Mean and Median

EXERCISE 34 (A)

Question 1.

Find the mean of :

(i) 7,10, 4 and 17

(ii) 12, 9, 6,11 and 17

(iii) 3, 1, 5, 4, 4 and 7

(iv) 7, 5, 0, 3, 0, 6, 0, 9, 1 and 4

(v) 2.1, 4.5, 5.2, 7.1 and 9.3

(vi) 5, 2.4, 6.2, 8.9, 4.1 and 3.4

Answer:

(*i*) 7, 10, 4 and 17

$$\text{Required mean} = \frac{\text{Sum of data values}}{\text{No. of data values}}$$

$$= \frac{7+10+4+17}{4}$$

$$= \frac{38}{4} = 9{\cdot}5$$

(*ii*) Mean of 12, 9, 6, 11 and 17

$$\text{Required mean} = \frac{\text{Sum of data values}}{\text{No. of data values}}$$

$$= \frac{12+9+6+11+17}{5}$$

$$= \frac{55}{5} = 11$$

(*iii*) Mean of 3, 1, 5, 4, 4 and 7

$$\text{Required mean} = \frac{\text{Sum of data values}}{\text{No. of data values}}$$

$$= \frac{3+1+5+4+4+7}{6}$$

$$= \frac{24}{6} = 4$$

(*iv*) Mean of 7, 5, 0, 3, 0, 6, 0, 9, 1 and 4

$$\text{Required mean} = \frac{\text{Sum of data values}}{\text{No. of data values}}$$

$$= \frac{7+5+0+3+0+6+0+9+1+4}{10}$$

$$= \frac{35}{10} = 3{\cdot}5$$

(*v*) Mean of 2·1, 4·5, 5·2, 7·1 and 9·3

$$\text{Required mean} = \frac{\text{Sum of data values}}{\text{No. of data values}}$$

$$= \frac{2{\cdot}1+4{\cdot}5+5{\cdot}2+7{\cdot}1+9{\cdot}3}{5}$$

$$= \frac{28{\cdot}2}{5} = 5{\cdot}64$$

(*vi*) Mean of 5, 2·4, 6·2, 8·9, 4·1 and 3·4

$$\text{Required mean} = \frac{\text{Sum of data values}}{\text{No. of data values}}$$

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

$$= \frac{30}{6} = 5$$

Question 2.

Find the mean of :

(i) first eight natural numbers

(ii) first six even natural numbers

(iii) first five odd natural numbers

(iv) all prime numbers upto 30

(v) all prime numbers between 20 and 40.

Answer:

(i) The first eight natural numbers are 1, 2, 3, 4, 5, 6, 7, 8

∴Sum of these observations =1+2+3+4+5+6+7+8=36

and, number of their observations = 8

∴Required mean = $\frac{36}{8}$ = 4.5

(ii) The first six even natural numbers are 1 = 2, 4, 6, 8, 10, 12

∴Sum of these observations = 2, 4, 6, 8, 10, 12 = 42

and, number of their observations = 6
∴ Required mean = $\frac{42}{6}$ = 7

(iii) The first five odd natural numbers are = 1, 3, 5, 7, 9
∴Sum of these observations =1 + 3 + 5 + 7 + 9 = 25
and, number of their observations = 5
∴Required mean = $\frac{25}{5}$ = 5

(iv) The all prime numbers upto 30 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29
∴Sum of these observations = 2 + 3 +5 + 7+ 11 + 13 + 17 + 19 + 23 +29 = 129
and, number of their observations = 10
∴Required mean = $\frac{129}{10}$ = 12-9

(v) All prime numbers between 20 and 40 are 23, 29, 31, 37
Sum of these observations = 23+29 + 31 + 37 = 120 .
and, number of their observations = 4
120
∴ Required mean = $\frac{120}{4}$ = 30

Question 3.
Height (in cm) of 7 boys of a locality are 144 cm, 155 cm, 168 cm, 163 cm, 167 cm, 151 cm and 158 cm. Find their mean height.
Answer:
Sum of the values = Sum of heights
= 144 cm + 155 cm + 168 cm + 163 cm + 167 cm + 151 cm + 158 cm = 1106 cm and
Number of values = Number of boys = 7

$$\therefore \text{ The mean} = \frac{\text{Sum of heights}}{\text{Number of boys}} = \frac{1106}{7} = 158 \text{ cm}$$

Question 4.
Find the mean of 35, 44, 31, 57, 38, 29, 26,36, 41 and 43.
Answer:
Sum of the values = 35 + 44 + 31 + 57 + 38 + 29 + 26 + 36 + 41 + 43 = 380
and Number of values = 10

$$\therefore \text{ Mean} = \frac{\text{Sum of the values}}{\text{Number of the value}} = \frac{380}{10} = 38$$

Question 5.
The mean of 18, 28, x, 32, 14 and 36 is 23. Find the value of x. Sum of data

Answer:

$$\because \text{Mean} = \frac{\text{Sum of data}}{\text{Number of data}}$$

$$\Rightarrow 23 = \frac{18+28+x+32+14+36}{6}$$

$$\Rightarrow 23 = \frac{128+x}{6}$$

$$\Rightarrow 23 \times 6 = 128 + x$$

$$\Rightarrow 138 = 128 + x$$

$$\Rightarrow 138 - 128 = x$$

$$\therefore x = 10$$

Question 6.

If the mean of x, x + 2, x + 4, x + 6 and x + 8 is 13, find the value of x. Sum of data

Answer:

$$\because \text{Mean} = \frac{\text{Sum of data}}{\text{Number of data}}$$

$$\Rightarrow 13 = \frac{x+(x+2)+(x+4)+(x+6)+(x+8)}{5}$$

$$\Rightarrow 13 = \frac{5x+20}{5}$$

$$\Rightarrow 13 \times 5 = 5x + 20$$

$$\Rightarrow 65 - 20 = 5x$$

$$\Rightarrow 45 = 5x$$

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

$$\therefore x = 9$$

EXERCISE 34 (B)

Question 1.

Find the median of

(i) 21, 21, 22, 23, 23, 24, 24, 24, 24, 25 and 25

(ii) 3.2, 4.8, 5.6, 5.6, 7.3, 8.9 and 91

(iii) 17, 23, 36, 12, 18, 23, 40 and 20

(iv) 26, 33, 41, 18, 30, 22, 36, 45 and 24
(v) 80, 48, 66, 61, 75, 52, 45 and 70

Solution:

(*i*) Given data = 21, 21, 22, 23, 23, 24, 24, 24, 24, 25 and 25

Clearly, middle term is 24

$\therefore$ Median = 24

(*ii*) Given data = 3·2, 4·8, 5·6, 5·6, 7·3, 8·9 and 9·1

Clearly, middle term is 5·6

$\therefore$ Median = 5·6

(*iii*) Arranging in ascending order, we get

12, 17, 18, 20, 23, 23, 36, 40

Here, number of terms = 8 which is even

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

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

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

$$= \frac{1}{2}\{20 + 23\}$$

$$= \frac{1}{2} \times 43 = 21{\cdot}5$$

(*iv*) Arranging in ascending order, we get

18, 22, 24, 26, 30, 33, 36, 41, 45

Here, number of terms (n) = 9 which is odd

$$\therefore \text{Median} = \frac{n+1}{2}\text{ th term}$$

$$= \frac{9+1}{2} = 5\text{th term} = 30$$

(v) Arranging in ascending order, we get

45, 48, 52, 61, 66, 70, 75, 80

Here, number of terms = 8 which is even

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

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

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

$$= \frac{1}{2}\{61 + 66\}$$

$$= \frac{1}{2} \times 127 = 63{\cdot}5$$

Question 2.

Find the mean and the median of :

(i) 1,3,4, 5, 9, 9 and 11

(ii) 10,12, 12, 15, 15, 17, 18, 18, 18 and 19

(iii) 2, 4, 5, 8, 10,13 and 14

(iv) 5, 8, 10, 11,13, 16, 19 and 20

(v) 1.2, 1.9, 2.2, 2.6 and 2.9

(vi) 0.5, 5.6, 3.8, 4.9, 2.7 and 4.4.

Solution:

(*i*) Given data = 1, 3, 4, 5, 9, 9 and 11

Clearly middle term = 5

$\therefore$ Median = 5

$$\text{Mean} = \frac{\text{Sum of observations}}{\text{Number of observations}} = \frac{1+3+4+5+9+9+11}{7} = \frac{42}{7} = 6$$

$\therefore$ Mean = 6

(*ii*) Given data = 10, 12, 12, 15, 15, 17, 18, 18, 18 and 19

Here, number of terms = 10 which is even

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

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

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

$$= \frac{1}{2}\{15 + 17\}$$

$$= \frac{1}{2} \times 32 = 16$$

$\therefore$ Median = 16

$$\text{Mean} = \frac{\text{Sum of observations}}{\text{Number of observations}} = \frac{10+12+12+15+15+17+18+18+18+19}{10}$$

$$= \frac{154}{10} = 15{\cdot}4$$

(*iii*) Given data = 2, 4, 5, 8, 10, 13 and 14

Clearly, middle term is 8

$\therefore$ Median = 8

$$\therefore \text{Mean} = \frac{\text{Sum of observations}}{\text{Number of observations}} = \frac{2+4+5+8+10+13+14}{7} = \frac{56}{7} = 8$$

(*iv*) Given data = 5, 8, 10, 11, 13, 16, 19 and 20

Number of data = 8 which is even

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

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

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

$$= \frac{1}{2}\{11 + 13\}$$

$$= \frac{1}{2} \times 24 = 12$$

$$\therefore \text{Mean} = \frac{\text{Sum of observations}}{\text{Number of observations}} = \frac{5+8+10+11+13+16+19+20}{8} = \frac{102}{8} = 17{\cdot}75$$

(*v*) 1·2, 1·9, 2·2, 2·6 and 2·9

Clearly, middle term is 2·2

$\therefore$ Median = 2·2

$$\therefore \text{Mean} = \frac{\text{Sum of observations}}{\text{Number of observations}} = \frac{1{\cdot}2+1{\cdot}9+2{\cdot}2+2{\cdot}6+2{\cdot}9}{5} = \frac{10{\cdot}8}{5} = 2{\cdot}16$$

(*vi*) Arranging in ascending order, we get

0·5, 2·7, 3·8, 4·4, 4·9, 5·6

Here, number of terms (n) = 6 which is even

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

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

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

$$= \frac{1}{2}\{3.8 + 4.4\}$$

$$= \frac{1}{2} \times 8.2 = 4{\cdot}1$$

$$\therefore \text{ Mean} = \frac{\text{Sum of observations}}{\text{Number of observations}} = \frac{0{\cdot}5 + 2{\cdot}7 + 3{\cdot}8 + 4{\cdot}4 + 4{\cdot}9 + 5{\cdot}6}{6} = \frac{21{\cdot}9}{6} = 3{\cdot}65$$