Important Questions Class 9 Maths Chapter 12 Statistics

1 Marks Quetions

1. If the mean of 2, 4, 6, 8, x, y is 5 then find the value of x+y.

Ans. 10

---

2. Write the class mark of 90-110 group.

Ans. 2

---

3. If the ratio of mean and median of a certain data is 2:3, then find the ratio of its mode and mean.

Ans. 3

---

4. Tally marks are used to find …….

Ans. Frequency

---

5. The following marks were obtained by the students in a test.
81, 72, 90, 90, 86, 85, 92, 70, 71, 83, 89, 95, 85, 79, 62
What is the range?

Ans. 33

---

6. In a histogram, each class rectangle is constructed with base as

(a) frequency
(b) class interval
(c) range
(d) size of the class

Ans. (b) class interval

---

7. Find the range of the following data: 25, 20 30, 18, 16, 15

(a) 15
(b) 10
(c) 5
(d) 20

Ans. (a) 15

---

8. Find the median of the given data: 7, 8, 7, 7, 9, 10, 13.

(d) 10

Ans. (c) 8

---

9. Find the mode of the given data: 7, 9, 11, 13, 9 13, 9, 9, 7, 8.

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

Ans. (b) 9

---

10. Find the mean of the first five multiples of 3?

(a) 9
(b) 12
(c) 14
(d) None of these

Ans. (a) 9

---

11. The mean of 7 observations is 20. If the mean of the first 4 observations is 12 & that of last 4 observations is 28, find the 4^{th} observations?

Ans. Since mean of 7 observations = 20

$$\therefore \text{Total of 7 observation} = 20 \times 7 = 140$$

$\therefore$ Mean of first 4 observations = 12
$\Rightarrow$ Total of first 4 observations $= 12 \times 4 = 48$
$\therefore$ Mean of first 4 observations $= 4 \times 28 = 92$

$\Rightarrow$ Total of first 4 observations =26

$\therefore$ Total of 7 observations + 4^{th} observation = 48 + 92

140 + 4^{th} observation = 140

$\Rightarrow$ 4^{th} observation = 140 – 140 = 0

---

12. What is the upper limit of the interval: 20 – 23?

(a) 20
(b) 23
(c) 22
(d) None of these

Ans. (b) 23

---

13. What is class size of interval 10, 12, 14, 16, 18?

(a) 2
(b) 1
(c) 10
(d) 18

Ans. (a) 2

---

14. Find the class mark of the interval 15.7 – 25.7?

(a) 15.3
(b) 16.3
(c) 17.3
(d) 20.7

Ans. (d) 20.7

---

15. What is the mid – points of class interval 12.3 – 22.3?

(a) 17.3
(b) 15.3
(c) 18.3
(d) 16.3

Ans. (a) 17.3

---

16. The median of the following observations arranged in ascending order is 40. find x

15, 12, 11, 14, x + 2, x + 4, 32, 30, 41, 35

Ans. No. of observation = 10 which is even –
∴ Median is the average of

$$\left(\frac{n}{2}\right)^{th} \& \left(\frac{n}{2}+1\right)^{th}$$

observations
i.e. 5^{th} observation = x + 2
& 6^{th} observation = x + 4

$$\therefore Median = \frac{(x+2)+(x+4)}{2}$$

$$40 = \frac{2x+6}{2}$$
$$40 = x+3$$
$$\therefore x = 37$$

---

17. What is the class Mark of the interval 15-20?

(A) 15
(B) 20
(C) 17.5
(D) none of these

Ans. (C) 17.5

---

18. What is the range of interval 15-20?

(A) 5
(B) 10
(C) 15
(D) none of these

Ans. (A) 5

---

19. What is the class – size of the interval 15-20?

(A) 5
(B) 10
(C) 15
(D) none of these

Ans. (A) 5

---

20. Find out the mean of following data. 5, 10, 15, 20, 25, 30,

(A) 16.5
(B) 17.5
(C) 18.5
(D) none of these

Ans. (B) 17.5

---

21. Find the arithmetic mean of first 6 natural numbers?

(a) 3.5
(b) 4.5
(c) 2.5
(d) none of these

Ans. (a) 3.5

---

22. What is the mid-point of interval 3-6?

(a) 3.5
(b) 4.5
(c) 5.5
(d) none of these

Ans. (b) 4.5

---

23. Find out the range of the following: 5, 10, 15, 20, 25, 30

(a) 25
(b) 20
(c) 30
(d) none of these

Ans. (a) 25

---

24. Find out the mode of the following: 5, 4, 3, 5, 6, 6, 6, 5, 4, 5, 5, 3, 2, 1

(a) 6
(b) 4
(c) 5
(d) none of these

Ans. (c) 5

---

25. What is the class size of the intervals 10-20?

(a) 10
(b) 5
(c) 15
(d) 20

Ans. (a) 10

---

26. What is the upper class limit of the class 37-43?

(a) 37
(b) 40
(c) 43
(d) none of these

Ans. (c) 43

---

27. What is the lower class limit of the class 37-43?

(a) 37
(b) 40
(c) 43
(d) none of these

Ans. (a) 37

---

28. Find the median of the following data: 15, 35, 18, 26, 19, 25, 29, 20, 27, 30,

(a) 25.5
(b) 24.5
(c) 26.5
(d) none of these

Ans. (a) 25.5

---

2 Marks Quetions

1. The mean of 10 numbers is 20, If 5 is subtracted from every number, what will be the new mean.

Ans. 15

---

2. Find the mean of first 10 even natural no.

Ans. 11

---

3. Calculate the mean for the following distribution.

x	5	6	7	8	9
f	4	8	14	11	3

Ans. 7.025

---

4. Find the median of 37, 31, 42, 43, 46, 25, 39, 45, 32

Ans. 39

---

5. Find the mode of following series.
25, 23, 22, 22, 24, 27, 27, 25, 23, 22, 26, 32

Ans. 22

---

6. If the median of a series of data is 3 and mean is 2 then find the mode.

Ans. 5

---

7. If the mean of 5 observation x, x + 4, x + 8, x + 12, x + 16 is 13, find the mean of the observations?

Ans. $\bar{x} = \frac{\sum xi}{n}$

$$\Rightarrow 13 = \frac{x+(x+4)+(x+8)+(x+12)+(x+16)}{5}$$

$$\Rightarrow 5 \times 13 = 5x + 40$$

$\Rightarrow 13 = x + 8$

$\therefore x = 5$

$\therefore$ The given set of 5 observations are 5, 9, 13, 17, 21

$$\bar{x} = \frac{5+9++13+17+21}{5} = 12.8$$

---

8. The class marks of the observations are 17, 21, 25, 29, 33, 37, 41, 45. Find the class intervals.

Ans. Class marks are 17, 21, 25, 29, 33, 37, 41 and 45

Class size = 21 – 17 = 25 – 21 = 4 and Half of class size = $\frac{4}{2} = 2$

So, Class intervals are:

17 – 2 = 15	&	17 + 2 = 19	i. e.	15 – 19
21 – 2 = 19	&	21 + 2 = 23	i. e.	19 – 23
25 – 2 = 23	&	25 + 2 = 27	i. e.	23 – 27
29 – 2 = 27	&	29 + 2 = 31	i. e.	27 – 31
33 – 2 = 31	&	33 + 2 = 35	i. e.	31 – 35
37 – 2 = 35	&	37 + 2 = 39	i. e.	35 – 39
41 – 2 = 39	&	41 + 2 = 43	i. e.	39 – 43
45 – 2 = 43	&	45 + 2 = 47	i. e.	43 – 47

---

9. The value of π up to 15 decimal places is: 3. 419078023195679

(i) List the digits from 0 to 9 & make frequency distributions of the digit after the decimal points.

(ii) What are the most * the least frequently occurring digits?

Ans. (i) Frequency distribution table

Digits	Tally Marks	Frequency
0	||	2
1	||	2
2	|	1
3	|	1
4	|	1
5	|	1
6	|	1
7	||	2
8	|	1
9	|||	3

(ii) Most frequency occurring digits = 9 & least frequently occurring digits = 2, 3, 4, 5, 6, 8

---

10. A random survey of the number of children of various age grout playing in the park was found:

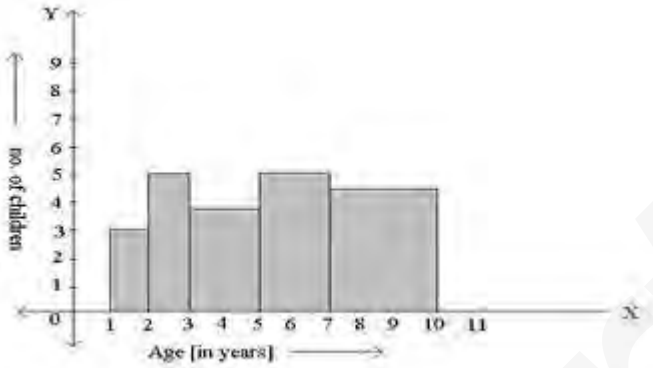
Age [in years]	**1 - 2**	**2 - 3**	**3 - 5**	**5 - 7**	**7 - 10**
No. of children	**3**	**5**	**7**	**10**	**13**

Draw a histogram to represent the data above?

Ans. Since the class intervals are not of equal width; we calculate the adjusted frequencies AF for histogram. Minimum class size CS = 1

Age [in years]	Frequency	Class Size [CS]	$\text{AF}=\frac{\text{minimum CS}}{\text{CS of this class}}\times Its$ frequency
1 – 2	3	1	$\frac{1}{1}\times 3=3$
2 – 3	5	1	$\frac{1}{1}\times 5=5$
3 – 5	7	2	$\frac{1}{2}\times 7=3.5$
5 – 7	10	2	$\frac{1}{2}\times 10=5$
7 – 10	13	3	$\frac{1}{3}\times 13=4.3$

Now we draw rectangles with heights equal to the corresponding adjusted frequencies & bases equal to the given class intervals, to get the required histogram, as shown below.



---

11. The mean of 20, 8, 12, 13, 15 & P is 30. Find the value of P?

Ans. Mean

$$= \bar{x} = \frac{20+8+12+13+15+P}{6}$$

$$30 = \frac{68+P}{6}$$

$$\Rightarrow 180 = 68+P$$

$$\therefore P = 180-68 = 112$$

---

12. Find the mode of the following data: 14, 25, 14, 14, 25, 24, 20, 28, 18, 20.

Ans. Arranging the given data in ascending order: 14, 14, 14, 18, 20, 20, 24, 25, 25, 28

We observe that the value 14 occurs most frequently i.e. 3 times in the given set of the observations.

$\therefore$ Mode is 14

---

13. Find the median of 5, 7, 10, 9, 5, 12, 15, 12, 18, 20. If 9 is replaced by 14, what will be the new median.

Ans. The given observations arranged in ascending order: 5, 5, 7, 9, 10, 12, 15, 18, 20

Here, n = 10 $even number$

So,

$$\therefore Median = \frac{5^{th} observaiton + 6^{th} observaiton}{2} = \frac{10+12}{2} = 11$$

When 9 is replaced by 14, we get 5, 5, 7, 10, 12, 12, 14, 15, 18, 20

Now 5th observation = 6th observation = 12

So, New Median = $\frac{12+12}{2} = 12$

---

14. The average mark of boys in an examination is 68 & that of girls in 89. If the average mark of all candidates in that examination is 80, find the ratio of the no. of boys to the number of girls that appeared in the examinations.

Ans. Let number of boys be x & that of girls be 4.

$\therefore$ Total marks of boys = $68 \times x$ = 68x

& Total marks of girls = $89 \times y$ = 89y

Hence total marks for boys & girls = 68x + 89y ---------- (1)

Also, total of boys & girls = x + y & average for all the candidates = 80

$\therefore$ Total marks for boys & girls, = 80 (x + y) ---------- (2)

From (1) & (2)

80 (x + y) = 68x + 89y

80x + 80y = 68x – 89y

80x – 68x = 89y – 80y

12x = 9y

$\frac{x}{y} = \frac{9}{12} = \frac{3}{4}$ $\therefore$

$\therefore$ Ratio of boys & girls = 3: 4

---

15. The mean of 6 numbers is 30. If one number is excluded, their mean is 24. Find the excluded number.

Ans. Here, n= 6, ($\bar{x}$) =30

$$\therefore \bar{x} = \frac{1}{n}(\sum x_i) = \sum x_i = n\bar{x}$$

$$= \sum x_i = 6 \times 30 = 180$$

So total of 6 numbers =180

Let the excluded number be a. then, total of 5 number is 180-a

$\therefore$ mean of 5 number = $\frac{180-a}{5}$

$$\Rightarrow 24 = \frac{180-a}{5}$$

$$\Rightarrow 24 \times 5 = 180 - a$$

$$\Rightarrow a = 180\text{-}120$$

$\Rightarrow a = 60$

Hence, the excluded number is 60

---

16. The median of the observation 11, 12, 14, 18, x+2, x+4, 30, 32, 35, 41, arranged in ascending order is 24. find the value of x.

Ans. Number of observation, n=10

Since n is even,

$$\therefore \text{median} = \frac{[\frac{n}{2}]th \text{ observation} + [\frac{n}{2}+1]th \text{ observation}}{2}$$

$$\Rightarrow 24 = \frac{5th \text{ observation} + 6\text{th observation}}{2}$$

$$\Rightarrow 24 = \frac{(x+2)+(x+4)}{2}$$

$$\Rightarrow 24 = \frac{2x+6}{2} \Rightarrow 24 = x+3$$

$\Rightarrow x = 21$

Hence, x =21

---

17. Find the median of the following data: 25, 34, 31, 23, 22, 26, 35, 28, 20, 32,

Ans. Arranging the data in ascending order, we get

20, 22, 23, 25, 26, 28, 31, 32, 34, 35

Hence, the no. of observation n=10 (even)

$$\Rightarrow \text{median} = \frac{\text{value of } 5th \text{ observation} + \text{value of } 6th \text{ observation}}{2}$$

$= \frac{26+28}{2} = 27$

Hence, median of the given data is 27.

---

18. In X standard, these are three section A, B, C with 25, 40 and 30 students respectively. The average mark of section A is 70%, of section B is 65% and of section C is 50%. Find the average marks of the entire X standards.

Ans. Hence,

$$n_1 = 25,\ n_2 = 40,\ n_3 = 35$$

$$\bar{x}_1 = 70,\ \bar{x}_2 = 65, \text{ and } \bar{x}_3 = 50$$

Let $\bar{X}$ denote the average mark of the entire 10th standard. Then,

$$\bar{X} = \frac{n_1 \bar{X}_1 + n_2 \bar{X}_2 + n_3 \bar{X}_3}{n_1 + n_2 + n_3}$$

$$= \frac{25 \times 70 + 40 \times 65 + 35 \times 50}{25 + 40 + 35}$$

$$= \frac{1750 + 2600 + 1750}{100}$$

$$= \frac{6100}{100} = 61$$

Hence, the average marks of the entire 10th standard is 61%

---

19. If $\bar{x}$ is a mean of

$$x_1, x_2, x_3 \text{ -------- } x_n$$

then the mean of

$$ax, ax_2 \text{ -------- } ax_n$$

is a $\bar{x}$, where a is any number different from 2 era i.e. If each observation is multiplied by a non 2 era number a, then the mean is also multiplied by a.

Ans. We have:

$$\bar{X} = \frac{1}{n}\left[\sum_{i=1}^{n} X_i\right] \quad \text{(i)}$$

Let $\bar{X}$ be the mean of $ax_1, ax_2 \ldots . ax_n$. Then,

$$\bar{X} = \frac{ax_1 + ax_2 + \ldots\ldots + ax_n}{n}$$

$$= \frac{a\,(x_1 + x_2 + \ldots\ldots + x_n)}{n}$$

$$= a\left[\frac{1}{n}\sum_{i=1}^{n} X_i\right]$$

$$= a\bar{X} \quad \rightarrow \quad [\text{using (i)}]$$

---

20. The class marks of a distribution are 26, 31, 41, 36, 46, 51, 56, 61, 66, 71.Find the true class limits.

Ans. Hence the class marks are uniformly spaced. So, the class size is the difference between any two consecutive class marks.

$\therefore$ Class size = 31-26 = 5

If a is the class mark of a class interval of size h, then the lower and upper limits of the class intervals are

$$a-\frac{h}{2} \text{ and } a+\frac{h}{2} \text{ respectively.}$$

Here h = 5

$\therefore$ Lower limit of first class interval = $26-\frac{5}{2}=23.5$

and upper limit of first class interval = $26+\frac{5}{2}=28.5$

$\therefore$ First class interval is 23.5-28.5

Thus, true class limits:

23.5-28.5, 28.5-33.5, 33.5-38.5, 38.5-43.5, 43.5-48.5, 48.5-53.5.

---

21. The marks obtained by 15 students in an examination are given below;

125, 130, 130, 120, 141, 146, 162, 163, 169, 173, 179, 188, 192, 195, 199.

Form a cumulative frequency table with class interval of length 20.

Ans.

Cumulative Frequency Distribution of Marks

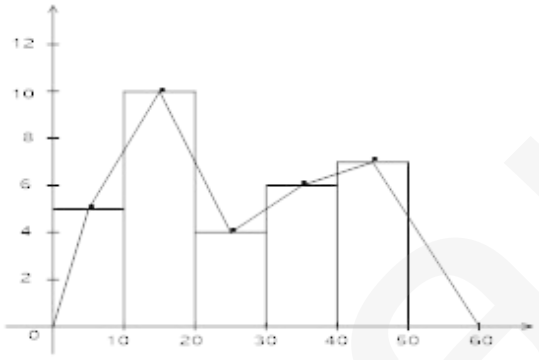
Class interval	Tally Mark	Frequency	Cumulative frequency
120-140	||||	4	4
140-160	||	2	6
160-180	𝍸	5	11
180-200	|||	4	15
Total		15	15

---

22. For the following data, draw a histogram and a frequency polygon:

Mark	0-10	10-20	20-30	30-40	40-50
No. of student	5	10	4	6	7

Ans.



---

23. If $\bar{X}$ is the mean of n observation $x_1, x_2 \ldots\ldots x_n$, then prove that the mean of

$$x_1 - a, x_2 - a \ldots\ldots x_n - a,$$

is $\bar{X} - a$, where a is any real number.

Ans. We have

$$\bar{X} = \frac{1}{n}\left[\sum_{i=1}^{n} X_i\right] \quad \text{(i)}$$

Let $\bar{X}$ be the mean of $x_1 - a, x_2 - a \ldots\ldots x_3 - a$. Then,

$$\bar{X} = \frac{(x_1 - a) + (x_2 - a) + \ldots\ldots + (x_n - a)}{n}$$

$$= \frac{(x_1 + x_2 + \ldots\ldots x_n) - na}{n}$$

$$= \frac{1}{n}\left[\sum_{i=1}^{n} X_i\right] - \frac{na}{a}$$

$$= \bar{X} - a \quad \text{[using (i)]}$$

---

24. The mean of 16 numbers is 8. If 2 is added to every number, what will be new mean?

Ans.

Let $x_1, x_2, x_3 \ldots\ldots x_{16}$ be 16 numvers with their mean equal to 8. Then,

$$\bar{X} = \frac{1}{n}\left(\sum x_i\right)$$

$$\Rightarrow 8 = \frac{x_1 + x_2 + \ldots\ldots + x_{16}}{16}$$

$$\Rightarrow 16 \times 8 = x_1 + x_2 + \ldots\ldots x_{16}$$

= 128 …..(i)
New numbers are

$$x_1 + 2,\ x_2 + 2,\ x_3 + 2, \ldots\ldots x_{16} + 2$$

Let $\bar{X}$ Be the mean of new numbers. Then,

$$\bar{X} = \frac{(x_1 + 2) + (x_2 + 2) + \ldots\ldots + (x_{16} + 2)}{16}$$

$$= \frac{(x_1 + x_2 + \ldots\ldots + x_{16}) + 2 \times 16}{16}$$

$Using\ (i)$

$$= \frac{128+32}{16}$$

$$= \frac{160}{16} = 10$$

---

25. Calculate the mean from the given data:

Mark	15	20	25	30	35	40
no cy students	6	7	12	14	15	6

Ans.

xi	f i	f i, x i
15	6	90
20	7	140
25	12	300
30	14	420
35	15	525
40	6	240

$$\sum fi = n = 60$$

$$\sum fi\ xi = 1715$$

$$\therefore \text{mean} = \frac{\sum fi\ xi}{n} = \frac{1715}{60} = 28.5$$

---

26. The following table gives the mark scored by 50 students in an entrance examination:

Mark	0-20	20-40	40-60	60-80	80-100
no of students	7	6	13	16	8

From this table find:
(i) the less than series and
(ii) the more than series.

Ans. (i) Less than cumulative frequency table.

mark obtained	number of students (Cumulative frequency
less then 20	7
less then 40	13
less then 60	26
less then 80	42
less then 100	50

(ii) More than cumulative frequency table.

mark obtained	number of students (Cumulative frequency
More then 0	50
more then 20	43
More then 40	37
more then 60	24
more then 80	8
more then 100	0

---

27. Find the sum of the deviations of the various values 3, 4, 6, 8, 14 from their mean.

Ans. Recall that the deviations of the values x_1, x_2, x_3 …… x_n about A are

X_1,-A, x_2-A, x_3-A ……. X_n–A.

Let $\bar{X}$ be the deviations of the values 3, 4, 6, 8, 14. Then,

$\bar{X}$ =

$$\frac{3+4+6+8+14}{5} = \frac{35}{5} = 7$$

Now sum of the deviations of the values 3, 4, 6, 8, and 14. From their mean $\bar{X}$ = 7 is given by (3-7) + (4-7) + (6-7) + (8-7) + (14-4) = -4-3-1+1+7 =0

---

28. The mean of 40 observations was 200. It was detected on rechecking that the value of 65 was wrongly copied as 25 for computation of mean. Find the correct mean.

Ans. Hence n=40 $\bar{X}$ =200

So $\bar{X}$ = $\frac{1}{n}$

$$(\sum x_i) \Rightarrow 200=\frac{1}{40}(\sum x_i)$$

$$\sum x_i = 200\times 40$$

=8000

$\therefore$ Incorrect value of $\sum x_i = 8000$

Now correct value of $\sum x_i$ = incorrect value of

$$\sum x_i - incorrect \text{ item} + \text{correct item}$$

=8000-25+65

=8040

$$\therefore \text{ correct mean} = \frac{8040}{40}$$

=201

---

29. It $\bar{X}$ is the mean of n observation $x_1, x_2 \ldots\ldots x_n$, then prove that

$$\sum_{i=1}^{n}(X_i - \bar{X}) = 0$$

i.e. the algebraic sum of deviations from mean is zero.

Ans. We have $\bar{X} = \frac{1}{n}\left[\sum_{i=1}^{n} x_i\right]$

$$\Rightarrow n\bar{X} = \sum_{i=1}^{n} x_i \quad \rightarrow \text{(i)}$$

Now,

$$\sum_{i=1}^{n}(x_i - \bar{X}) = (x_i - \bar{X}) + (x_2 - \bar{X}) + \ldots\ldots + (x_n - \bar{X})$$

$$= (x_1 + x_2 + ... + x_n) - n\bar{X}$$

$$= \sum_{i=1}^{n} x_i - n\bar{X}$$

$$= n\bar{X} - n\bar{X} \qquad [\text{Using}]$$

=0

$$\text{Hence } \sum_{i=1}^{n} (x_i - \bar{X}) = 0$$

---

3 Marks Quetions

1. Find the median of the following data

19, 25, 59, 48, 35, 31, 30, 32, 51. If 25 is replaced by 52, what will be the new median.

Ans. 32, 35

---

2. If the mean of the following distribution is 6, then find the value of p.

x	2	4	6	10	p+5
f	3	2	3	1	2

Ans. 7

---

3. If the mean of five observations x, x+2, x+4, x+6, x+8 is 11 find the mean of first three observations.

Ans. 9

---

4. The mean of 5 numbers is 18. If one number is excluded, their mean is 16, find the excluded number.

Ans. 26

---

5. The following observations have been arranged in ascending order. If the median of the data is 63, find the value of x.

29, 32, 48, 50, x, x+2, 72, 78, 84, 95

Ans. 62

---

6. (i) Find the mean of the following data: 25, 27, 19, 29, 21, 23, 25, 30, 28, 20.

Show that the sum of deviation of all the observations from the mean is zero.

(ii) Find the median of the data given above.

Ans. (i) Mean =

$$\bar{x} = \frac{25+27+19+29+21+23+25+30+28+20}{10}$$

$$= \frac{247}{10} = 24.7$$

Sum of the deviations of all the observations from the mean $= \sum_{i=1}^{10}(x_i - \bar{x})$

$$\begin{aligned}&=(25-24.7)+(27-24.7)+(19-24.7)+(27-24.7)+\\&(23-24.7)+(25-24.7)+(30-24.7)+(28-24.7)+(20-24.7)\\&=0.3+2.3-5.7+4.3-2.7-1.7+0.3+5.3+3.3-4.7=0\end{aligned}$$

(ii) Arranging the data in ascending order: 19, 20, 21, 23, 25,25, 27, 28, 29, 30

Here, n = 10 $even number$

$$\therefore Median = \frac{\left[\frac{n}{2}\right]^{th} \text{ observation} + \left[\frac{n}{2}+1\right]^{th} \text{ observation}}{2}$$

$$= \frac{5^{th} \text{ observation} + 6^{th} \text{ observation}}{2} = \frac{25+25}{2} = 25$$

---

7. If the mean of the following data is 21. Find the value of P.

X 7 15 28 5 1

Y 8 20 P 3 2

Ans.

x_i	f_i	$x_i f_i$
7	8	56
15	20	300
28	P	28P
5	3	15
1	2	2
total	33+p	373+28p

$$\sum f_i = 33 + P \qquad \sum x_i f_i = 373 + 28P$$

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

$$21 = \frac{373 + 28P}{33 + P}$$

$$21 \times 33 + 21P = 373 + 28P$$

$$693 + 21P = 373 + 28P$$

$$693 - 373 = 28P - 21P$$

$$320 = 7P$$

$$P = 320/7$$

$$\therefore P = 45.7$$

---

8. In a mathematics test given to 10 students, the following marks $outof 100$ are recorded as: 82, 41, 39, 52, 53, 45, 96, 47, 50, 60.

Find out the mean & median of the above marks.

Ans. The given observation are

82, 41, 39, 52, 53, 45, 96, 47, 50, 60

Sum of 10 observations = 82+ 41+39+52+53+ 45+ 96+ 47+ 50 +60

$$\Rightarrow n\bar{x} = x_1 + x_2 + x_3 - - - - - - - - - + x_n - - - - - - - (1)$$

$$\therefore Mean = \frac{Z}{10} = \frac{565}{10} = 56.5$$

Arranging the given observation in ascending order:

39, 41, 45, 47, 50, 52, 53, 60, 82, 96

Here, n = 10 $evenno$.

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

$$= \frac{5^{th}\ observation + 6^{th} observation}{2}$$

$$= \frac{50+52}{2} = \frac{102}{2} = 51$$

---

9. The following is the monthly expenditure (Rs.) of ten families of the particular area:

145, 115, 129, 135, 139, 158, 170, 175, 188, 163

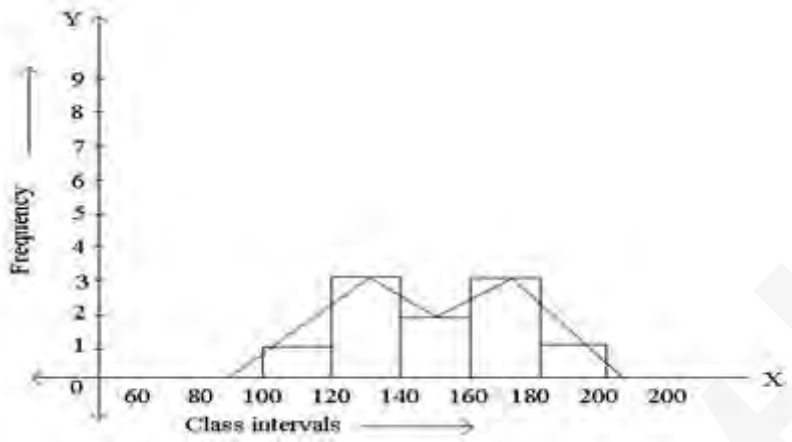
(a) Make a frequency distribution table by using the following class interval:

100 – 120, 120 – 140, 140 – 160, 160 – 180, 180 – 200.

(b) Construct a frequency polygon for the above frequency distribution.

Ans.

Frequency Distribution		
Class intervals	Tally Marks	Frequency
100 – 120	I	1
120 – 140	III	3
140 – 160	II	2
160 – 180	III	3
180 – 120	I	1
Total		10



10. The mean of 5 numbers is 39. If one number is excluded, their mean is 35, find the excluded number.

Ans. The mean of 5 numbers = 39

∴ The sum of five numbers = $39 \times 5 = 195$

The mean of 4 numbers = 35

∴ The sum of four numbers = $35 \times 4 = 140$

Thus,

∴ The excluded numbers = Sum of five numbers – Sum of four numbers

= 195 – 140 = 55

11. If the mean of 8 observation x, x + 1, x + 3, x + 4, x + 5, x + 6, x + 7 is 50, find the mean of first 5 observation

Ans. Mean = $\bar{x} = \frac{\sum x_i}{n}$

$$\bar{x} = \frac{x+(x+1)+(x+2)+(x+3)+(x+4)+(x+5)+(x+6)+(x+7)}{8}$$

$$50 = \frac{8x+28}{8}$$

$$400 - 28 = 8x$$

$$\therefore x = \frac{372}{8} = 46.5$$

∴ The given set of 8 observations is

46.5, 47.5, 48.5, 50.5, 49.5, 51.5, 52.5, 53.5

So, the mean of first 5 observations is given by

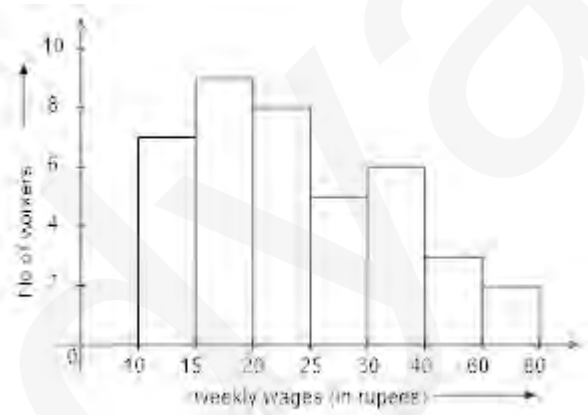
$$\bar{x} = \frac{46.5+47.5+48.5+49.5+50.5}{5} = \frac{242.5}{5} = 48.5$$

---

12. Represent the following data by means of histogram.

weekly wages (in R's)	10-15	15-20	20-25	25-30	30-40	40-60	60-80
no. of workers (frequency)	7	9	8	5	12	12	8

Ans.



The adjusted frequency

10-15	7	5/5 × 7 = 7
15-20	9	5/5 × 9 = 9
20-25	8	5/5 × 8 = 8
25-30	5	5/5 × 5 = 5
30-40	12	5/10 × 6 = 6
40-60	12	5/20 × 12 = 3
60-80	8	5/20 × 8 = 2

---

13. The Mean monthly salary of 10 members of a group is Rs 1445, one more member whose monthly salary is Rs 1500 has joined the group. Find mean monthly salary of 11 member of the group.

Ans. Here n = 10, $\bar{X}$ = 1445

So,

$$\bar{X} = \frac{1}{n}(\sum x_i) \Rightarrow n\bar{X} = \sum x_i$$

$$\Rightarrow 10 \times 1445 = \sum x_i$$

$$\Rightarrow \sum x_i = 14450$$

So, total monthly wages of 10 person Rs = 14450

Monthly salary wages of one more person who joined the group is 1500.

$\therefore$ total monthly wages of 11 persons =Rs 14450+1500=Rs 15950

So, average monthly salary to 11 parson

$$= \frac{total\ monthly\ \text{wages}}{11}$$

$$= \frac{15950}{11} = \text{Rs } 1450.$$

---

14. The sum of the deviations of a set of n values

$$x_1, x_2 ------ x_n$$

measured from 50 is –10 and the sum of deviation of the values from 46 is 70. Find the values of n and the mean.

Ans. We have

$$\sum_{i=1}^{n} (x_1 - 50) = -10$$

and

$$\sum_{i=1}^{n} (x_i - 46) = 70$$

$$\Rightarrow \sum_{i=1}^{n} xi - 50n = 10 \quad \rightarrow \quad (i)$$

And

$$\sum_{i=1}^{n} X_i - 46n = 70 \quad \rightarrow \text{(ii)}$$

subtracting (ii) from (i), we get -4n=-80

= n = 20

Putting n = 20 in (i), we get

$$\sum_{i=1}^{n} (X_i - 50 \times 20 = -10$$

$$\Rightarrow \sum_{i=1}^{n} X_i = 990$$

$$\therefore mean = \frac{1}{n}\left[\sum_{i=1}^{n} X_i\right] = \frac{990}{20}$$

=49.5

hence, n=20 and mean =49.5

---

15. There are 50 students in a class out of which 40 are boys and rest girls. The average weight of the class is 44 kg and the average weight of the girls is 40 kg. Find the average weight of the boys.

Ans. We have: n = No. of students in a class = 50

n_1= No. of boys in a class = 40

n_2= No. of girls in a class = 10

$\bar{X}_1$ = Average weight of boys =?

$\bar{X}_2$ = Average weight of girls = 40 kg

$\therefore$

$$\bar{X} = \frac{n_1\bar{X}_1 + n_2 + \bar{X}_2}{n_1 + n_2}$$

$$\Rightarrow 44 = \frac{40x_1 + 10 \times 40}{40 + 10}$$

$$\Rightarrow 50\times 44 = 40\bar{X}_1 + 400$$

$$\Rightarrow 2200 = 40\bar{X}_1 + 400$$

$\Rightarrow \bar{X}_1 = 45$

Hence, the average weight of boys is 45 Kg

---

16. The means of 100 items was found to be 300. If at the time of calculation two items were wrongly taken as 32 and 12 instead of 23 and 11, find the correct mean.

Ans. Here, n = 100, $\bar{X}$ = 30

So, $\bar{X}$ =

$$\frac{1}{n}\left(\sum x_i\right) \Rightarrow \sum x_i = n\bar{X}$$

$$\Rightarrow \sum x_i = 100\times 30$$

=3000

$$\therefore \quad \text{Incorrect value of } \sum x_i = 3000$$

$$Now, \text{ correct value of } \sum x_i = \text{ Incorrect value of } \sum x_i - (\text{sum of incorrect value}) + (sum \text{ of correct value})$$

= 3000 - (32+12) + (23+11)=2990

$$\therefore \text{Correct mean} =$$

$$\frac{Correct \text{ value of } \sum x_i}{n} = \frac{2990}{100}$$

=29.9

---

17. The mean of 10 numbers is 20. If 8 is subtracted from every number, what will be the mew

mean?

Ans.

$$Let \ x_1, x_2, \ldots x_{10}$$

be 10 numbers with their mean equal to 20.

Then,

$$\bar{X} = \frac{1}{n}\left(\sum x_i\right)$$

$$20 = \frac{x_1 + x_2 + ... + x_{10}}{10}$$

$$\Rightarrow 200 = x_1 + x_2 + ... + x_{10}$$

…(i)

New numbers are

$$x_1 - 5,\ x_2 - 5, ... x_{10} - 5.$$

Let $\bar{X}$ be the mean of new number.

$$\bar{X} = \frac{(x_1 - 5) + (x_2 - 5) + ... + (x_{10} - 5)}{10}$$

$$\bar{X} = \frac{(x_1 + x_2 + ... + x_{10}) - 5 \times 10}{10}$$

…(i)

$$= \frac{200 - 50}{10} = 15$$

---

18. The mean of n observation $x_1,\ x_2 ..... x_n$, is $\bar{X}$ If (a-b) is added to each of the observation, show that the mean of the new set of observation is $\bar{X}$ + (a-b).

Ans. We have:

$$\bar{X} = \frac{x_1 + x_2 + ... + x_n}{n} \quad \rightarrow \quad \text{(i)}$$

Let $\bar{X}$ be the mean of

$$x_1 + (a-b),\ x_2 + (a-b), ... x_n + (a-b).\ \text{Then,}$$

$$\bar{X} = \frac{[x_1 + (a-b)] + [x_2 + (a-b)] + ... + [x_n + (a-b)]}{n}$$

$$= \frac{x_1 + x_2 + ... + x_n + n(a-b)}{n}$$

$$= \frac{x_1 + x_2 + ... + x_n}{n} + \frac{n(a-b)}{n}$$

$= \bar{X} + (a-b)$ $using\ (\ i\ )$

---

19. If x_1, x_2 …….x_n are n values of a variable x such that

$$\sum_{i=1}^{n}(x_i - 2) = 110$$

and $\sum_{i=1}^{n}(x_i - 5)$ **. Find the value of and the mean.**

Ans. We have:

$$\sum_{i=1}^{n} x_i - 2 = 110$$

and

$$\sum_{i=1}^{n} X_i - 5 = 20$$

$$\Rightarrow \quad (x_1 - 2) + (x_2 - 2) + ... + (x_n - 2) = 110$$

And

$$\Rightarrow (x_1 - 5) + (x_2 - 5) + ... + (x_n - 5) = 20$$

$$\Rightarrow (x_1 + x_2 + ... + x_n) - 2n = 110$$

and

$$(x_1 + x_2 + ... + x_n) - 5n = 20$$

$$\Rightarrow \sum_{i=1}^{n} x_i - 2n = 110$$

and $\sum_{i=1}^{n} x_i - 5n = 20$

S-2n =110 and S-5n=20

Thus, we have S-2n=110 ….(i)

And S-5n=20 ….(ii)

Subtracting (ii) from (i), we get:

3n-90 =90

=n=30

Putting n =30 in (i), we get:

S-60 =110

$$S=170 \Rightarrow \sum_{i=1}^{n} x_i = 170$$

$$\therefore \quad \text{mean} = \frac{1}{n}\left[\sum_{i=1}^{n} x_i\right]$$

$$= \frac{170}{30} = \frac{17}{3}$$

Hence, n =30 and mean $= \frac{17}{3}$

---

20. Find the missing frequencies in the following frequency distribution shown that the mean of the distribution is 1.46.

number of accidents (x) :	0	1	2	3	4	5	total
frequency (f) :	46	?	?	25	10	5	200

Ans. Let the missing frequencies be f_1 and f_2

x_i	f_i	f_ix_i
0	46	0
1	f_1	f_1
2	f_2	$2f_2$
3	25	75
4	10	40
5	5	25
	$\sum f_i=86+f_1+f_2$	$\sum f_ix_i=140+f_1+2f_2$

We have: N = 200

$$\therefore 200 = 86 + f_1 + f_2$$

$114 = f_1 + f_2$ (i)

Also, Mean = 1.46

$$\Rightarrow 1.46 = \frac{\sum f_i x_i}{N}$$

$$\Rightarrow 1.46 = \frac{140 + f_1 + 2f_2}{200}$$

$$\Rightarrow 292 = 140 + f_1 + 2f_2$$

$$\Rightarrow 152 = f_1 + 2f_2 \qquad \text{(ii)}$$

Solving (i) and (ii), we get

$$f_1 = 76 \text{ and } f_2 = 38$$

---

21. Give some examples of data that you can collect from your day to day life.

Ans. Some examples of data that we can gather from our day to day life are:

(i) Number of students in our class.

(ii) Number of fans in our school.

(iii) Electricity bills of our house for last two years.

(iv) Election results obtained from television or newspapers.

(v) Literacy rate figures obtained from Educational Survey.

(vi) Heights of 20 students of our class.

(vii) Maximum temperatures of the days of a particular week from television.

(viii) Number of members in the families of your locality from a record.

(ix) Distances from the school of the homes of ten students.

---

22. Classify the data in Q.1 above as primary or secondary data.

Ans. Primary data: When the information was collected by the investigator herself or himself with a definite objective in her or his mind, the data obtained is called Primary data.These types of data are original in character and collected for the first time for their own use.

Above mentioned (i), (ii), (iii), (iv) and (ix) are the examples of primary data.

Secondary data: When the information was gathered from a source (like newspapers, television or some records) which already had the information stored is called Secondary data. Such data has been collected by someone else in another context needs to be used with great care. These data are collected for a purpose other than that of original investigator.

Above mentioned (iv), (v), (vii) and (viii) are the examples of secondary data.

---

23. The blood groups of 30 students of a class VIII are recorded as follows:

A, B, O, O, AB, O, A, O, B, A, O, B, A, O, O, A, AB, O, A, A, O, O, AB, B, A, O, B, A, B, O

Represent this data in the form of a frequency distribution table. Which is the most common and which is the rarest blood group among these students?

Ans. The frequency distribution table for the given data is as follows:

Blood group	Tally Marks	Frequency (Number of students)
A	𝍸 | | | |	9
B	𝍸 |	6
O	𝍸 𝍸 | |	12
AB	| | |	3
Total		30

From the table we observe that most common blood groups is O and the rarest group is AB.

---

24. Distance (in km) of 40 engineers from their place of residence to their place of work were found as follows:

5	3	10	20	25	11	13	7	12	31
19	10	12	17	18	11	32	17	16	2
7	9	7	8	3	5	12	15	18	3
12	14	2	9	6	15	15	7	6	12

Construct a grouped frequency distribution table with class size 5 for the data given above taking the first interval as 0 – 5 (5 not included). What main features do you observe from this tabular representation?

Ans. The grouped frequency distribution table for the given data is as follows:

Distances	Tally Marks	Frequency (Number of female engineer's)
0-5	𝍸	5
5-10	𝍸 𝍸 |	11
10-15	𝍸 𝍸 |	11
15-20	𝍸 | | | |	9
20-25	|	1
25-30	|	1
30-35	| |	2
Total		40

From the table we observe that out of 40 female engineers 36 (5 +11 + 11 + 9) engineers i.e. 90% of the total female engineers reside less than 20 km from their place of work.

---

25. The relative humidity (in %) of a certain city for a month of 30 days was as follows:

98.1	98.6	99.2	90.3	86.5	95.3	92.9	96.3	94.2	95.1
89.2	92.3	97.1	93.5	92.7	95.1	97.2	93.3	95.2	97.3
96.2	92.1	84.9	90.2	95.7	98.3	97.3	96.1	92.1	89

(i) Construct a grouped frequency distribution table with classes 84 – 86, 86 – 88 etc.
(ii) Which month or season do you think this data is about?
(iii) What is the range of this data?

Ans. (i) The grouped frequency distribution table for the given data is as follows:

(ii) From the data we observe that relative humidity is high. So data appears to be taken in the rainy season.

(iii) From the data, we observe that

Highest relative humidity = 99.2%

Lowest relative humidity = 84.9%

Range = (99.2 – 84.9) % = 14.3%

---

26. The heights of 50 students, measured to the nearest centimeters have been found to be as follows:

161	150	154	165	168	161	154	162	150	151
162	164	171	165	158	154	156	172	160	170
153	159	161	170	162	165	166	168	165	164
154	152	153	156	158	162	160	161	173	166
161	159	162	167	168	159	158	153	154	159

(i) Represent the data given above by a grouped frequency distribution table, taking the class – intervals as 160 – 165, 165 – 170 etc.

(ii) What can you conclude about their heights from the table?

Ans. (i) The grouped frequency distribution table for the given data is as follows:

Distances	Tally Marks	Number of students Frequency)
150-155	𝍸 𝍸 | |	12
155-160	𝍸 | | | |	9
160-165	𝍸 𝍸 | | | |	14
165-170	𝍸 𝍸	10
170-175	𝍸	5
Total		50

(ii) From the frequency distribution table drawn above, we conclude that more than 50% of the students are shorter than 165 cm.

---

27. A study was conducted to find out the concentration of sulphur dioxide in the air in parts per million (ppm) of a certain city. The data obtained for 30 days is as follows:

0.03	0.08	0.08	0.09	0.04	0.17
0.16	0.05	0.02	0.06	0.18	0.20
0.11	0.08	0.12	0.13	0.22	0.07
0.08	0.01	0.10	0.06	0.09	0.18
0.11	0.07	0.05	0.07	0.01	0.04

(i) Make a grouped frequency distribution table for this data with class intervals as 0.01 – 0.04, 0.04 – 0.08 and so on.

(ii) For how many days, was the concentration of Sulphur dioxide more than 0.11 parts per million.

Ans. (i) The minimum and maximum concentration of Sulphur dioxide in the air in parts per million is 0.01 and 0.22 respectively.

It is given that 0.00 – 0.04 is one of the class intervals and the class size is the same.

So, the classes of equal size are

0.00 – 0.04, 0.04 – 0.08, …., 0.20 – 0.24

Thus, the frequency distribution table is as under:

Concentration of Sulphur dioxide (in ppm)	Frequency
0.00 – 0.04	4
0.04 – 0.08	9
0.08 – 0.12	9
0.12 – 0.16	2
0.16 – 0.20	4
0.20 – 0.24	2
Total	30

(ii) The concentration of Sulphur dioxide was more than 0.11 ppm for 8 days.

---

28. Three coins were tossed 30 times simultaneously. Each time the number of heads occurring was noted down as follows:

0	1	2	2	1	2	3	1	3	0
1	3	1	1	2	2	0	1	2	1
3	0	0	1	1	2	3	2	2	0

Ans. Prepare a frequency distribution for the data given above.

Number of heads	Number of times (frequency)
0	6
1	10
2	9
3	5
Total	30

---

29. The value of π up to 50 decimal places is given below:

3.1415926535 8979323846 2643383279 5028841971 6939937510

(a) Make a frequency distribution of the digits after the decimal point list the digits from 0 to 9 in your first column.

(b) What are the most and the least frequency occurring digits?

Ans. (i) The frequency distribution table is as under:

Digits	Frequency
0	2
1	5
2	5
3	8
4	4
5	5
6	4
7	4
8	5
9	8
Total	50

(ii) The most frequently occurring digits are 3 and 9. The least occurring is 0.

---

30. Thirty children were asked about the number of hours they watched TV programmers in the previous week. The results were found as follows:

1	**6**	**2**	**3**	**5**	**12**	**5**	**8**	**4**	**8**
10	**3**	**4**	**12**	**2**	**8**	**15**	**1**	**17**	**6**
3	**2**	**8**	**5**	**9**	**6**	**8**	**7**	**14**	**12**

(i) Make a grouped frequency distribution table for this data, taking class width 5 and one of the class interval 5 – 10.

(ii) How many children watched television for 15 or more hours a week?

Ans. (i) The minimum and maximum number of hours children watched TV programmers in the previous week are 1 hour and 17 hours, respectively. It is given that 5 – 10 is one of the class intervals and the class size is same. So, the classes of equal size are 0 – 5, 5 – 10, 10 – 15, 15 – 20.

Thus, the frequency distribution table is as under.

Number of heads	Frequency
0 – 5	10
5 – 10	13
10 – 15	5
15 – 20	2
Total	30

(ii) 2 children watched television for 15 or more hours a week.

---

31. A company manufactures car-batteries of particular type. The live (in years) of 40 such batteries were recorded as follows:

2.6	3.0	3.7	3.2	2.2	4.1	3.5	4.5
3.5	2.3	3.2	3.4	3.8	3.2	4.6	3.7
2.5	4.4	3.4	3.3	2.9	3.0	4.3	2.8
3.5	3.2	3.9	3.2	3.2	3.1	3.7	3.4
4.6	3.8	3.2	2.6	3.5	4.2	2.9	3.6

Construct a grouped frequency distribution table for this data, using class intervals of size 0.5 starting from the interval 2 – 2.5.

Ans. The minimum and maximum life in number of years of car batteries are 2.2 years and 4.6 years. It is given that 2 – 2.5 is one of the class interval with uniform size of 0.5. So, the classes of equal size are 2.0 – 2.5, 2.5 – 3.0, 3.0 – 3.5, ……, 4.5 – 5.0.

Thus, the frequency distribution table is as under:

Life of batteries (in years)	Frequency
2.0 – 2.5	2
2.5 – 3.0	6
3.0 – 3.5	14
3.5 – 4.0	11
4.0 – 4.5	4
4.5 – 5.0	3
Total	30

---

4 Marks Quetions

1. Find the value of x and y in following distribution if it known that the mean of the distribution is 1.46.

No. of accidents	0	1	2	3	4	5	Total
Frequency	46	X	Y	25	10	5	200

Ans. X = 76, y = 38

---

2. The mean monthly salary of 10 members of a group is Rs. 1445, one more member whose monthly salary is Rs. 1500 has joined the group. Find the mean monthly salary of 11 members of the group.

Ans. 1450

---

3. Given below is a cumulative frequency distribution table showing the age of people living in a locality.

Age in years	No. of persons
Above 108	0
Above 96	1
Above 84	3
Above 72	5
Above 60	20
Above 48	158
Above 36	427
Above 24	809
Above 12	1026
Above 0	1124

Prepare a frequency distribution table.

Ans.

Age	0-12	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108
Person	98	217	382	269	138	15	2	2	1

Question for self-evaluation

4. If $x, x_2 \ldots\ldots x_n$ **are n values of a variable X such that**

$$\sum_{i=1}^{n}(x_1 - 2) = 110 \; and \; \sum_{i=1}^{n}(x_1 - 5) = 20$$

find the value of n and mean.

Ans. N = 30, mean = $\frac{17}{3}$

---

5. The mean of 200 items was 50. Later on, it was discovered that the two items were misread as 92 and 8 instead of 192 and 88. Find the correct mean.

Ans. 50.9

---

6. Find the value of p, if the mean of following distribution is 20.

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

Ans. 1

---

7. Prove that the sum of the deviations of individual's observations from the mean is zero.

Ans. Let x_1, x_2, x_3, -------, x_n be n individual's observations whose mean is . The sum of the deviations of these n observations from is given by

Since mean of n observation x_1, x_2, x_3, -------, x is given as

= 0

Hence proved.

---

8. From the data given below find:

(a) Lower limit of the third class

(b) Upper limit of the seventh class.

(c) Class boundaries of the sixth class.

(d) The class mark of the fifth class.

(e) The size of the second class

(f) Draw histogram of the data.

Ans. (a) Lower limit of the third class =250

(b) Upper limit of the seventh class. = 500

(c) Class boundaries of the sixth class. = 400 – 450

(d) The class mark of the fifth class. = 375

(e) The size of the second class = 50

(f) Histogram

---

9. Draw a histogram with frequency polygon for the following data:

Ans. Ascertainment of lower and upper class limits: since the difference between the second and first mid-points is 25-29

Let h=1

Then for continuous frequency distribution, we subtract from lower limit and Add to upper limit.

---

10. The average score of girls in class examination in a school is 67 and that of boys is 63. The average score for the whole class is 64.5 find the percentage of girls and boys in the class.

Ans. Let the number of girls and boys be n_1 and n_2 respectively.

We have:

Average score of girls =67

Average score of boys =63

Average score of the whole class=64.5

Total number of students in the class

percentage of girls

And percentage of boys,

= 62.5

---

11. Find the unknown entries (a, b, c, d, e, f) from the following frequency distribution of heights of 50 students in a class.

Ans. Since the given frequency distribution is the frequency distribution of 50 students.

Therefore, g = 50

From the table, we have

a = 12, b + 12 = 25, 12 + b + 10 = c, 12 + b + 10 + d = 43,

12 + b + 10 + d + e = 48 and 12 + b + 10 + d + e + g = f

Now,

b + 12 = 25 ⇒ b = 13

12 + b + 10 = c

⇒ 12 + 13 + 10 = c [∵ b = 13]

⇒ c = 35

12 + b + 10 + d = 43

⇒ 12 + 13 + 10 + d = 43 [∵ b = 13]

⇒ d = 8

12 + b + 10 + d + e = 48

⇒ 12 + 13 + 10 + 8 + e = 48 [∵ b=13, d= 8]

⇒ e = 5

and 12 + b + 10 + d + e + 2 = f

⇒ 12 + 13 + 10 + 8 + 5 + 2 = f

and f = 50

Hence, a = 12,
b = 13,
c = 35,
d = 8,
e = 5,
f = 50