

21. The A.M of two numbers is 127.5 and G.M is 60.

Find H.M ? (28.235)

2. A data consisting of 25 observations, have mean 12.7 cms. Later, on checking it is discovered that a number 21 was wrongly added in addition to 25. Find the correct mean if the additional value is omitted. (12.86)

3. The mean of 12 observations is 37.4. One more observation is added and the mean becomes 37.5. Find the value of new observation. (38.7)

4. The mean age of 5 persons in a room is 30 years. A 39 years old person walks in. What is now the mean age of the persons in the room? (31.5)

5. The mean weight of 150 students in a certain class is 60 kg, The mean weight of boys in the class is 70 kg and that of girls is 55 kg. Find the number of boys and girls in the class (50, 100)

The mean marks obtained by 300 students in the subject of statistics are 45. The mean of the top 100 of them was found to be 70 & mean of last 100 was known to be 20. What are the mean marks of remaining 100 students. (45)

Show that the weighted A.M of first N natural numbers, whose weights are equal to the corresponding numbers, is equal to $\left(\frac{2N+1}{3}\right)$.

For a set of 15 observations, the mean came out to be 17.3. Later on checking it is discovered that an observation 19.5 was wrongly recorded. The correct value was 15.9. Calculate the correct mean. (17.06)

Q9. You can take a trip which entails travelling of 900 km by train at an average speed of 60 km.P.h., 3000 km by boat at an average speed of 25 km.P.h. and finally 400 km by plane at 350 km.P.h. and finally 15 km by taxi at 25 km.P.h.. What is your speed for entire distance. (62.43)

Q10. Find out the missing frequencies of the following data, whose mean is 67.45 inches.

Height inches	60-62	63-65	66-68	69-71	72-74	Total
# of students	5	18	f_3	f_4	8	100 (27, 6)

Q11. You are given the following incomplete frequency distribution. It is known that the total frequency is 1000 and that the median is 413.11. Estimate the missing frequencies and find the mode.

Classes	300-325	325-350	350-375	375-400	400-425	425-450	450-475	475-500
frequencies	5	17	80	?	326	?	88	9 (227, 24)

Q12. The G.M of six numbers is 75. If the G.M of four of the numbers is 67. What is the G.M of other two numbers.

Q13. Find A.M, G.M. & H.M of the following Geometric Progression $a, ar, ar^2, ar^3, ar^4, \dots, ar^{n-1}$. $A.M = \frac{a(1-r^n)}{n(1-r)}$

Q14. The A.M of 3 observations is $\frac{7}{3}$ and G.M is 2. If one of the observation is 4. Find the other two observations. (2, 4)

$(1+x)^n$ if $x < 1$

Q1. Whether the following variables are discrete or continuous also give possible range.

- D a) number of motor-cycle accidents in a month in Karachi
- C b) amount of rainfall in a year
- C c) length of time it takes to run a mile
- D d) number of eggs laid by a hen in a month.
- C e) grades obtained by candidates in statistics Exam.
- D f) number of runs scored in a Cricket match.

Q2. If a variable X takes the different values as

$X: 18, 4, 6, 3, 8, 11, 13, 9$

Find i) $(X_1 + X_2)^2$, $(X_4 - X_5)^2$, $\sum_{i=1}^6 X_i^2$, $\sum_{i=3}^8 X_i$
 ii) $\sum_{i=1}^8 (X_i - \bar{X})$, $\sum_{i=1}^8 (X_i - \bar{X})^2$, $\sum_{i=1}^8 (2X_i - 1)^3$

Q3. Suppose that $\sum_{i=1}^4 X_i = 9$, $\sum_{i=1}^4 X_i^2 = 50$, Evaluate

i) $\sum_{i=1}^4 (X_i - 2)^2$, $\sum_{i=1}^4 2.5(2X_i^2 - 3X_i + 1)$

Q4. Write down the class boundaries, midpoints and class width for each of the following classes.

- a) 10 - 19
- b) 3.5 - 5.5
- c) (-6) - (-3)

Q5. A group of 1,000 army recruits are measured for

height the shortest man is 59 inches tall, and the tallest is 79 inches. Calculate the class interval width. 10 intervals are desired for frequency distribution.

Q6. The following Tire-Tread life data are incomplete. Fill in the missing values.

Class Interval km	Frequency f_i	relative frequency	Cumulative frequency (Less than)
10,000 - 15,000	6	0.06	6
15,000 - 20,000	21	0.21	27
20,000 - 25,000	38	0.38	65
25,000 - 30,000	19	0.19	84
30,000 - 35,000	16	0.16	100
Total	100	1.000	-

Q7. From the following data

X_i	115	125	135	145	155	165	175	185
f_i	6	25	48	72	116	60	38	22

i) Find class intervals

ii) Draw histogram and Frequency Curve

iii) Calculate mean, median and mode

Q8. Find the missing frequency from the following data.

Marks	0-5	5-10	10-15	15-20	20-25	25-30	30-35
f_i	10	12	16	?	14	10	8

The average mark is 16.82

Ans ($f = 18$)

Q9. In the frequency distribution of 100 families given below, the number of families corresponding to expenditure groups 20-40 and 60-80 are missing from the table. However, the median is thrown to be 50.

Find the missing frequencies

Expenditure	0-20	20-40	40-60	60-80	80-100
No. of families	14	f_1	27	f_2	15

Ans ($f_1 = 23, f_2 = 21$)

Q10. The numbers 3.2, 5.8, 7.7 and 4.5 have frequencies a , $(a+2)$, $(a-3)$ and $(a+6)$ respectively. If A.M is 4.876 find the value of a .

Ans ($a = 5$)

Q11. The following distribution of marks was obtained with an examination paper.

Marks	0-20	20-29	30-39	40-49	45-49	50-59	60-69	70-79
Frequency	2	8	14	26	28	47	13	10

$$\begin{aligned} \text{A.M} &= \frac{7247}{148} \\ &= 48.96 \end{aligned}$$

Use suitable measure of central tendencies to measure average performance? Give reasons for your answer.

Q12. Given below is the distribution of 100 candidates obtaining marks X or higher in a certain examination (all marks are given in whole numbers).

X :	10	20	30	40	50	60	70	80	90	100
C.f:	140	133	118	100	75	45	25	9	2	0

Calculate the mean, median and mode of the distribution.

Ans (mean = 50.714, Median 51.167) Mode = 48.333

$$\begin{aligned} &46.214 \\ &46.667 \end{aligned}$$

- Q13. a) List 5 types of data which would be qualitative.
 b) List 5 types of data which would be quantitative.
 c) Explain how "Time" might be considered as discrete value.
 d) Explain how "Time" might be considered as continuous value.

Q14. Consider the following set of measurements

$n=20$ 3, 5, 4, 5, 7, 3, 5, 4, 6, 4, 3, 5, 3, 5, 4, 4, 5, 2, 6, 5

- a) Calculate mean, median and mode for the given set.
 b) Calculate mean, median and mode for odd values.
 c) Calculate mean, median and mode for Even numbers.
 d) Does the values calculated in (b), (c) approximate the values of set (a).

Q15. If the G.M of two numbers (x_1 and x_2) is 4 and A.M is 5 find these numbers. ($x_1=2, x_2=8$)

Q16. Mean of 20 values is 45. If one of the values is to be taken 64 instead 46. Find corrected mean. ($\bar{x}=44.1$)

Q17. The G.M of 10 observations on a certain variable was found as 16.2. It was later discovered that one of the observation was wrongly recorded as 12.9. In fact it was 21.9. Apply appropriate correction and calculate the correct G.M. (17.06)

Q18. a) Show that the A.M of first 'n' natural numbers is $(n+1)/2$.

b) Show that the A.M of first 'n' natural numbers where frequencies are equal to the corresponding numbers is equal to $(2n+1)/3$.

Q19. a) A variate takes the values $a, ar, ar^2, \dots, ar^{n-1}$

each with frequency unity show that

$$A.M = \frac{a(1-r^n)}{n(1-r)}, \quad G.M = a \cdot r^{(n-1)/2}, \quad H.M = \frac{an(1-r)r^{n-1}}{1-r^n}$$

b) Prove that $(G.M)^2 = (A.M)(H.M)$

Q20. If $x_1 = a, x_2 = 4, x_3 = 5$, find x_4 so that so that standard deviation of three observation is 3.

$$(a=10.8)$$

Q21 Given $\sum x_i = 100$, $n = 10$, $\sum (x_i - 8)^2 = 100$

Find σ_x^2 and $\sum x_i^2 = ?$

Q22 The A.M of two numbers is 3 and the variance is 4, find these numbers. ($x_1 = 1, x_2 = 5$)

Q23 Calculate S.D of the following sets ($\sum x_i = 6, \sum x_i^2 = 26$)

x_i 2 2 2 2 (Bero)

y_i -3.5 -3.0 -2.0 -1.5 (0.79)

z_i 34 32 29 32 32 31 (1.49)

Q24 In a frequency distribution, Karl Pearson's coefficient of skewness revealed that the distribution was skewed to the left to an extent of -0.6. Its mean value was less than its modal value by 4.8. What was the standard deviation.

Q25. A frequency distribution gives the following results

i) Coefficient of variation = 5

ii) Standard deviation = 2

iii) Karl Pearson's coefficient of skewness = 0.5

Find the mean and mode of the distribution. [Ans Mean = 40, Mode = 39]

Q26. The first four moments of a distribution about the value

$\bar{x} = 7 = 2 + 5$ are 2, 20, 40 and 50. Obtain, as far as possible, the various characteristics of the distribution on the basis of the information given. Comment upon the nature of the distribution $\bar{x}, \mu_2, \mu_3, \mu_4, \beta_1, \beta_2$.

$\mu_2 = 16$
 $\mu_3 = -64$
 $\mu_4 = 162$
 $\beta_1 = 1$
 $\beta_2 = \frac{81}{128} = 0.63$

Q27. The first three moments of a distribution about the value "1" are 2, 25, and 80. Find its mean, S.D

and moment measure of skewness [Ans Mean = 3, S.D = 4.58, Sk = -0.5619]

Q28 Which group is more symmetrically skewed?

i) Mean = 22, Median = 24, S.D = 10 $Sk = \frac{3(\text{Mean} - \text{Median})}{\sigma} = -0.6$

ii) Mean = 22, Median = 25, S.D = 12 $\rightarrow -0.75$

Q29 The Karl Pearson's Coefficient of Skewness of a distribution is 0.32. Its S.D is 6.5 and the mean is 29.6

Find the mode [Ans 27.52]. $Sk = \frac{\text{Mean} - \text{Mode}}{\sigma}$

$$\beta_2 = 4, \beta_1 = 1$$

$$\mu_1' = 10, \mu_2' = 116, \mu_3' = 1544, \mu_4' = 123184$$

$$\mu_2 = 16, \mu_3 = 64, \mu_4 = 1024$$

Q30 In a distribution, mean is 10, Variance is 16, γ_1 is +1 and $\beta_2 = 4$. Find the first four moments about origin.

Q31 In a distribution mean = 65, median = 70 and Coefficient of Skewness = -0.6. Find (i) Mode (ii) Coefficient of Variation.

$$SK = \frac{3(\text{Mean} - \text{Median})}{SD}$$

$$SK = \frac{\text{Mean} - \text{Mode}}{SD}$$

Q32

In calculating the moments of a frequency distribution based on 100 observations, following results were obtained: mean = 9, Variance = 19, $\beta_1 = 0.7$, $\beta_2 = 4$

But later on it was noticed that one observation 12 was read as 21. Obtain the correct values of mean moments and β_1 & β_2 .

Q33. The numbers 4, 6, 12, 4, 10, 12, 3, $\boxed{x, y}$ have a mean of 7 and a mode 4. Find (i) the values of the two numbers x and y (ii) the median of this set of nine values. (iii) When two additional numbers $7+n$ and $7-n$ are included the standard deviation of all eleven numbers is found to be 4. Write down the mean of these eleven numbers and calculate the value of n .

$$n = 6$$

$$\bar{x} = 7$$

$$\text{Ans } [x=4, y=8, \text{Median}=6, \text{Mean}=7, n=6]$$

Q34 A set of digits consists of m zeros and n ones. Find the mean of this set and show that the standard deviation is $\sqrt{(mn)/(m+n)}$.

Q35. Show from the basic definition, why the standard deviation of a set of observations x_1, x_2, \dots, x_n with mean \bar{x} may be found by evaluating

$$\sqrt{\frac{\sum x_i^2}{n} - \bar{x}^2}$$

Q36. For a set of 20 numbers $\sum x = 300$ and $\sum x^2 = 5500$. For a second set of 30 numbers $\sum x = 480$ and $\sum x^2 = 9600$. Find the mean and the standard deviation of the combined set of 50 numbers.

$$\text{Mean} = 15.6, \bar{x}_1 = 15$$

$$\sigma_c = 7.63$$

$$\bar{x}_2 = 16$$