5. STATISTICS

Arithmetic Mean = $\frac{\text{Sum of all observations}}{\text{Number of observations}}$

Example 5.1

The daily wages of a worker for 10 days is as follows. Find the average income of the worker.

Day	1	2	3	4	5	6	7	8	9	10
Wages in ₹	250	350	100	400	150	270	450	320	610	750

Solution:

Arithmetic mean = $\frac{\text{Sum of all observations}}{\text{Number of observations}}$

$= \frac{250+350+100+400+150+270+450+320+610+750}{10}$

$= \frac{3650}{10}$

$= 365$

The average income of the worker is ₹365

Example 5.2

The mean of 9 observations is 24. Find the sum of the 9 observations.

Solution:

Arithmetic mean = $\frac{\text{Sum of all observations}}{\text{Number of observations}}$

$\frac{\text{Sum of all observations}}{9} = 24$

Sum of all observations $= 24 \times 9$

Sum of all observations = 216

Example 5.3: The mean age of 15 teachers in a school is 42. The ages of the teachers are 35, 42, 48, x, x+8, 40, 43, 50, 46, 50, 37, 32, 38, 41, 40 (in years). Find the value of x and unknown ages of the two teachers?

Solution:

Mean = $\frac{\text{Total ages of teachers}}{\text{Number of teachers.}}$

$\frac{35+42+48+x+(x+8)+40+43+50+46+50+37+32+38+41+40}{15} = 42$

$\frac{550+2x}{15} = 42$

$550+2x = 42 \times 15$

$550+2x = 630$

$2x = 630 - 550$

$2x = 80$

$x = \frac{80}{2}$

$x = 40$

∴ the age of the teacher (x) = 40

The age of the another teacher (x+8) = 40+8 = 48

Example 5.4 If the mean of the following numbers is 38, find the value of x.

48, x, 37, 38, 36, 27, 35, 34, 38, 49, 33.

Solution:

Mean = $\frac{\text{Sum of all observations}}{\text{Number of observations.}}$

$\frac{48+x+37+38+36+27+35+34+38+49+33}{11} = 38$

$\frac{375+x}{11} = 38$

$375+x = 38 \times 11$

$375+x = 418$

$x = 418 - 375$

$x = 43$

∴ The value of x = 43

Exercise 5.1

1. Fill in the blanks

(i) The mean of first ten natural numbers is _____.

Mean = $\frac{\text{Sum of all observations}}{\text{Number of observations}}$

$= \frac{1+2+3+4+5+6+7+8+9+10}{10}$

$= \frac{55}{10}$

mean = 5.5

(ii) If the average selling price of 15 books is ₹235, then the total Selling price is _____.

Average selling price = ₹235

Number of books = 15

$\frac{\text{The total selling price}}{\text{Number of books}} = \text{Average Selling price}$

$\frac{\text{The total selling price}}{15} = ₹235$ $\quad 235 \times 15 = 1175 + 2350 = 3525$

The total selling price = ₹235 × 15

The total selling price = ₹3525

(iii) The average of the marks 2,9,5,4,4,8,10, is _____.

$$\text{Average} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

$$= \frac{2+9+5+4+4+8+10}{7}$$

$$= \frac{42}{7}$$

Average = 6

(iv) The average of integers between −10 to 10 is _____

$$\text{Average} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

$$= \frac{-9-8-7-6-5-4-3-2-1+0+1+2+3+4+5+6+7+8+9}{19}$$

$$= \frac{0}{19}$$

Average = 0

2. Ages of 15 students in 8th standard is 13,12,13,14,12,13,13,14,12,13,13,14,13,12,14. Find the mean age of the students.

Solution:

$$\text{Mean age} = \frac{\text{Sum of all ages of the students}}{\text{Number of ages of the students}}$$

$$= \frac{13+12+13+14+12+13+13+14+12+13+13+14+13+12+14}{15}$$

$$= \frac{195}{15}$$

$$= 13$$

∴ The mean age of the student = 13.

(3) The marks of 14 students in a science test out of 50 are given below. 34,23,10,45, 44,47,35,37,41,30,28,32,45,39. Find (i) the mean mark. (ii) the maximum mark obtained (iii) the minimum mark obtained.

Solution:

(i) $$\text{Mean marks} = \frac{\text{Sum of all marks}}{\text{Number of students}}$$

$$= \frac{34+23+10+45+44+47+35+37+41+30+28+32+45+39}{14}$$

$$= \frac{490}{14}$$

$$= 35$$

Mean marks = 35

(ii) Maximum mark obtained = 47

(iii) Minimum mark obtained = 10

(4) The mean height of 11 students in a group is 150cm. The heights of the students are 154 cm, 145cm, Ycm, Y+4 cm, 160cm, 151cm, 149cm, 149cm, 150cm, 144cm and 140cm. Find the value of Y and the heights of two students?

Solution:

$$\text{Mean height} = \frac{\text{Sum of heights of all students}}{\text{Number of students.}}$$

$$\frac{154+145+Y+(Y+4)+160+151+149+149+150+144}{11} = 150$$

$$\frac{1346+2Y}{11} = 150$$

$$1346+2Y = 150\times 11$$

$$1346+2Y = 1650$$

$$2Y = 1650-1346$$

$$2Y = 304$$

$$Y = \frac{304}{2}$$

Y = 152

The height of two students = Y and Y+4

= 152 & 152+4

= 152cm & 156cm

(5) The mean of runs scored by a cricket team in the last 10 innings is 276. If the scores are 235, 400, 351, x, 100, 315, 410, 165, 260, 284, then find the runs scored in the fourth innings.

Solutions:

$$\text{Mean} = \frac{\text{Total runs of all innings}}{\text{Number of innings}}$$

$$276 = \frac{235+400+351+x+100+315+410+165+260+284}{10}$$

$$\frac{2520+x}{10} = 276$$

$$2520+x = 276\times 10$$

$$2520+x = 2760$$

$$x = 2760-2520$$

x = 240

∴ The runs scored in the fourth innings = 240

(6) Find the mean of the following data.
5.1, 4.8, 4.3, 4.5, 5.1, 4.7, 4.5, 5.2, 5.4, 5.8, 4.3, 5.6, 5.2, 5.5

Solution:

$$\text{Mean} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

$$\text{Mean} = \frac{5.1+4.8+4.3+4.5+5.1+4.7+4.5+5.2+5.4+5.8+4.3+5.6+5.2+5.5}{14}$$

$$= \frac{70.0}{14}$$

Mean = 5

(7) Arithmetic mean of 10 observations was found to be 22. If one more observation 44 was to be added to the data, what would be the new mean?

Solution:

Arithmetic mean of 10 observations = 22

$$\frac{\text{Sum of 10 observations}}{10} = 22$$

Sum of 10 observations = 22×10

Sum of 10 observations = 220

If New number is added,

$$\text{Mean of 11 observations} = \frac{\text{Sum of 10 observations} + 44}{11}$$

$$= \frac{220+44}{11}$$

$$= \frac{264}{11}$$

Mean of 11 observations = 24

New mean = 24

Objective type questions

8. _____ is a representative value of the entire data

Ans: (i) Mean.

9. The mean of first fifteen even numbers is _____.

$$\text{Mean} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

$$= \frac{2+4+6+8+10+12+14+16+18+20+22+24+26+28+30}{15}$$

$$= \frac{240}{15}$$

$$= 16$$

Mean = 16

Ans: (ii) 16

10. The average of two numbers are 20. One number is 24, another number is ____.

Let the number be x

$$\frac{x+24}{2} = 20$$

$$x+24 = 20 \times 2$$

$$x+24 = 40$$

$$x = 40-24$$

$x = 16$

Ans: (i) 16

11. The mean of the data 12, x, 28 is 18. Find the value of x.

$$\frac{12+x+28}{3} = 18$$

$$40+x = 54$$

$$x = 54-40$$

$x = 14$

Ans: (iii) 14

Example 5.5 Find the mode of the given set of numbers. 5, 7, 10, 12, 4, 5, 3, 10, 3, 4, 5, 7, 9, 10, 5, 12, 16, 20, 5.

Solution:

Arranging the numbers in ascending order.

3, 3, 4, 4, 5, 5, 5, 5, 5, 7, 7, 9, 10, 10, 10, 12, 12, 16, 20

5 occurs maximum number of times

Mode = 5

Example 5.6 The marks obtained by 11 Students of a class in a test are 23, 2, 15, 38, 21, 19, 23, 23, 26, 34, 23. Find the mode of the marks.

Solution:

Arranging the marks in ascending order.

2, 15, 19, 21, 23, 23, 23, 23, 26, 34, 38.

23 occurs maximum number of times

Mode of marks = 23

Example 5.7. Find the mode of the following data 123, 132, 145, 176, 180, 120.

Solution:

There is no repetition of values.

There is no mode.

Mode:

* Mode is the value of the data which occurs maximum number of times.
* A data is of large size, mode can be found out after grouping.

Example 5.8 Find the mode of the following data. 14, 15, 12, 14, 16, 15, 17, 13, 16, 16, 15, 12, 16, 15, 13, 14, 15, 13, 15, 17, 15, 14, 18, 19, 12, 14, 15, 16, 15, 16, 13, 12.

Solution:

Observation	Tally marks	Frequency
12	𝍸	4
13	𝍸	4
14	𝍸	5
15	𝍸 𝍸	9
16	𝍸	6
17	𝍸	2
18	𝍸	1
19	𝍸	1
	Total	32

Highest frequency = 9

Mode = 15

Example 5.9 The following data shows that the number of hours spent by the students for study.

Number of study hours	1	2	3	4	5	6
Number of students	4	2	1	2	1	0

Find the mode.

Solution:

One hour study time is spent by maximum number of students.

Mode = 1 hour

Exercise 5.2

1. Find the mode of the following data.
2, 4, 5, 2, 6, 7, 2, 7, 5, 4, 8, 6, 10, 3, 2, 4, 2.

Solution:

Arranging the numbers in ascending order.

2, 2, 2, 2, 2, 3, 4, 4, 4, 5, 5, 6, 6, 7, 7, 8, 10

2 occurs maximum number of times

mode = 2

2. The number of points scored by a kabaddi team in 20 matches are 36, 35, 27, 28, 29, 31, 32, 31, 35, 38, 38, 31, 28, 31, 34, 33, 34, 31, 30, 29. Find the mode of the goals scored by the team.

Solution:

Arranging the points in ascending order.

27, 28, 28, 29, 29, 30, 31, 31, 31, 31, 31, 32, 33, 34, 34, 35, 35, 36, 38, 38.

31 occurs maximum number of times.

mode = 31

3. The ages (in years) of IRCricket players are given below. 25, 36, 39, 38, 40, 36, 25, 25, 38, 26, 36. Find the mode of their ages.

Solution:

Arranging the ages in ascending order.

25, 25, 25, 26, 36, 36, 36, 38, 38, 39, 40.

25 and 36 occurs maximum number of times.

mode = 25 and 36.

4. Find the mode of the following data.
12, 14, 12, 16, 15, 13, 14, 18, 19, 12, 14, 15, 16, 15, 16, 16, 15, 17, 13, 16, 16, 15, 15, 13, 15, 17, 15, 14, 15, 13, 15, 14.

Solution:

Observation	Tally marks	frequency
12	𝍸	3
13	𝍸	4
14	𝍸	5
15	𝍸 𝍸	10
16	𝍸	6
17	𝍸	2
18	𝍸	1
19	𝍸	1
	Total	32

Highest frequency = 10

Mode = 15

Objective type questions

5. The colours used by the six students for drawing is blue, orange, yellow, white, green, and blue then the mode is _____.

blue colour occurs maximum number of times

mode = blue

Ans: (i) blue

6. Find the mode of data 3, 6, 9, 12, 15

There is no repetition of values.

There is no mode.

Ans: (iv) No mode

7. Find the modes of the data 2, 1, 1, 3, 4, 5, 2.

Arranging the numbers in ascending order.

1, 1, 2, 2, 3, 4, 5

1 and 2 occurs maximum number of times

Ans: (iii) 2 and 1

Median:

Median is the middle most value of the given data.

To find the median,

(i) Arrange the data in ascending or descending order.

(ii) If n = odd, $\left(\frac{n+1}{2}\right)^{th}$ term is the median.

(iii) If n = even, $\left(\frac{n}{2}\right)^{th}$ and $\left(\frac{n}{2}+1\right)^{th}$ term is the median.

Example 5.10

Find the median of the following golf scores. 68, 79, 78, 65, 75, 70, 73.

Solution:

Arranging the golf scores in ascending order.

65, 68, 70, 73, 75, 78, 79

n = 7 (odd)

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

$$= \left(\frac{7+1}{2}\right)^{th} \text{ term}$$

$$= \left(\frac{8}{2}\right)^{th} \text{ term}$$

$$= 4^{th} \text{ term}$$

Median = 73

Example 5.11

The weights of 10 students (in kg) are 35, 42, 40, 38, 25, 32, 29, 45, 20, 24. Find the median of their weight?

Solution:

Arranging the weights in ascending order

20, 24, 25, 29, 32, 35, 38, 40, 42, 45

n = 10 (even)

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

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

$$= \frac{1}{2}\left\{5^{th} \text{ term} + 6^{th} \text{ term}\right\}$$

$$= \frac{1}{2}\left\{32 + 35\right\} \text{ kg}$$

$$= \frac{1}{2}\left\{67\right\} \text{ kg}$$

$$= 33.5 \text{ kg}$$

Median is 33.5 kg

Example 5.12

Create a collection of 12 observations with median 16.

Solution:

The number of observations = 12 (even)

There are 2 middle values.

Average = 16

$$\frac{14+18}{2} = 16$$

Required data is 2, 4, 7, 9, 12, 14, 18, 24, 28, 30, 45, 62.

Example 5.13

The lifetime (in days) of 11 types of LED bulbs is given in days. 365, 547, 730, 1095, 547, 912, 365, 1460, 1825, 1500, 2000. Find the median life time of the LED bulbs.

Solution:

Arranging the data in ascending order.

365, 365, 547, 547, 730, 912, 1095, 1460, 1500, 1825, 2000

n = 11 (odd)

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

$$= \left(\frac{11+1}{2}\right)^{th} \text{ term}$$

$$= \left(\frac{12}{2}\right)^{th} \text{ term}$$

$$= 6^{th} \text{ term}$$

Median = 912

The median lifetime of the LED bulb = 912 days

Example 5.14

Find the Median of the following data 12, 7, 23, 14, 19, 10, 5, 26.

Solution:

Arranging the data in ascending order.

5, 7, 10, 12, 14, 19, 23, 26

n = 8 (even)

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

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

$$= \frac{1}{2}\left\{4^{th} \text{ term} + 5^{th} \text{ term}\right\}$$

$$= \frac{1}{2}\left\{12 + 14\right\}$$

$$= \frac{1}{2}\left\{26\right\}$$

Median = 13

Exercise 5.3

1. Fill in the blanks.

(i) The median of the data 12, 14, 23, 25, 34, 11, 42, 45, 32, 22, 44 is _____.

Arranging the data in ascending order

11, 12, 14, 22, 23, 25, 32, 34, 42, 44, 45

n = 11 (odd)

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

$$= \left(\frac{11+1}{2}\right)^{th} \text{ term}$$

$$= \left(\frac{12}{2}\right)^{th} \text{ term}$$

$$= 6^{th} \text{ term}$$

Median = 25

(ii) The median of first ten even natural numbers is _____.

2, 4, 6, 8, 10, 12, 14, 16, 18, 20

$n = 10$ (even)

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

$$= \frac{1}{2}\left\{5^{th}\text{ term} + 6^{th}\text{ term}\right\}$$

$$= \frac{1}{2}\{10+12\}$$

$$= \frac{1}{2}\{22\}$$

Median = 11

2. Find the median of the given data:
35, 25, 34, 36, 45, 18, 28

Solution:

Arranging the data in ascending order

18, 25, 28, 34, 35, 36, 45

$n = 7$ (odd)

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

$$= \left(\frac{7+1}{2}\right)^{th}\text{term}$$

$$= \left(\frac{8}{2}\right)^{th}\text{term}$$

$$= 4^{th}\text{ term}$$

Median = 34

3. The weekly sale of motor bikes in a showroom for the past 14 weeks given below. 10, 6, 8, 3, 5, 6, 4, 7, 12, 13, 16, 10, 4, 7. Find the median of the data.

Solution:

Arranging the data in ascending order.

3, 4, 4, 5, 6, 6, 7, 7, 8, 10, 10, 12, 13, 16

$n = 14$ (even)

$$\text{Median} = \frac{1}{2}\left\{\left(\frac{14}{2}\right)^{th}\text{term} + \left(\frac{14}{2}+1\right)^{th}\text{term}\right\}$$

$$= \frac{1}{2}\left\{7^{th}\text{ term} + 8^{th}\text{ term}\right\}$$

$$= \frac{1}{2}\{7+7\}$$

$$= \frac{1}{2}\{14\}$$

Median = 7

4. Find the median of the 10 observations 36, 33, 45, 28, 39, 45, 54, 23, 56, 25. If another observation 35 is added to the above data, what would be the new median?

Solution:

Arranging the data in ascending order.

23, 25, 28, 33, 36, 39, 45, 45, 54, 56

$n = 10$ (even)

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

$$= \frac{1}{2}\left\{5^{th}\text{ term} + 6^{th}\text{ term}\right\}$$

$$= \frac{1}{2}\{36+39\}$$

$$= \frac{1}{2}\{75\}$$

Median = 37.5

The added new observation = 35

$\therefore$ 23, 25, 28, 33, 35, 36, 39, 45, 45, 54, 56 ($n = 11$ (odd))

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

$$= \left(\frac{11+1}{2}\right)^{th}\text{term}$$

$$= \left(\frac{12}{2}\right)^{th}\text{term}$$

$$= 6^{th}\text{ term}$$

Median = 36

Objective type questions

5. If the median of $a, 2a, 49, 69, 9a$ is 8, then find the value of a is

$n = 5$ (odd)

Median = 8

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

$$= \left(\frac{5+1}{2}\right)^{th}\text{term}$$

$$= \left(\frac{6}{2}\right)^{th}\text{term}$$

$$= 3^{rd}\text{ term}$$

Median = $4a$

$4a = 8$

$a = \frac{8}{4}$

$a = 2$

Ans: (iii) 2

6. The median of the data 24, 29, 34, 38, 35 and 30 is _____.

Arranging the data in ascending order

24, 29, 30, 34, 35, 38

$n = 6$ (even)

$$\text{Median} = \frac{1}{2}\left\{\left(\frac{6}{2}\right)^{th}\text{term} + \left(\frac{6}{2}+1\right)^{th}\text{term}\right\}$$

$$= \frac{1}{2}\left\{3^{rd}\text{ term} + 4^{th}\text{ term}\right\}$$

$$= \frac{1}{2}\{30+34\}$$

$$= \frac{1}{2}\{64\}$$

Median = 32

Ans: (iv) 32

7. The median of first 6 odd natural numbers is

1, 3, 5, 7, 9, 11

$n = 6$ (even)

$$\text{Median} = \frac{1}{2}\left\{\left(\frac{6}{2}\right)^{th}\text{term} + \left(\frac{6}{2}+1\right)^{th}\text{term}\right\}$$

$$= \frac{1}{2}\left\{3^{rd}\text{ term} + 4^{th}\text{ term}\right\}$$

$$= \frac{1}{2}\{5+7\}$$

$$= \frac{1}{2}\{12\}$$

Median = 6

Ans: (i) 6

Exercise 5.4

Miscellaneous practice problems

1. Arithmetic mean of 15 observations was calculated as 85. In doing so an observation was wrongly taken as 73 for 28. What would be correct mean?

Solution:

$$\text{Arithmetic mean} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

$$\frac{\text{Sum of 15 observations}}{15} = 85$$

Sum of 15 observations $= 85 \times 15$

Sum of 15 observations $= 1275$

Wrong observation $= 73$

Correct observation $= 28$

$$\text{Correct mean} = \frac{\text{Sum} - \text{Wrong value} + \text{correct value}}{\text{Number of observation}}$$

$$= \frac{1275 - 73 + 28}{15}$$

$$= \frac{1202 + 28}{15}$$

$$= \frac{1230}{15}$$

$$= 82$$

Correct mean = 82

2. Find the median of 25, 16, 15, 10, 8, 30.

Solution:

Arranging the values in ascending order

8, 10, 15, 16, 25, 30

$n = 6$ (even)

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

$$= \frac{1}{2}\left\{\left(\frac{6}{2}\right)^{th} \text{term} + \left(\frac{6}{2}+1\right)^{th} \text{term}\right\}$$

$$= \frac{1}{2}\left\{3^{rd} \text{ term} + 4^{th} \text{ term}\right\}$$

$$= \frac{1}{2}\{15+16\}$$

$$= \frac{1}{2}\{31\}$$

Median = 15.5

3. Find the mode of 2, 5, 5, 1, 3, 2, 2, 1, 3, 5, 3

Solution:

Arranging the data in ascending order

1, 1, 2, 2, 2, 3, 3, 3, 5, 5, 5.

2, 3 and 5 occurs maximum number of times.

Mode = 2, 3 and 5.

4. Marks scored by the students in Social test out of 20 marks are as follows: 12, 10, 8, 18, 14, 16. Find the mean and median.

Solution:

Arranging the given data in ascending order

8, 10, 12, 14, 16, 18

$$\text{Mean} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

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

$$= \frac{78}{6}$$

$$= 13$$

Mean = 13

$n = 6$ (even)

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

$$= \frac{1}{2}\left\{\left(\frac{6}{2}\right)^{th} \text{term} + \left(\frac{6}{2}+1\right)^{th} \text{term}\right\}$$

$$= \frac{1}{2}\left\{3^{rd} \text{ term} + 4^{th} \text{ term}\right\}$$

$$= \frac{1}{2}\{12+14\}$$

$$= \frac{1}{2}\{26\}$$

$$= 13$$

Median = 13

5. The number of goals scored by a football team is given below. Find the mode and median for the data of 2, 3, 2, 4, 6, 1, 3, 2, 4, 1, 6.

Solution:

Arranging the given data in ascending order

1, 1, 2, 2, 2, 3, 3, 4, 4, 6, 6

2 occurs maximum number of times

mode = 2

$n = 11$ (odd)

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

$$= \left(\frac{11+1}{2}\right)^{th} \text{term}$$

$$= \left(\frac{12}{2}\right)^{th} \text{term}$$

$$= 6^{th} \text{ term}$$

Median = 3

6. Find the mean and mode of 6, 11, 13, 12, 4, 2.

Solution:

Arranging the values in ascending order

2, 4, 6, 11, 12, 13

$$\text{Mean} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

$$= \frac{2+4+6+11+12+13}{6}$$

$$= \frac{48}{6}$$

$$= 8$$

Mean = 8

There is no repetition of values

There is no mode.

Challenge Problems:

7. The average marks of six students is 8. One more student mark is added and the mean is still 8. Find the student mark that has been added.

Solution:

$$\text{Average} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

$$\frac{\text{Sum of observations}}{6} = 8$$

Sum of observations = 8×6

Sum of observations = 48

One more mark is added.

Number of observations $= 6 + 1 = 7$

Let the number be x.

$$\frac{48+x}{7} = 8$$

$$48 + x = 8 \times 7$$

$$48 + x = 56$$

$$x = 56 - 48$$

$$\boxed{x = 8}$$

∴ The student mark that has been added = 8.

8. Calculate the mean, mode and median for the following data: 22, 15, 10, 10, 24, 21.

Solution:

Arranging the data in ascending order

10, 10, 15, 21, 22, 24

$$\text{Mean} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

$$= \frac{10+10+15+21+22+24}{6}$$

$$= \frac{102}{6}$$

Mean = 17

$n = 6$ (even)

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

$$= \frac{1}{2}\left\{\left(\frac{6}{2}\right)^{th} \text{term} + \left(\frac{6}{2}+1\right)^{th} \text{term}\right\}$$

$$= \frac{1}{2}\left\{3^{rd} \text{ term} + 4^{th} \text{ term}\right\}$$

$$= \frac{1}{2}\{15+21\}$$

$$= \frac{1}{2}\{36\}$$

Median = 18

10 occurs maximum number of times.

Mode = 10

9. Find the median of the given data:

14, −3, 0, −2, −8, 13, −1, 7

Solution:

Arranging the data in ascending order

−8, −3, −2, −1, 0, 7, 13, 14

$n = 8$ (even)

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

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

$$= \frac{1}{2}\left\{4^{th} \text{ term} + 5^{th} \text{ term}\right\}$$

$$= \frac{1}{2}\{-1+0\}$$

$$= \frac{1}{2}\{-1\}$$

$$= \frac{-1}{2}$$

Median = −0.5

10. Find the mean of the first 10 prime numbers and first 10 composite numbers.

Solution:

1st 10 prime numbers are

2, 3, 5, 7, 11, 13, 17, 19, 23, 29

$$\text{Mean} = \frac{2+3+5+7+11+13+17+19+23+29}{10}$$

$$= \frac{129}{10}$$

Mean = 12.9

first 10 composite numbers are

4, 6, 8, 9, 10, 12, 14, 15, 16, 18

$$\text{Mean} = \frac{4+6+8+9+10+12+14+15+16+18}{10}$$

$$= \frac{112}{10}$$

Mean = 11.2