RD SHARMA Solutions for Class 9 Maths Chapter 24 - Measures of Central Tendency

Chapter 24 - Measures of Central Tendency Exercise 24.21

Question 1

Which one of the following is not a measure of central value?

(a) Mean
(b) Range
(c) Median
(d) Mode

Solution 1

Range is not a measure of central value.
The difference between the highest value and the lowest value in the data set is called Range.
Hence, correct option is (b).

Question 2

The mean of n observations is $\overline{X}$. If k is added to each observation, then new mean is

(a) $\overline{X}$
(b) $\overline{X} + k$
(c) $\overline{X} - k$
(d) $k\overline{X}$

Solution 2

$$\text{Mean} = \overline{X} = \frac{\text{Sum of all observations}}{\text{Total number of observations}} = \frac{\text{Sum of all observations}}{n}$$

Now if k is added to each observation

$$\text{New mean, } \overline{X'} = \frac{\text{Sum of all observations} + nk}{n} = \frac{\text{Sum of all observations}}{n} + k$$

$$\Rightarrow \overline{X'} = \overline{X} + k$$

Hence, correct option is (b).

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Question 3

The mean of n observations is $\overline{X}$. If each observation is multiplied by k, the mean of new observations is

(a) $k\overline{X}$
(b) $\dfrac{\overline{X}}{k}$
(c) $\overline{X} + k$
(d) $\overline{X} - k$

Solution 3

Mean, $\bar{X}$ = $\dfrac{\text{Sum of all observations}}{\text{Total number of observations}}$ = $\dfrac{\text{Sum of all observations}}{n}$

If each observation is multiplied by k, then

New mean, $\bar{X'}$ = $\dfrac{(\text{Sum of all observations}) \, k}{n}$

$\Rightarrow \bar{X'} = k\bar{X}$

Hence, correct option is (a).

Question 4

The mean of a set of seven numbers is 81. If one of the numbers is discarded, the mean of the remaining numbers is 78. The value of discarded number is

(a) 98
(b) 99
(c) 100
(d) 101

Solution 4

Mean = 81 = $\dfrac{\text{Sum of Seven numbers}}{7}$

$\Rightarrow$ Sum of Seven numbers = $81 \times 7 = 567$

Let the discarded number be x.

$\Rightarrow$ Sum of 6 numbers = $567 - x$

Now, mean of remaining 6 numbers = $\dfrac{567 - x}{6} = 78$

$\Rightarrow 567 - x = 468$

$\Rightarrow x = 99$

So, discarded number is 99.

Hence, correct option is (b).

Question 5

For which set of numbers do the mean, median and mode all have the same value?

(a) 2, 2, 2, 2, 4
(b) 1, 3, 3, 3, 5
(c) 1, 1, 2, 5, 6
(d) 1, 1, 1, 2, 5

Solution 5

Mean	Median	Mode
2, 2, 2, 2, 2, 4 $\dfrac{12}{5} = 2.4$	2	2

Data	Mean	Median	Mode
1, 3, 3, 3, 5	$15/5 = 3$	3	3
1, 1, 2, 5, 6	$15/5 = 3$	2	1
1, 1, 1, 2, 5	$10/5 = 2$	1	1

From above table, data 1, 3, 3, 3, 5 has mean, median, mode all have same value, i.e. 3. Hence, correct option is (b).

Question 6

For the set of numbers 2, 2, 4, 5 and 12, which of the following statements is true?
(a) Mean = Median
(b) Mean > Mode
(c) Mean < Mode
(d) Mode = Median

Solution 6

2, 2, 4, 5, 12
Median = 4
Mode = 2
Mean $= \dfrac{2+2+4+5+12}{5} = \dfrac{25}{5} = 5$
Hence (Mean = 5) > (Mode = 2)
Hence, correct option is (b).

Question 7

If the arithmetic mean of 7, 5, 13, x and 9 is 10, then the value of x is

(a) 10
(b) 12
(c) 14
(d) 16

Solution 7

$$\text{Mean} = \frac{7+5+13+x+9}{5} = 10$$

$\Rightarrow 34 + x = 50$

$\Rightarrow x = 16$

Hence, correct option is (d).

Question 8

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

(a) 9
(b) 11
(c) 13
(d) none of these

Solution 8

$$\text{Mean of first five observations} = \frac{x+x+2+x+4+x+6+x+8}{5} = 11$$

$\Rightarrow 5x + 20 = 55$

$\Rightarrow x = 7$

$\Rightarrow$ First three numbers are 7, 9, 11

$$\text{Mean} = \frac{7+9+11}{3} = \frac{27}{3} = 9$$

Hence, correct opion is (a).

Question 9

Mode is
(a) least frequent value
(b) middle most value
(c) most frequent value
(d) none of these

Solution 9

Most Frequent value is called mode.
Hence, correct option is (c).

Question 10

The following is the data of wages per day: 5, 4, 7, 5, 8, 8, 8, 5, 7, 9, 5, 7, 9, 10, 8
The mode of the data is

(a) 7
(b) 5
(c) 8
(d) 10

Solution 10

In data 5, 4, 7, 5, 8, 8, 8, 5, 7, 9, 5, 7, 9, 10, 8,
We observe that values 5 and 8 both have maximum frequency i.e. 4
So, 5 and 8, both are mode of this data.

Question 11

The median of the following data: 0, 2, 2, 2, -3, 5, -1, 5, 5, -3, 6, 6, 5, 6 is

(a) 0

(b) -1.5

(c) 2

(d) 3.5

Solution 11

Data: 0, 2, 2, 2, −3, 5, −1, 5, 5, −3, 6, 6, 5, 6
Rearranging data in increasing order, we have
−3, −3, −1, 0, 2, 2, 2, 5, 5, 5, 5, 6, 6, 6
Number of observations = n = 14 (even)

$$\text{Now, median} = \frac{\left(\frac{n}{2}\right)^{th} \text{observation} + \left(\frac{n+1}{2}\right)^{th} \text{observation}}{2}$$

$$= \frac{7^{th} \text{observation} + 8^{th} \text{observation}}{2}$$

$$= \frac{2+5}{2}$$

⇒ Median = 3.5
Hence, correct option is (d).

Question 12

The algebraic sum of the deviations of a set of n values from their mean is

(a) 0

(b) n - 1

(c) n

(d) n + 1

Solution 12

If $\bar{k}$ is the mean of n observations x_1, x_2, x_3, x_4 ....x_n.

$$\text{then algebraic sum of deviations} = \sum_{i=0}^{n} (x_i - \bar{x})$$

$$= \sum_{i=0}^{n} x_i - n\bar{x}$$

$$= n\left(\frac{\sum_{i=0}^{n} x_i}{n}\right) - n\bar{x}$$

$$= n\bar{x} - n\bar{x}$$

$$= 0$$

Hence, correct option is (a).

Question 13

A, B, C are three sets of values of x:

A: 2, 3, 7, 1, 3, 2, 3

B: 7, 5, 9, 12, 5, 3, 8

C: 4, 4, 11, 7, 2, 3, 4

Which one of the following statements is correct?

(a) Mean of A = Mode of C
(b) Mean of C = Median of B
(c) Median of B = Mode of A
(d) Mean, Median and Mode of A are equal.

Solution 13

Arranging data in ascending order, we have

A: 1, 2, 2, 3, 3, 3, 7

B: 3, 5, 5, 7, 8, 9, 12

C: 2, 3, 4, 4, 4, 7, 11

Mean of A $= \dfrac{1+2+2+3+3+3+7}{7} = \dfrac{21}{7} = 3$

Mean of B $= \dfrac{3+5+5+7+8+9+12}{7} = \dfrac{49}{7} = 7$

Mean of C $= \dfrac{2+3+4+4+4+7+11}{7} = \dfrac{35}{7} = 5$

Mode of A = 3	Median of A = 3
Mode of B = 5	Median of B = 7
Mode of C = 4	Median of C = 4

(Mean of A = 3) ≠ (Mode of C = 4)

(Mean of C = 5) ≠ (Median of B = 7)

(Median of B = 7) ≠ (Mode of A = 3)

Mean of A = 3, Mode of A = 3, Median of A = 3

Hence, correct option is (d).

Question 14

The empirical relation between mean, mode and median is
(a) Mode = 3 Median - 2 Mean
(b) Mode = 2 Median - 3 Mean
(c) Median = 3 Mode - 2 Mean
(d) Mean = 3 Median - 2 Mode

Solution 14

The empirical Relation between mean, median and mode is

Mode = 3 Median - 2 mean

Hence, correct option is (a).

Question 15

The mean of a, b, c, d and e is 28. If the mean of a, c, and e is 24, what is the mean of b and d?
(a) 31
(b) 32
(c) 33
(d) 34

Solution 15

$$\text{Mean} = \frac{a+b+c+d+e}{5} = 28$$

$$\Rightarrow a+b+c+d+e = 140 \quad ....(1)$$

$$\text{Also, Mean} = \frac{a+c+e}{3} = 24$$

$$\Rightarrow a+c+e = 72 \quad ....(2)$$

Subtracting equation (2) from (1), we have

$$b+d = 68$$

$$\text{Mean} = \frac{b+d}{2} = \frac{68}{2} = 34$$

Hence, correct option is (d).

Chapter 24 - Measures of Central Tendency Exercise Ex. 24.1

Question 1

If the heights of 5 persons are 140 cm, 150 cm, 152 cm, 158 cm and 161 cm respectively, find the mean height.

Solution 1

The heights of 5 persons are = 140 cm, 150 cm, 152 cm, 158 cm and 161 cm

$$\therefore \quad \text{Mean height} = \frac{\text{Sum of all heights}}{\text{Total no. of persons}}$$

$$= \frac{140 + 150 + 152 + 158 + 161}{5}$$

$$= \frac{761}{5}$$

$$= 152.2 \text{ cm}$$

Question 2

Find the mean of 994, 996, 998, 1002, and 1000.

Solution 2

Numbers are = 994, 996, 998, 1002 and 1000

$$\therefore \quad \text{Mean} = \frac{\text{Sum of numbers}}{\text{Total numbers}}$$

$$= \frac{994 + 996 + 998 + 1002 + 1000}{5}$$

$$= \frac{4990}{5}$$

$$= 998$$

Question 3

Find the mean of first five natural numbers.

Solution 3

The first five natural numbers be 1, 2, 3, 4, 5

$$\therefore \quad \text{Mean} = \frac{\text{Sum of numbers}}{\text{Total numbers}}$$

$$= \frac{1+2+3+4+5}{5}$$

$$= \frac{15}{5}$$

$$= 3$$

Question 4

Find the mean of all factors of 10.

Solution 4

All factors of 10 = 1, 2, 5, 10

$$\therefore \quad \text{Mean} = \frac{\text{Sum of all factors}}{\text{Total factor}}$$

$$= \frac{1+2+5+10}{4}$$

$$= \frac{18}{4}$$

$$= 4.5$$

Question 5

Find the mean of first 10 even natural numbers.

Solution 5

First 10 even natural numbers be = 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

$$\therefore \quad \text{Mean} = \frac{\text{Sum of all numbers}}{\text{Total number}}$$

$$= \frac{2+4+6+8+10+12+14+16+18+20}{10}$$

$$= \frac{110}{10}$$

$$= 11$$

Question 6

Find the mean of x, $x+2$, $x+4$, $x+6$, $x+8$.

Solution 6

Numbers be x, $x + 2$, $x + 4$, $x + 6$, $x + 8$.

$$\therefore \quad \text{Mean} = \frac{\text{Sum of numbers}}{\text{Total number}}$$

$$= \frac{x + x + 2 + x + 4 + x + 6 + x + 8}{5}$$

$$= \frac{5x + 20}{5}$$

$$= \frac{5(x + 4)}{5}$$

$$= x + 4$$

Question 7

Find the mean of first five multiples of 3.

Solution 7

First five multiples of 3 :
3, 6, 9, 12, 15

$$\therefore \quad \text{Mean} = \frac{\text{Sum of numbers}}{\text{Total number}}$$

$$= \frac{3 + 6 + 9 + 12 + 15}{5}$$

$$= \frac{45}{5}$$

$$= 9$$

Question 8

Following are the weights (in kg) of 10 new born babies in a hospital on a particular day:

3.4, 3.6, 4.2, 4.5, 3.9, 4.1, 3.8, 4.5, 4.4, 3.6. Find the mean $\bar{x}$.

Solution 8

The weights (in kg) of 10 new born babies
= 3.4, 3.6, 4.2, 4.5, 3.9, 4.1, 3.8, 4.5, 4.4, 3.6.

$$\therefore \quad \text{Mean} \left(\bar{x}\right) = \frac{\text{Sum of all weights}}{\text{Total babies}}$$

$$= \frac{3.4 + 3.6 + 4.2 + 4.5 + 3.9 + 4.1 + 3.8 + 4.5 + 4.4 + 3.6}{10}$$

$$= \frac{40}{10}$$

$$= 4 \text{ kg}$$

Question 9

The percentage of marks obtained by students of a class in mathematics are:

64, 36, 47, 23, 0, 19, 81, 93, 72, 35, 3, 1. Find their mean.

Solution 9

The percentage of marks obtained by students are

= 64, 36, 47, 23, 0, 19, 81, 93, 72, 35, 3, 1

$$\therefore \quad \text{Mean marks} = \frac{\text{Sum of all marks}}{\text{Total no. of students}}$$

$$= \frac{64 + 36 + 47 + 23 + 0 + 19 + 81 + 93 + 72 + 35 + 3 + 1}{12}$$

$$= \frac{474}{12}$$

$$= 39.5$$

Question 10

The numbers of children in 10 families of a locality are:
2, 4, 3, 4, 2, 0, 3, 5, 1, 1, 5. Find the mean number of children per family.

Solution 10

The numbers of children in 10 families are = 2, 4, 3, 4, 2, 3, 5, 1, 1, 5.

$$\therefore \quad \text{Mean number of children per family} = \frac{\text{Total no. of children}}{\text{Total families}}$$

$$= \frac{2 + 4 + 3 + 4 + 2 + 3 + 5 + 1 + 1 + 5}{10}$$

$$= \frac{30}{10}$$

$$= 3$$

Question 11

Explain, by taking a suitable example, how the arithmetic mean alters by (i) adding a constant k to each term, (ii) subtracting a constant k from each them, (iii) multiplying each term by a constant k and (iv) dividing each term by a non-zero constant k.

Solution 11

Suppose numbers be 3,4,5

$$\therefore \quad \text{Mean} = \frac{\text{Sum of numbers}}{\text{Total number}}$$

$$= \frac{3+4+5}{3}$$

$$= \frac{12}{3}$$

$$= 4$$

(i) Adding constant term $k = 2$ in each term

New numbers are $= 5, 6, 7$

$$\therefore \quad \text{New mean} = \frac{5+6+7}{3}$$

$$= \frac{18}{3} = 6 = 4+2$$

$\therefore$ **New mean will be 2 more than the original mean.**

(ii) Subtracting constant term $k = 2$ in each term

New numbers are $= 1, 2, 3$

$$\therefore \quad \text{New mean} = \frac{1+2+3}{3}$$

$$= \frac{6}{3} = 2 = 4-2$$

$\therefore$ **New mean will be 2 less than the original mean.**

(iii) Multiply by constant term $k = 2$ in each term

New numbers are $= 6, 8, 10$

$$\therefore \quad \text{New mean} = \frac{6+8+10}{3}$$

$$= \frac{24}{3} = 8 = 4 \times 2$$

$\therefore$ **New mean will be 2 times of the original mean.**

(ii) Divide by constant term $k = 2$ in each term

New numbers are = 1.5, 2, 2.5

$$\therefore \quad \text{New mean} = \frac{1.5 + 2 + 2.5}{3}$$

$$= \frac{6}{3} = 2 = \frac{4}{2}$$

$\therefore$ New mean will be half of the original mean.

Question 12

The mean of marks scored by 100 students was found to be 40. Later on it was discovered that a score of 53 was misread as 83. Find the correct mean.

Solution 12

Mean marks of 100 students = 40

$\Rightarrow$ Sum of marks of 100 students = $100 \times 40 = 4000$

Correct value = 53
InCorrect value = 83
Correct sum = 4000 − 83 + 53
            = 3970

$$\therefore \quad \text{Correct mean} = \frac{3970}{100}$$

$$= 39.7$$

Question 13

The traffic police recorded the speed (in km/hr) of 10 motorists as 47, 53, 49, 60, 39, 42, 55, 57, 52, 48. Later on an error in recording instrument was found. Find the correct average speed of the motorists if the instrument recorded 5 km/hr less in each case.

Solution 13

The speed of 10 motorists (in km/hr)

= 47, 53, 49, 60, 39, 42, 55, 57, 52, 48

Later on it was discovered that the instrument recorded 5 km/hr less in each case.

$\therefore$ Correct values are = 52, 58, 54, 65, 44, 47, 60, 62, 57, 53

$\therefore$ Correct mean $= \dfrac{52 + 58 + 54 + 65 + 44 + 47 + 60 + 62 + 57 + 53}{10}$

$$= \dfrac{552}{10}$$

$$= 55.2 \text{ km/hr}$$

Question 14

The mean of five numbers is 27. If one number is excluded, their mean is 25. Find the excluded number.

Solution 14

The mean of five numbers is 27.

Then, sum of five numbers = 5 × 27

                   = 135

If one number is excluded, then new mean is 25

$\therefore$ Sum of four numbers = 4 × 25

                        = 100

$\therefore$ Excluded number = 135 − 100

                        = 35

Question 15

The mean weight per student in a group of 7 students is 55 kg. The individual weights of 6 of them (in kg) are 52, 54, 55, 53, 56 and 54. Find the weight of the seventh student.

Solution 15

The mean weight per student in a group of 7 students = 55 kg.

Weights of 6 students (in kg) = 52, 54, 55, 53, 56 and 54.

Let Weight of 7th student = x kg

$$\therefore \quad Mean = \frac{Sum\ of\ all\ weights}{Total\ students}$$

$$\Rightarrow \quad 55 = \frac{52+54+55+53+56+54+x}{7}$$

$$\Rightarrow \quad 385 = 324 + x$$

$$\Rightarrow \quad x = 385 - 324$$

$$\Rightarrow \quad x = 61\ kg$$

$\therefore$ Weight of 7th student = 61 kg

Question 16

The mean weight of 8 numbers is 15. If each number is multiplied by 2, what will be the new mean?

Solution 16

We have,

The mean weight of 8 numbers is 15.

Then, the sum of 8 numbers = 8 × 15

= 120

If each number is multiplied by 2

Then, new sum = 120 × 2

= 240

$$\therefore \quad New\ mean = \frac{240}{8}$$

$$= 30$$

Question 17

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

Solution 17

The mean of 5 numbers is 18.

Then, the sum of 5 numbers = 5 × 18

$$= 90$$

If one number is excluded

Then, the mean of 4 numbers = 16

∴ Sum of 4 numbers = 4 × 16

$$= 64$$

∴ excluded number = 90 – 64

$$= 26$$

Question 18

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.

Solution 18

The mean of 200 items = 50.

Then, the sum of 200 items = 200 × 50

$$= 10000$$

Correct values = 192 and 88

Incorrect values = 92 and 8

∴ Correct sum = 10000 – 92 – 8 + 192 + 88

$$= 10180$$

∴ Correct mean = $\dfrac{10180}{200}$

$$= 50.9$$

Question 19

If M is the mean of x_1, x_2, x_3, x_4, x_5 and x_6, prove that
$(x_1 - M) + (x_2 - M) + (x_3 - M) + (x_4 - M) + (x_5 - M) + (x_6 - M) = 0$

Solution 19

M is the mean of x_1, x_2, x_3, x_4, x_5 and $x6$,

Then, $M = \dfrac{x_1 + x_2 + x_3 + x_4 + x_5 + x_6}{6}$

$\Rightarrow \quad x_1 + x_2 + x_3 + x_4 + x_5 + x_6 = 6M \qquad\qquad ---(1)$

To prove:- $(x_1 - M) + (x_2 - M) + (x_3 - M) + (x_4 - M) + (x_5 - M) + (x_6 - M) = 0.$

Proof:- LHS

$= (x_1 - M) + (x_2 - M) + (x_3 - M) + (x_4 - M) + (x_5 - M) + (x_6 - M)$

$= (x_1 + x_2 + x_3 + x_4 + x_5 + x) - (M + M + M + M + M + M)$

$= 6M - 6M \qquad\qquad\qquad\qquad\qquad \left[\text{By using } (1)\right]$

$= 0$

$= RHS$

Question 20

Durations of sunshine (in hours) in Amritsar for first 10 days of August 1997 as reported by the Meteorological Department are given below:

9.6, 5.2, 3.5, 1.5, 1.6, 2.4, 2.6, 8.4, 10.3, 10.9

(i) Find the mean $\bar{x}$ (ii) Verify that $\displaystyle\sum_{i=1}^{10} \left(x_i - \bar{X}\right) = 0$

Solution 20

Durations of sunshine (in hours) for 10 days are
= 9.6, 5.2, 3.5, 1.5, 1.6, 2.4, 2.6, 8.4, 10.3, 10.9

(i) Mean $\bar{x} = \dfrac{\text{Sum of all numbers}}{\text{Total number}}$

$$= \frac{9.6+5.2+3.5+1.5+1.6+2.4+2.6+8.4+10.3+10.9}{10}$$

$$= \frac{56}{10}$$

$$= 5.6$$

(ii) $LHS = \sum\limits_{i=1}^{10} \left(x_i - \bar{x}\right)$

$= \left(x_1 - \bar{x}\right) + \left(x_2 - \bar{x}\right) + \left(x_3 - \bar{x}\right) + - - - - - - - - - + \left(x_{10} - \bar{x}\right)$

$= (9.6 - 5.6) + (5.2 - 5.6) + (3.5 - 5.6) + (1.5 - 5.6) + (1.6 - 5.6) + (2.4 - 5.6)$
$+ (2.6 - 5.6) + (8.4 - 5.6) + (10.3 - 5.6) + (10.9 - 5.6)$

$= (4) + (-0.4) + (-2.1) + (-4.1) + (-4) + (-3.2) + (-3) + (2.8) + (4.7) + (5.3)$
$= 16.8 - 16.8$

$= 0$
$= RHS$

Question 21

Find the values of n and $\bar{x}$ in each of the following cases:

(i) $\sum\limits_{i=1}^{n} \left(x_i - 12\right) = -10$ and $\sum\limits_{i=1}^{n} \left(x_i - 3\right) = 62$

(ii) $\sum\limits_{i=1}^{n} \left(x_i - 10\right) = 30$ and $\sum\limits_{i=1}^{n} \left(x_i - 6\right) = 150$

Solution 21
(i)

Given, $\sum\limits_{i=1}^{n} (x_i - 12) = -10$

$\Rightarrow$ $(x_1 - 12) + (x_2 - 12) + ---- + (x_n - 12) = -10$

$\Rightarrow$ $(x_1 + x_2 + ---- + x_n) - (12 + 12 + --- + 12) = -10$

$\Rightarrow$ $\sum x - 12n = -10$ ----(1)

And $\sum\limits_{i=1}^{n} (x_i - 3) = 62$

$\Rightarrow$ $(x_1 - 3) + (x_2 - 3) + ---- + (x_n - 3) = 62$

$\Rightarrow$ $(x_1 + x_2 + ---- + x_n) - (3 + 3 + ---- + 3) = 62$

$\Rightarrow$ $\sum x - 3n = 62$ ----(2)

Subtract equation (1) from equation (2)

$\sum x - 3n - \sum x + 12n = 62 + 10$

$\Rightarrow$ $9n = 72$

$\Rightarrow$ $n = \dfrac{72}{9} = 8$

Put value of n in equation (1)

$\sum x - 12 \times 8 = -10$

$\Rightarrow$ $\sum x - 96 = -10$

$\Rightarrow$ $\sum x = -10 + 96 = 86$

$\therefore$ $\bar{x} = \dfrac{\sum x}{n} = \dfrac{86}{8} = 10.75$

(ii)

Given, $\sum\limits_{i=1}^{n} (x_i - 10) = 30$

$\Rightarrow \quad (x_1 - 10) + (x_2 - 10) + --- + (x_n - 10) = 30$

$\Rightarrow \quad (x_1 + x_2 + --- + x_n) - (10 + 10 + --- + 10) = 30$

$\Rightarrow \quad \sum x - 10n = 30 \qquad\qquad ---(1)$

And $\sum\limits_{i=1}^{n} (x_i - 6) = 150$

$\Rightarrow \quad (x_1 - 6) + (x_2 - 6) + --- + (x_n - 6) = 150$

$\Rightarrow \quad (x_1 + x_2 + --- + x_n) - (6 + 6 + --- + 6) = 150$

$\Rightarrow \quad \sum x - 6n = 150 \qquad\qquad ---(2)$

Subtract equation (1) from equation (2)

$\sum x - 6n - \sum x + 10n = 150 - 30$

$\Rightarrow \quad 4n = 120$

$\Rightarrow \quad n = \dfrac{120}{4} = 30$

Put value of n in equation (1)

$\sum x - 10 \times 30 = 30$

$\Rightarrow \quad \sum x - 300 = 30$

$\Rightarrow \quad \sum x = 30 + 300 = 330$

$\therefore \quad \overline{x} = \dfrac{\sum x}{n} = \dfrac{330}{30} = 11$

Question 22

The sums of the deviations of a set of n values $x_1, x_2, ---, x_n$ measured from 15 and -3 are -90 and 54 respectively. Find the value of n and mean.

Solution 22

Given, $\sum\limits_{i=1}^{n}(x_i - 15) = -90$

$\Rightarrow$ $(x_1 - 15) + (x_2 - 15) + \cdots + (x_n - 15) = -90$

$\Rightarrow$ $(x_1 + x_2 + \cdots + x_n) - (15 + 15 + \cdots + 15) = -90$

$\Rightarrow$ $\Sigma x - 15n = -90$ $\qquad$ ---(1)

And $\sum\limits_{i=1}^{n}(x_i + 3) = 54$

$\Rightarrow$ $(x_1 + 3) + (x_2 + 3) + \cdots + (x_n + 3) = 54$

$\Rightarrow$ $(x_1 + x_2 + \cdots + x_n) + (3 + 3 + \cdots + 3) = 54$

$\Rightarrow$ $\Sigma x + 3n = 54$ $\qquad$ ---(2)

Subtract equation (1) from equation (2)

$\Sigma x + 3n - \Sigma x + 15n = 54 + 90$

$\Rightarrow$ $18n = 144$

$\Rightarrow$ $n = \dfrac{144}{18} = 8$

Put value of n in equation (1)

$\Sigma x - 15 \times 8 = -90$

$\Rightarrow$ $\Sigma x - 120 = -90$

$\Rightarrow$ $\Sigma x = -90 + 120 = 30$

$\therefore$ Mean $= \dfrac{\Sigma x}{n} = \dfrac{30}{8} = \dfrac{15}{4}$

Question 23

Find the sum of the deviations of the variate values 3, 4, 6, 7, 8, 14 from their mean.

Solution 23

Values are 3, 4, 6, 7, 8, 14

$$\therefore \quad \text{Mean} = \frac{\text{Sum of numbers}}{\text{Total number}}$$

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

$$= \frac{42}{6}$$

$$= 7$$

$\therefore$ Sum of deviations of values from their mean

$$= (3-7)+(4-7)+(6-7)+(7-7)+(8-7)+(14-7)$$
$$= (-4)+(-3)+(-1)+(0)+(1)+(7)$$
$$= -8+8$$

$$= 0$$

Question 24

If $\overline{X}$ is the mean of the ten natural numbers $x_1, x_2, x_3, \dots, x_{10}$, show that

$$\left(x_1 - \overline{X}\right) + \left(x_2 - \overline{X}\right) + ---- + \left(x_{10} - \overline{X}\right) = 0.$$

Solution 24

We have,

$$\overline{X} = \frac{x_1 + x_2 + x_3 + \dots + x_{10}}{10}$$

$\Rightarrow \quad x_1 + x_2 + x_3 + \dots + x_{10} = 10\overline{x}$ ——(i)

Now,

$$\left(x_1 - \overline{X}\right) + \left(x_2 - \overline{X}\right) + ---- + \left(x_{10} - \overline{X}\right)$$
$$= (x_1 + x_2 + \dots + x_{10}) - \left(\overline{X} + \overline{X} + \dots \text{ up to 10 terms}\right)$$
$$= 10\overline{X} - 10\overline{X} \qquad\qquad \left[\text{By equation (i)}\right]$$
$$= 0$$

$\therefore \left(x_1 - \overline{X}\right) + \left(x_2 - \overline{X}\right) + ---- + \left(x_{10} - \overline{X}\right) = 0$ Hence proved.

Chapter 24 - Measures of Central Tendency Exercise Ex. 24.2

Question 1

Calculate the mean for the following distribution:

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

Solution 1

x	f	fx
5	4	20
6	8	48
7	14	98
8	11	88
9	3	27
	N = 40	Σfx = 281

∴   Mean $\bar{x} = \dfrac{\Sigma fx}{N}$

$$= \dfrac{281}{40}$$

$$= 7.025$$

Question 2

Find the mean of the following data:

x:	19	21	23	25	27	29	31
f:	13	15	16	18	16	15	13

Solution 2

x	f	fx
19	13	247
21	15	315
23	16	368
25	18	450
27	16	432
29	15	435
31	13	403
	$N = 106$	$\sum fx = 2650$

$$\therefore \quad \text{Mean } \overline{x} = \frac{\sum fx}{N}$$

$$= \frac{2650}{106}$$

$$= 25$$

Question 3

Find the mean of the following distribution:

x:	10	12	20	25	35
f:	3	10	15	7	5

Solution 3

x	f	fx
10	3	30
12	10	120
20	15	300
25	7	175
35	5	175
	N = 40	Σfx = 800

$$\text{Mean}(\bar{x}) = \frac{\Sigma fx}{N}$$

$$= \frac{800}{40}$$

$$= 20$$

Question 4

Five coins were simultaneously tossed 1000 times and at each toss the number of heads were observed. The number of tosses during which 0, 1, 2, 3, 4 and 5 heads were obtained are shown in the table below. Find the mean number of heads per toss.

No. of heads per toss	No. of tosses
0	38
1	144
2	342

3	**287**
4	**164**
5	**25**
Total	**1000**

Solution 4

No. of heads per toss x	No. of tosses f	fx
0	38	0
1	144	144
2	342	684
3	287	861
4	164	656
5	25	125
	N = 1000	$\sum fx = 2470$

$$\therefore \quad \text{Mean number of heads per toss} = \frac{\sum fx}{N}$$

$$= \frac{2470}{1000}$$

$$= 2.47$$

Question 5

The mean of the following data is 20.6. Find the value of p.

x: 10   15   p   25   35

f: 3   10   25   7   5

Solution 5

x	f	fx
10	3	30
15	10	150
p	25	25 p
25	7	175
35	5	175
	N = 50	$\sum fx = 25p + 530$

Given Mean = 20.6

$$\Rightarrow \quad \frac{\sum fx}{N} = 20.6$$

$$\Rightarrow \quad \frac{25p + 530}{50} = 20.6$$

$$\Rightarrow \quad 25p + 530 = 1030$$

$$\Rightarrow \quad 25p = 1030 - 530$$

$$\Rightarrow \quad 25p = 500$$

$$\Rightarrow \quad p = \frac{500}{25} = 20$$

Question 6

If the mean of the following data is 15, find p.

x:	5	10	15	20	25
f:	6	p	6	10	5

Solution 6

x	f	fx
5	6	30
10	p	10 p
15	6	90
20	10	200
25	5	125
	$N = p+27$	$\Sigma fx = 10p+445$

Given Mean = 15

$\Rightarrow \quad \dfrac{\Sigma fx}{N} = 15$

$\Rightarrow \quad \dfrac{10p+445}{p+27} = 15$

$\Rightarrow \quad 10p+445 = 15p+405$

$\Rightarrow \quad 15p-10p = 445-405$

$\Rightarrow \quad 5p = 40$

$\Rightarrow \quad p = \dfrac{40}{5} = 8$

Question 7

Find the value of p for the following distribution whose mean is 16.6.

x:	8	12	15	p	20	25	30
f:	12	16	20	24	16	8	4

Solution 7

x	f	fx
8	12	96
12	16	192
15	20	300
p	24	24p
20	16	320
25	8	200
30	4	120
	N = 100	$\sum fx = 24p + 1228$

Given Mean = 16.6

$\Rightarrow \quad \dfrac{\sum fx}{N} = 16.6$

$\Rightarrow \quad \dfrac{24p + 1228}{100} = 16.6$

$\Rightarrow \quad 24p + 1228 = 1660$

$\Rightarrow \quad 24p = 1660 - 1228$

$\Rightarrow \quad 24p = 432$

$\Rightarrow \quad p = \dfrac{432}{24} = 18$

Question 8

Find the missing value of p for the following distribution whose mean is 12.58.

x:	5	8	10	12	p	20	25
f:	2	5	8	22	7	4	2

Solution 8

x	f	fx
5	2	10
8	5	40
10	8	80
12	22	264
p	7	7p
20	4	80
25	2	50
	N = 50	$\sum fx = 7p + 524$

Given Mean = 12.58

$\Rightarrow \quad \dfrac{\sum fx}{N} = 12.58$

$\Rightarrow \quad \dfrac{7p + 524}{50} = 12.58$

$\Rightarrow \quad 7p + 524 = 629$

$\Rightarrow \quad 7p = 629 - 524$

$\Rightarrow \quad 7p = 105$

$\Rightarrow \quad p = \dfrac{105}{7} = 15$

Question 9

Find the missing frequency (p) for the following distribution whose mean is 7.68.

x:	3	5	7	9	11	13

f:	6	8	15	p	8	4

Solution 9

x	f	fx
3	6	18
5	8	40
7	15	105
9	p	9p
11	8	88
13	4	52
	N = p + 41	$\sum fx$ = 9p + 303

Given Mean = 7.68

$$\Rightarrow \quad \frac{\sum fx}{N} = 7.68$$

$$\Rightarrow \quad \frac{9p + 303}{p + 41} = 7.68$$

$$\Rightarrow \quad 9p + 303 = 7.68p + 314.88$$
$$\Rightarrow \quad 9p - 7.68p = 314.88 - 303$$
$$\Rightarrow \quad 1.32p = 11.88$$

$$\Rightarrow \quad p = \frac{11.88}{1.32} = 9$$

Question 10

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

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

Solution 10

x	f	fx
15	2	30
17	3	51
19	4	76
20+p	5p	$100p + 5p^2$
23	6	138
	$N = 15 + 5p$	$\Sigma fx = 295 + 100p + 5p^2$

Given Mean = 20

$\Rightarrow \quad \dfrac{\Sigma fx}{N} = 20$

$\Rightarrow \quad \dfrac{295 + 100p + 5p^2}{15 + 5p} = 20$

$\Rightarrow \quad 295 + 100p + 5p^2 = 300 + 100p$

$\Rightarrow \quad 295 + 100p + 5p^2 - 300 - 100p = 0$

$\Rightarrow \quad 5p^2 - 5 = 0$

$\Rightarrow \quad p^2 - 1 = 0 \qquad\qquad$ [Divide by 5]

$\Rightarrow \quad (p+1)(p-1) = 0$

If $p + 1 = 0 \quad$ or $\quad p - 1 = 0$

$\Rightarrow \quad p = -1$ reject $p = 1$

Question 11

Candidates of four schools appear in a mathematics test. The data were as follows:

Schools	No. of Candidates	Average Score
I	60	75
II	48	80
III	Not available	55
IV	40	50

If the average score of the candidates of all the four schools is 66, find the number of candidates that appeared from school III.

Solution 11

Let no. of candidates appeared from school III = *x*

Schools	No. of Candidates	Average Score
I	60	75
II	48	80
III	X	55
IV	40	50

Given, Average score of all schools = 66

$$\Rightarrow \quad \frac{N_1\overline{x_1}+N_2\overline{x_2}+N_3\overline{x_3}+N_4\overline{x_4}}{N_1+N_2+N_3+N_4}=66$$

$$\Rightarrow \quad \frac{60\times75+48\times80+x\times55+40\times50}{60+48+x+40}=66$$

$$\Rightarrow \quad \frac{4500+3840+55x+2000}{148+x}=66$$

$$\Rightarrow \quad \frac{10340+55x}{148+x}=66$$

$$\Rightarrow \quad 10340+55x=9768+66x$$
$$\Rightarrow \quad 66x-55x=10340-9768$$
$$\Rightarrow \quad 11x=572$$

$$\Rightarrow \quad x=\frac{572}{11}=52$$

∴   **No. of candidates appeared from school III = 52**

Question 12
Find the missing frequencies in the following frequency distribution if it is known that the mean of the distribution is 50.

x:	10	30	50	70	90	
f:	17	f_1	32	f_2	19	Total 120.

Solution 12

x	f	xf
10	17	170

30	f_1	$30f_1$
50	32	1600
70	f_2	$70f_2$
90	19	1710
	$N = 120$	$\sum fx = 3480 + 30f_1 + 70f_2$

Given

Mean = 50

$\Rightarrow \quad \dfrac{\Sigma fx}{N} = 50$

$\Rightarrow \quad \dfrac{30f_1 + 70f_2 + 3480}{120} = 50$

$\Rightarrow \quad 30f_1 + 70f_2 + 3480 = 6000$

$\Rightarrow \quad 30f_1 + 70f_2 = 6000 - 3480$

$\Rightarrow \quad 30f_1 + 70f_2 = 2520$

$\Rightarrow \quad 3f_1 + 7f_2 = 252 \qquad \qquad ---(1) \qquad \qquad$ [Divide by 10]

And N = 120

$\Rightarrow \quad 17 + f_1 + 32 + f_2 + 19 = 120$

$\Rightarrow \quad 68 + f_1 + f_2 = 120$

$\Rightarrow \quad f_1 + f_2 = 120 - 68$

$\Rightarrow \quad f_1 + f_2 = 52$

$\Rightarrow \quad 3f_1 + 3f_2 = 156 \qquad \qquad ---(2) \qquad \qquad$ [Multiply by 3]

Subtract equation (2) from equation (1)

$3f_1 + 7f_2 - 3f_1 - 3f_2 = 252 - 156$

$\Rightarrow \quad 4f_2 = 96$

$\Rightarrow \quad f_2 = \dfrac{96}{4} = 24$

Put value of f_2 in equation (1)

$3f_1 + 7 \times 24 = 252$

$\Rightarrow \quad 3f_1 + 168 = 252$

$\Rightarrow \quad 3f_1 = 252 - 168 = 84$

$\Rightarrow \quad f_1 = \dfrac{84}{3} = 28$

Chapter 24 - Measures of Central Tendency Exercise Ex. 24.3
Question 1
Find the median of 83, 37, 70, 29, 45, 63, 41, 70, 34, 54

Solution 1

83, 37, 70, 29, 45, 63, 41, 70, 34, 54

Arrange the numbers in ascending order

29, 34, 37, 41, 45, 54, 63, 70, 70, 83

$n = 10$ (even)

$$\therefore \quad \text{Median} = \frac{\frac{n}{2}th \text{ value} + \left(\frac{n}{2} + 1\right)th \text{ value}}{2}$$

$$= \frac{\frac{10}{2}th \text{ value} + \left(\frac{10}{2} + 1\right)th \text{ value}}{2}$$

$$= \frac{5th \text{ value} + 6th \text{ value}}{2}$$

$$= \frac{45 + 54}{2}$$

$$= \frac{99}{2} = 49.5$$

Question 2

Find the median of 133, 73, 89, 108, 94, 104, 94, 85, 100, 120

Solution 2

133, 73, 89, 108, 94, 104, 94, 85, 100, 120

Arrange in ascending order

73, 85, 89, 94, 94, 100, 104, 108, 120, 133

$n = 10$ (even)

$$\therefore \quad \text{Median} = \frac{\frac{n}{2}th \text{ value} + \left(\frac{n}{2} + 1\right)th \text{ value}}{2}$$

$$= \frac{\frac{10}{2}th \text{ value} + \left(\frac{10}{2} + 1\right)th \text{ value}}{2}$$

$$= \frac{5th \text{ value} + 6th \text{ value}}{2}$$

$$= \frac{94 + 100}{2}$$

$$= \frac{194}{2} = 97$$

Question 3

Find the median of 31, 38, 27, 28, 36, 25, 35, 40

Solution 3

31, 38, 27, 28, 36, 25, 35, 40

Arrange in increasing order

25, 27, 28, 31, 35, 36, 38, 40

$n = 8$ (even)

$$\therefore \quad \text{Median} = \frac{\frac{n}{2}th \text{ value} + \left(\frac{n}{2}+1\right)th \text{ value}}{2}$$

$$= \frac{\frac{8}{2}th \text{ value} + \left(\frac{8}{2}+1\right)th \text{ value}}{2}$$

$$= \frac{4th \text{ value} + 5th \text{ value}}{2}$$

$$= \frac{31+35}{2}$$

$$= \frac{66}{2} = 33$$

Question 4

Find the median of 15, 6, 16, 8, 22, 21, 9, 18, 25

Solution 4

15, 6, 16, 8, 22, 21, 9, 18, 25

Arrange in increasing order

6, 8, 9, 15, 16, 18, 21, 22, 25

$n = 9$ (odd)

$$\therefore \quad \text{Median} = \left(\frac{n+1}{2}\right)th \text{ value}$$

$$= \left(\frac{9+1}{2}\right)th \text{ value}$$

$$= 5th \text{ value}$$

$$= 16$$

Question 5

Find the median of 41, 43, 127, 99, 71, 92, 71, 58, 57

Solution 5

41, 43, 127, 99, 71, 92, 71, 58, 57

Arrange in increasing order

41, 43, 57, 58, 71, 71, 92, 99, 127

$n = 9$ (odd)

$\therefore$ Median $= \left(\dfrac{n+1}{2}\right)th$ value

$= \left(\dfrac{9+1}{2}\right)th$ value

$= 5th$ value

$= 71$

Question 6

Find the median of 25, 34, 31, 23, 22, 26, 35, 29, 20, 32

Solution 6

25, 34, 31, 23, 22, 26, 35, 29, 20, 32

Arrange in increasing order

20, 22, 23, 25, 26, 29, 31, 32, 34, 35

$n = 10$ (even)

$\therefore$ Median $= \dfrac{\dfrac{n}{2}th \text{ value} + \left(\dfrac{n}{2}+1\right)th \text{ value}}{2}$

$= \dfrac{\dfrac{10}{2}th \text{ value} + \left(\dfrac{10}{2}+1\right)th \text{ value}}{2}$

$= \dfrac{5th \text{ value} + 6th \text{ value}}{2}$

$= \dfrac{26+29}{2}$

$= \dfrac{55}{2} = 27.5$

Question 7

Find the median of 12, 17, 3, 14, 5, 8, 7, 15

Solution 7

12, 17, 3, 14, 5, 8, 7, 15

Arrange in increasing order

3, 5, 7, 8, 12, 14, 15, 17

$n = 8$ (even)

$$\therefore \quad \text{Median} = \frac{\frac{n}{2}\text{th value} + \left(\frac{n}{2} + 1\right)\text{th value}}{2}$$

$$= \frac{\frac{8}{2}\text{th value} + \left(\frac{8}{2} + 1\right)\text{th value}}{2}$$

$$= \frac{4\text{th value} + 5\text{th value}}{2}$$

$$= \frac{8 + 12}{2}$$

$$= \frac{20}{2} = 10$$

Question 8

Find the median of 92, 35, 67, 85, 72, 81, 56, 51, 42, 69

Solution 8

92, 35, 67, 85, 72, 81, 56, 51, 42, 69

Arrange in increasing order

35, 42, 51, 56, 67, 69, 72, 81, 85, 92

$n = 10$ (even)

$$\therefore \quad \text{Median} = \frac{\frac{n}{2}\text{th value} + \left(\frac{n}{2} + 1\right)\text{th value}}{2}$$

$$= \frac{\frac{10}{2}\text{th value} + \left(\frac{10}{2} + 1\right)\text{th value}}{2}$$

$$= \frac{5\text{th value} + 6\text{th value}}{2}$$

$$= \frac{67 + 69}{2}$$

$$= \frac{136}{2} = 68$$

Question 9

Numbers 50, 42, 35, 2x + 10, 2x - 8, 12, 11, 8 are written in descending order and their median is 25, find x.

Solution 9

Here, number of observations, n = 8

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

$$= \frac{2x + 10 + 2x - 8}{2}$$

$$= 2x + 1$$

Given, median = 25

$\therefore 2x + 1 = 25$

$2x = 24$

$x = 12$

Question 10

Find the median of the following observations: 46, 64, 87, 41, 58, 77, 35, 90, 55, 92, 33.
If 92 is replaced by 99 and 41 by 43 in the above data, find the new median?

Solution 10

46, 64, 87, 41, 58, 77, 35, 90, 55, 92, 33.

Arrange in increasing order

33, 35, 41, 46, 55, 58, 64, 77, 87, 90, 92

$n = 11$ (odd)

$$\therefore \quad \text{Median} = \left(\frac{n+1}{2}\right) th \text{ value}$$
$$= \left(\frac{11+1}{2}\right) th \text{ value}$$
$$= 6th \text{ value}$$

$$= 58$$

If 92 is replaced by 99 and 41 by 43
Then, the new values be 33, 35, 43, 46, 55, 58, 64, 77, 87, 90, 99

$$\therefore \quad n = 11 \text{(odd)}$$

$$\text{New median} = \left(\frac{n+1}{2}\right) th \text{ value}$$
$$= \left(\frac{11+1}{2}\right) th \text{ value}$$
$$= 6th \text{ value}$$

$$= 58$$

Question 11

Find the median of the following data: 41, 43, 127, 99, 61, 92, 71, 58, 57
If 58 is replaced by 85 what will be the new median

Solution 11

41, 43, 127, 99, 61, 92, 71, 58, 57

Arrange in increasing order

41, 43, 57, 58, 61, 71, 92, 99, 127

$n = 9$ (odd)

$$\therefore \quad \text{Median} = \left(\frac{n+1}{2}\right) th \text{ value}$$
$$= \left(\frac{9+1}{2}\right) th \text{ value}$$
$$= 5th \text{ value}$$

$$= 61$$

If 58 is replaced by 85
Then, new values be 41, 43, 57, 61, 71, 85, 92, 99, 127

$n = 9$ (odd)

$$\therefore \quad \text{New median} = \left(\frac{n+1}{2}\right) th \text{ value}$$
$$= \left(\frac{9+1}{2}\right) th \text{ value}$$
$$= 5th \text{ value}$$

$$= 71$$

Question 12

The weights (in kg) of 15 students are: 31, 35, 27, 29, 32, 43, 37, 41, 34, 28, 36, 44, 45, 42, 30. Find the median. If the weight 44 kg is replaced by 46 kg and 27 kg by 25 kg, find the new median.

Solution 12

31, 35, 27, 29, 32, 43, 37, 41, 34, 28, 36, 44, 45, 42, 30

Arrange in increasing order

27, 28, 29, 30, 31, 32, 34, 35, 36, 37, 41, 42, 43, 44, 45,

$n = 15$ (odd)

$\therefore$ Median $= \left(\dfrac{n+1}{2}\right)th$ value

$\quad = \left(\dfrac{15+1}{2}\right)th$ value

$\quad = 8\,th$ value

$\quad = 35\text{ kg}$

If the weight 44 kg is replaced by 46 kg and 27 kg by 25 kg
Then, new values are 25, 28, 29, 30, 31, 32, 34, 35, 36, 37, 41, 42, 43, 45, 46

$n = 15$ (odd)

$\therefore$ New median $= \left(\dfrac{n+1}{2}\right)th$ value

$\quad = \left(\dfrac{15+1}{2}\right)th$ value

$\quad = 8th$ value

$\quad = 35\text{ kg}$

Question 13
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

Solution 13

Total number of observation in the given data is 10 (even number). So median of this data will be mean of $\frac{10}{2}$ i.e. 5th and $\frac{10}{2}$ + 1 i.e. 6th observations

So, median of data = $\dfrac{5^{th} \text{ observation} + 6^{th} \text{ observation}}{2}$

$\Rightarrow 63 = \dfrac{x + x + 2}{2}$

$\Rightarrow 63 = \dfrac{2x + 2}{2}$

$\Rightarrow 63 = x + 1$

$\Rightarrow x = 62$

Chapter 24 - Measures of Central Tendency Exercise Ex. 24.4

Question 1

Find out the mode of the following marks obtained by 15 students in a class:

marks: 4, 6, 5, 7, 9, 8, 10, 4, 7, 6, 5, 9, 8, 7, 7.

Solution 1

Marks	4	5	6	7	8	9	10
No. of students	2	2	2	4	2	2	1

Since, the maximum frequency corresponds to the value 7 then mode = 7 marks

Question 2

Find the mode from the following data:

125, 175, 225, 125, 225, 175, 325, 125, 375, 225, 125

Solution 2

Values	125	175	225	325	375
Frequency	4	2	3	1	1

Since, maximum frequency 4 corresponds to value 125 then mode = 125

Question 3

Find the mode for the following series:

7.5, 7.3, 7.2, 7.2, 7.4, 7.7, 7.7, 7.5, 7.3, 7.2, 7.6, 7.2

Solution 3

Values	7.2	7.3	7.4	7.5	7.6	7.7
Frequency	4	2	1	2	1	2

Since, maximum frequency 4 corresponds to value 7.2 then mode = 7.2

Question 4(i)

Find the mode of

14,   25, 14, 28, 18, 17, 18, 14, 23, 22, 14, 18

Solution 4(i)
Arranging the data in an ascending order
14, 14, 14, 14, 17, 18, 18, 18, 22, 23, 25, 28
Here observation 14 is having the highest frequency i.e. 4 in given data. So, mode of given data is 14.

Question 4 (ii)
Find the mode of the following data in each case:

7, 9, 12, 13, 7, 12, 15, 7, 12, 7, 25, 18, 7

Solution 4 (ii)

Values	7	9	12	13	15	18	25
Frequency	5	1	3	1	1	1	1

Since, maximum frequency 5 corresponds to value 7 then mode = 7

Question 5
The demand of different sizes, as obtained by a survey, is given below:

Size	38	39	40	41	42	43	44	Total
Number of persons (wearing it):	26	39	20	15	13	7	5	125

Find the modal shirt size, as observed from the survey.

Solution 5

Size	38	39	40	41	42	43	44	Total
No. of persons	26	39	20	15	13	7	5	125

Since, maximum frequency 39 corresponds to value 39 then model size = 39