 natural numbers.

3. The number of pages read by a student during a week are as under: -

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
14	14	12	18	13	15	12

Find the mean number of pages.

4. The observation 15, 24, 32, $a + 5$, b , 46, 50 is arranged in ascending order. The median is

36. Find the value of a .

5. From the following frequency distribution, find the median class.

Monthly wages	Number of workers
18000 – 24000	18
24000 – 30000	25
30000 – 36000	30
36000 – 42000	28
42000 – 48000	35
48000 – 54000	32
54000 – 60000	32

6. Find the mode of the following frequency distribution.

Class Interval	Frequency
0 – 10	10
10 – 20	14
20 – 30	12
30 – 40	8
40 – 50	9

7. While finding the mean of 18 observations, an observation 43 was wrongly noted as 34 and then the mean was 30. Find the correct mean.

8. In the following frequency distribution, find the lower limit of the median class.

Age group (in years)	Number of Students
5 – 8	45
8 – 11	50
11 – 14	35
14 – 17	60
17 – 20	110

9. The mean of the following frequency distribution is 4.84. Find the value of f.

Class Interval	Frequency
0 – 2	5
2 – 4	f
4 – 6	25
6 – 8	4
8 – 10	6

10. Find the missing frequency from the following data, when mode is 27.

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	5	x	15	12	7

IV. Long Answer Type Questions: -

1. A survey was conducted to find the monthly earnings of 500 people in a city. Their monthly earnings are given by the following frequency distribution table. Find the mean earnings and modal monthly earnings.

Monthly earnings (in Rs.)	Number of people
20000 – 30000	58
30000 – 40000	56
40000 – 50000	60
50000 – 60000	85
60000 – 70000	37
70000 – 80000	70
80000 – 90000	77
90000 – 100000	57

2. In a Vidyalaya, students were asked to find out the number of people of different ages those who have been recovered from Covid-19 pandemic. The students asked 100 people and represented the data as given:

Age (in years)	Number of people
Below 10	2
Below 20	6
Below 30	22
Below 40	40
Below 50	75
Below 60	84
Below 70	90
Below 80	96
Below 90	99
Below 100	100

Calculate the median age and mean age of the people.

3. The percentage of marks scored by 40 students of class X in their board examination is given below in the table. Find the mean and modal percentage of their marks.

Percentage of marks	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90	90 – 100
Number of students	6	14	20	25	15	12	8

4. Apples are supplied to a retail market from a garden. Different number of apples are packed in the boxes as per their size. The following are the distribution of apples according to the number of boxes:

Number of apples	100 – 105	105 – 110	110 – 115	115 – 120	120 – 125
Number of boxes	25	100	130	125	20

Find the average number of apples kept in a packing box. Also find the mode of the given distribution.

5. The class teacher of class X A has the following attendance record of 40 students for 200 days. The minimum number of days any student present is 80. Find the mean, median and modal attendance of the students.

Number of days	Number of students present
More than or equal to 80	40
More than or equal to 100	36
More than or equal to 120	30
More than or equal to 140	20
More than or equal to 160	15
More than or equal to 180	8

6. It is good news that the number of covid-19 cases are decreasing day by day. 30 cities of our country is surveyed and the number of positive cases in a day are recorded as under.

Number of cases	Number of cities
Less than 15	3
Less than 30	4
Less than 45	5
Less than 60	7
Less than 75	10
Less than 90	12
Less than 105	15
Less than 120	23
Less than 135	26
Less than 150	30

Find the median and modal number of cases.

7. The distribution below gives the weight of 50 students of class X. Find the median and modal weight of the students.

Weight (in kg)	35 – 45	45 – 55	55 – 65	65 – 75	75 – 85
Number of students	5	10	20	12	3

8. Data of average annual rainfall (incm)of different states and union territories of our country is recorded by the students of class X B. It is represented by the following table.

Average annual rainfall (incm)	Number of states or union territories
50 – 74	3
75 – 99	5
100 – 124	4
125 – 149	10
150 – 174	8
175 – 199	4
200 – 225	1

Find the median and mean rainfall of the cities.

Answer Key

I. Case Study and Situation Based Questions:

1. (i) Lower class limit of modal is (150 – 155) is 150. Mode of the observation is 151.79

(ii) Mean of the data is 190.13 and median is 150

2. Hint: Convert the less than type data into class intervals.

(i) $80 - 71 = 9$

(ii) Median of the marks obtained is 21.92

3. Hint: Convert the more than type data into class intervals and find cumulative frequency.

(i) more than or equal to 50 is 51 and less 10 is 5.

(ii) Range of the runs scored by individual player = $99 - 0 = 99$.

II. VSA

1. 2

2. 7

3. 30 – 40

4. 3 Median = Mode + 2 Mean

5. 5 th

6. 6

7. 30

8. 35

III. SA

1. 11

2. 8

3. 14

4. 31 (Hint: When data is arranged in ascending or descending order, the middle value is its median.)

5. 36000 – 42000

6. 16.67

7. 30.5

8. 14

9. $f = 10$

10. $x = 8$

IV. Long Answer Type Questions

1. The mean earnings is Rs. 58190 and modal earnings is Rs. 53203.

2. (Hint: Convert the 'below type' into class intervals as 0 – 10, 10 – 20, 20 – 30 etc.

Median age is 43 years and mean age is 41.05 years.

3. Mean percentage of marks is 64.70 and modal percentage of marks is 63.33.

4. The average number of apples is 113 (112.69) and mode of the given distribution is 114.29

5. Mean = 144.5, Median = 140 and mode = 128.89

6. Median = 105 and mode = 112.5

7. Median = 60 and mode = 60.56

8. (Hint: convert the data to continuous classes, as 49.5 – 74.5, 74.5 – 99.5, 99.5 – 124.5 and so on) Median rainfall is 138.25 cm and mean rainfall is 134.14 cm.