INDIAN SCHOOL AL WADI AL KABIR

Class: XI	Department: Commerce
Worksheet No: 1	Topic: Measures of Central Tendency

1. Which average would be suitable in the following cases?
    a. Average size of readymade garments.
    b. Average intelligence of students in a class.
    c. Average production in a factory per shift.
    d. Average wages in an industrial concern.
    e. When the sum of absolute deviations from average is least.
    f. When quantities of the variable are in ratios.
    g. In case of open-ended frequency distribution.

Answer:
    a. Mode Average size of any ready-made garments should be the size for which demand is the maximum. Hence, the modal value which represents the value with the highest frequency should be taken as the average size to be produced.
    b. Median It is the value that divides the series into two equal parts. Therefore, Median will be the best measure for calculating the average intelligence of students in a class as it will give the average intelligence such that there are equal number of students above and below this average. It will not be affected by extreme values.
    c. Arithmetic Mean The average production in a factory per shift is best calculated by Arithmetic Mean as it will capture all types of fluctuations in production during the shifts.
    d. Arithmetic Mean Arithmetic Mean will be the most suitable measure. It is calculated by dividing the sum of wages of all the workers by the total number of workers in the industrial concern. It gives a fair idea of average wage bill considering all the workers.
    e. Arithmetic Mean The algebraic sum of the deviations of values about Arithmetic Mean is zero. Hence, when the sum of absolute deviations from average is the least, then mean could be used to calculate the average.
    f. Median will be the most suitable measure in case the variables are in ratios as it is least affected by the extreme values.
    g. Median is the most suitable measure as it can be easily computed even in case of open-ended frequency distribution and will not get affected by extreme values.

2. Indicate the most appropriate alternative from the multiple choices provided against each question.
    a. The most suitable average for qualitative measurement is
    b. Arithmetic mean
    c. Median
    d. Mode
    e. Geometric mean
    f. None of these
       Median is the most suitable average for qualitative measurement because Median divides a

series in two equal parts thus representing the average qualitative measure without being affected by extreme values.

3. Which average is affected most by the presence of extreme items?
   a. Median
   b. Mode
   c. Arithmetic Mean
   d. Geometric Mean
   e. Harmonic Mean

   (c) It is defined as the sum of the values of all observations divided by the number of observations and therefore it is. affected the most by extreme values.

4. Comment whether the following statements are true or false.
   a. The sum of deviation of items from median is zero.
   b. An average alone is not enough to compare series.
   c. Arithmetic mean is a positional value.
   d. Upper quartile is the lowest value of top 25% of items.
   e. Median is unduly affected by extreme observations.

   a. False
      This mathematical property applies to the arithmetic mean and not to median.
   b. True
      Average is not enough to compare the series as it does not explain the extent of deviation of different items from the central tendency and the difference in the frequency of values. These are measured by measures of dispersion and kurtosis.
   c. False
      Median is a positional value.
   d. True
      The upper quartile also called the third quartile, has 75 % of the items below it and 25 % of items above it.
   e. False
      Arithmetic mean is unduly affected by extreme observations.

5. ------ is the most commonly used measures of central tendency.
a. Mean
b. Mode
c. Quartile
d. Median

A: a

6. Arithmetic mean is defined as the sum of the values of all observations divided by the ---- (Number of observations)

7. The sum of deviations of items about arithmetic mean is always equal to ------

a. One

b. Zero
c. Infinity
d. None of these

A: b

8. The ------- is the middle element when the data set is arranged in order of the magnitude.

a. Mean
b. Median
c. Quartile
d. Mode

A: b

9. Median divides the series into how many parts:

a. 2

b. 3
c. 4
d. None of these

A: a

10. For a symmetrical distribution, median = 30 and mode = 35. What is the value of the mode?
a. 0
b. 30
c. 32.5
d. 27.5

A= b

11. Median is unaffected if the size of the largest value increases. True / False? Give reason.
   True, because median is determined by the position of different values.

12. In case of continuous series, you have to locate the median class where ------- item lies.
   (N/2) th

13. Q1 is known as upper quartile of the series. True or false? True

14. The second quartile (Q2) is called ------ (median).

15. Show that the sum of deviations of the values of the variables from their AM is always

   equal to zero.
   A: $\sum (X - \bar{X}) = 0$

X	$(X - \bar{X})$

10	-20
20	-10
30	0
40	10
50	20
$\sum X = 150$	$\sum (X - \bar{X}) = 0$

$\bar{X} = \dfrac{\sum X}{N}$ = 150/5 = 30. When the sum of the deviations from the arithmetic mean, i.e: ,30 is taken it comes out to be 0.

16 --------- divide the distribution into hundred equal parts. (percentiles)

17. In a discrete series, mode can be determined by looking to that value of the variable which has the --------- frequency. (highest)

- **Numerical problems:**

1. The following table gives the daily income of ten workers in a factory. Find the arithmetic mean.

Workers	A	B	C	D	E	F	G	H	I	J
Daily Income (in ₹)	120	150	180	200	250	300	220	350	370	260

Answer:

Workers	Daily Income (in ₹) (X)
A	120
B	150
C	180
D	200
E	250
F	300
G	220
H	350
I	370
J	260
Total	$\sum X = 2400$

N = 10

$\bar{X} = \dfrac{\sum X}{N} = \dfrac{2400}{10} = 240$

Arithmetic Mean = ₹ 240

2. Following information pertains to the daily income of 150 families. Calculate the arithmetic mean.

Income (in ₹)	Number of Families
More than 75	150
More than 85	140
More than 95	115
More than 105	95
More than 115	70
More than 125	60
More than 135	40
More than 145	25

Answer:

Income Class Interval	Number of Families (cf)	Frequency (f)	Mid Value (m)	fm
75-85	150	150 – 140 =10	80	800
85-95	140	140 – 115 =25	90	2250
95-105	115	115 – 95 =20	100	2000
105-115	95	95 – 70 =25	110	2750
115-125	70	70 – 60 =10	120	1200
125-135	60	60 – 40 =20	130	2600
135-145	40	40 – 25 =15	140	2100
145-155	25	25	150	3750
Total		$\Sigma f = 150$		$\Sigma fm = 17{,}450$

$$\text{Mean} = \frac{\Sigma fm}{\Sigma f} = \frac{17450}{150} = ₹\,116.33$$

3. Calculate mean, median and mode with the help of the data.

Class interval	F
0-2	2
2-4	5
4-6	6
6-8	9
8-10	15
10-12	28
12-14	14
14-16	5
16-18	3
18-20	1

A = Mean = 10. Median = 10.5 and Mode = 11.5, Use this formula to calculate mode
(Mode = 3 median – 2 mean)

4. Calculate mean, median, Q1 & Q3 from the data:

Class – interval	F
0-7	1
7-14	5
14-21	9
21-28	15
28-35	25
35-42	10
42-49	4
49-56	2

A= mean = 28.7, median = 29.54, Q1 = 22.2, Q3 = 34.4

5. The following table gives production yield in kg's per hectare of wheat of 150 farms. Calculate mean, median and mode.

Production yield	No.of . Families
50-53	3
53-56	8
56-59	14
59-62	30
62-65	36
65-68	28
68-71	16
71-74	10
74-71	5

A = Mean = 63.8, Median = 63.6, Mode = 62.56