

Exercise 24.1

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**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:**

The heights of 5 persons are 140 cm , 150 cm , 152 cm , 158 cm and 161 cm (Given)

Mean height = (Sum of heights) / (Total number of persons)

Sum of heights =  $140 + 150 + 152 + 158 + 161 = 761$

Total number of persons = 5

So, Mean height =  $761/5 = 152.2$

**Question 2:** Find the mean of 994 , 996 , 998 , 1002 , 1000.

**Solution:**

Sum of numbers =  $994 + 996 + 998 + 1000 + 1000 = 4990$

Total counts = 5

Therefore, Mean = (Sum of numbers)/(Total Counts)

=  $4990/5$

= 998

Mean = 998

**Question 3:** Find the mean of first five natural numbers.

**Solution:**

First five natural numbers are 1 , 2 , 3 , 4 , 5.

Sum of all the numbers =  $1 + 2 + 3 + 4 + 5 = 15$

Total Numbers = 5

Therefore, Mean = (Sum of numbers)/(Total Numbers)

=  $15/5$

= 3

Mean = 3

**Question 4: Find the mean of all factors of 10.**

**Solution:**

Factors of 10 are 1, 2, 5, 10.

Sum of all the factors =  $1+2+5+10 = 18$

Total Numbers = 4

Therefore, Mean = (Sum of factors)/(Total Numbers)  
=  $18/4$   
= 4.5

Mean = 4.5

**Question 5: Find the mean of first 10 even natural numbers.**

**Solution:**

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

Sum of numbers =  $2+4+6+8+10+12+14+16+18+20 = 110$

Total Numbers = 10

Now,

Mean = (Sum of numbers) / (Total Numbers)

=  $110/10$

Mean = 11

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

**Solution:**

Given numbers are  $x, x + 2, x + 4, x + 6, x + 8$ .

Sum of numbers =  $x+(x+2) + (x+4) + (x+6) + (x+8) = 5x+20$

Total Numbers = 5

Now,

$$\text{Mean} = (\text{Sum of numbers}) / (\text{Total Numbers})$$

$$= (5x+20)/5$$

$$= 5(x + 4)/5$$

$$= x + 4$$

$$\text{Mean} = x + 4$$

**Question 7: Find the mean of first five multiples of 3.**

**Solution:**

First five multiples of 3 are 3 , 6 , 9 , 12 , 15.

$$\text{Sum of numbers} = 3+6+9+12+15 = 45$$

$$\text{Total Numbers} = 5$$

Now,

$$\text{Mean} = (\text{Sum of numbers}) / (\text{Total Numbers})$$

$$= 45/5$$

$$= 9$$

$$\text{Mean} = 9$$

**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.**

**Solution:**

The weights of 10 new born babies (in kg): 3.4 , 3 .6 , 4.2 , 4.5 , 3.9 , 4.1 , 3.8 , 4.5 , 4.4 , 3.6

$$\text{Sum of weights} = 3.4+3.6+4.2+4.5+3.9+4.1+3.8+4.5+4.4+3.6 = 40$$

$$\text{Total number of babies} = 10$$

No, Mean = (Sum of weights) / (Total number of babies)

$$= 40/10$$

$$= 4$$

Mean weight = 4 kg

**Question 9: The percentage 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:**

The percentage marks obtained by students: 64 , 36 , 47 , 23 , 0 , 19 , 81 , 93 , 72 , 35 , 3 , 1

$$\text{Sum of marks} = 64+36+47+23+0+19+81+93+72+35+3+1 = 474$$

Total students = 12

Now, Mean marks = (Sum of marks) / (Total students)

$$= 474/12$$

$$= 39.5$$

Mean Marks = 39.5

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

**Solution:**

The numbers of children in 10 families: 2 , 4 , 3 , 4 , 2 , 3 , 5 , 1 , 1 , 5

$$\text{Total number of children} = 2+4+3+4+2+3+5+1+1+5 = 30$$

Total Families = 10

Number of children per family = Mean = (Total number of children) / (Total Families) = 30/10

$$= 3$$

Therefore, Number of children per family is 3.

Exercise 24.2

**Question 1: Calculate the mean for the following distribution:**

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

**Solution:**

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

Formula to calculate mean:

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

$$= 281/40$$

$$= 7.025$$

=> Mean for the given distribution is 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:**

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		$\sum fx = 2650$

Formula to calculate mean:

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

$$= 2650/106$$

$$= 25$$

=> Mean for the given data is 25.

**Question 3: 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:**

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

Formula to calculate mean:

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

$$= (25p + 530)/50$$

$$\text{Mean} = 20.6 \text{ (Given)}$$

So,

$$20.6 = (25p + 530)/50$$

$$25p + 530 = 1030$$

$$25p = 1030 - 530 = 500$$

$$\text{or } p = 20$$

=> The value of p is 20.

**Question 4: If the mean of the following data is 15, find p.**

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

**Solution:**

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

Formula to calculate mean:

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

$$= (10p + 445)/(p + 27)$$

Mean = 15 (Given)

$$\text{So, } (10p + 445)/(p + 27) = 15$$

$$10p + 445 = 15(p + 27)$$

$$10p - 15p = 405 - 445 = -40$$

$$-5p = -40$$

$$\text{or } p = 8$$

=> The value of p is 8.

**Question 5:** 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:**

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		$\sum fx = 24p + 1228$

Formula to calculate mean:

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

$$= (24p + 1228)/100$$

$$\text{Mean} = 16.6 \text{ (given)}$$

$$\text{So, } (24p + 1228)/100 = 16.6$$

$$24p + 1228 = 1660$$

$$24p = 1660 - 1228 = 432$$

$$p = 432/24 = 18$$

=> The value of p is 18.

**Question 6:** 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:**

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

Formula to calculate mean:

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

$$= (7p + 524)/50$$

$$\text{Mean} = 12.58 \text{ (given)}$$

$$\text{So, } (7p + 524)/50 = 12.58$$

$$7p + 524 = 12.58 \times 50$$

$$7p + 524 = 629$$

$$7p = 629 - 524 = 105$$

$$p = 105/7 = 15$$

=> The value of  $p$  is 15.

**Question 7:** 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:**

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

Formula to calculate mean:

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

$$= (9p + 303)/(p + 41)$$

$$\text{Mean} = 7.68 \text{ (given)}$$

$$\text{So, } (9p + 303)/(p + 41) = 7.68$$

$$9p + 303 = 7.68(p + 41)$$

$$9p + 303 = 7.68p + 314.88$$

$$9p - 7.68p = 314.88 - 303$$

$$1.32p = 11.88$$

$$\text{or } p = (11.881)/(1.32) = 9$$

$\Rightarrow$  The value of  $p$  is 9.

### Exercise 24.3

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**Question 1: Find the median of the following data:**

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

**Solution:**

Arranging given numbers in ascending order:

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

Here, Total number of terms =  $n = 10$  (even)

$$\begin{aligned}\therefore \text{median} &= \frac{\frac{n}{2} \text{th value} + \left(\frac{n}{2} + 1\right) \text{th value}}{2} \\ &= \frac{\frac{10}{2} \text{th value} + \left(\frac{10}{2} + 1\right) \text{th value}}{2} \\ &= \frac{5\text{th value} + 6\text{th value}}{2} \\ &= \frac{45 + 54}{2} \\ &= \frac{99}{2} = 49.5\end{aligned}$$

**Question 2: Find the median of the following data:**

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

**Solution:**

Arranging given numbers in ascending order:

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

Here, total number of terms =  $n = 10$  (even)

$$\begin{aligned}
 \therefore \text{median} &= \frac{\frac{n}{2} \text{th value} + \left(\frac{n}{2} + 1\right) \text{th value}}{2} \\
 &= \frac{\frac{10}{2} \text{th value} + \left(\frac{10}{2} + 1\right) \text{th value}}{2} \\
 &= \frac{5 \text{th value} + 6 \text{th value}}{2} \\
 &= \frac{94 + 100}{2} \\
 &= \frac{194}{2} = 97
 \end{aligned}$$

**Question 3: Find the median of the following data:**

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

**Solution:**

Arranging given numbers in ascending order

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

Here, total number of terms =  $n = 8$  (even)

$$\begin{aligned}
 \therefore \text{median} &= \frac{\frac{n}{2} \text{th value} + \left(\frac{n}{2} + 1\right) \text{th value}}{2} \\
 &= \frac{\frac{8}{2} \text{th value} + \left(\frac{8}{2} + 1\right) \text{th value}}{2} \\
 &= \frac{4 \text{th value} + 5 \text{th value}}{2} \\
 &= \frac{31 + 35}{2} \\
 &= \frac{66}{2} = 33
 \end{aligned}$$

**Question 4: Find the median of the following data:**

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

**Solution:**

Arranging given numbers in ascending order

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

Here, total number of terms =  $n = 9$  (odd)

$$\begin{aligned}\therefore \text{Median} &= \left(\frac{n+1}{2}\right) \text{th term} \\ &= \left(\frac{9+1}{2}\right) \text{th term} \\ &= 5\text{th term} = 16\end{aligned}$$

**Question 5: Find the median of the following data:**

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

**Solution:**

Arranging given numbers in ascending order

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

Here, total number of terms =  $n = 9$  (odd)

$$\begin{aligned}\therefore \text{Median} &= \left(\frac{n+1}{2}\right) \text{th term} \\ &= \left(\frac{9+1}{2}\right) \text{th term} \\ &= 5\text{th term} = 71\end{aligned}$$

**Question 6: Find the median of the following data:**

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

**Solution:**

Arranging given numbers in ascending order

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

Here, total number of terms =  $n = 10$  (even)

$$\begin{aligned}
 \therefore \text{median} &= \frac{\frac{n}{2} \text{th value} + \left(\frac{n}{2} + 1\right) \text{th value}}{2} \\
 &= \frac{\frac{10}{2} \text{th value} + \left(\frac{10}{2} + 1\right) \text{th value}}{2} \\
 &= \frac{5 \text{th value} + 6 \text{th value}}{2} \\
 &= \frac{26 + 29}{2} \\
 &= \frac{55}{2} = 27.5
 \end{aligned}$$

**Question 7: Find the median of the following data:**  
**12, 17, 3, 14, 5, 8, 7, 15**

**Solution:**

Arranging given numbers in ascending order  
 3, 5, 7, 8, 12, 14, 15, 17

Here, total number of terms = n = 8 (even)

$$\begin{aligned}
 \therefore \text{median} &= \frac{\frac{n}{2} \text{th value} + \left(\frac{n}{2} + 1\right) \text{th value}}{2} \\
 &= \frac{\frac{8}{2} \text{th value} + \left(\frac{8}{2} + 1\right) \text{th value}}{2} \\
 &= \frac{4 \text{th value} + 5 \text{th value}}{2} \\
 &= \frac{8 + 12}{2} \\
 &= \frac{20}{2} = 10
 \end{aligned}$$

**Question 8: Find the median of the following data:**  
**92, 35, 67, 85, 72, 81, 56, 51, 42, 69**

**Solution:**

Arranging given numbers in ascending order

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

Here, total number of terms = n = 10 (even)

$$\begin{aligned}\therefore \text{median} &= \frac{\frac{n}{2} \text{th value} + \left(\frac{n}{2} + 1\right) \text{th value}}{2} \\ &= \frac{\frac{10}{2} \text{th value} + \left(\frac{10}{2} + 1\right) \text{th value}}{2} \\ &= \frac{5 \text{th value} + 6 \text{th value}}{2} \\ &= \frac{67 + 69}{2} \\ &= \frac{136}{2} = 68\end{aligned}$$





Exercise 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:**

Mode is the value which occurs most frequently in a set of observations.

Frequency of given set of observations are:

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

Here, we can see that 7 occurred most frequently.

So, Mode = 7

**Question 2:** Find out the mode from the following data :

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

**Solution:**

Find the frequency of given set of observations:

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

125 occurred for 4 times than any other values.

So, 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:**

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Find the frequency:

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

Maximum frequency 4 corresponds to the value 7.2.

So, mode = 7.2



Exercise VSAQs

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**Question 1:** If the ratio of mean and median of a certain data is 2:3, then find the ratio of its mode and mean.

**Solution:**

Empirical formula: Mode = 3 median - 2 mean

Since, ratio of mean and median of a certain data is 2:3, then mean = 2x and median = 3x

$$\begin{aligned}\text{Mode} &= 3(3x) - 2(2x) \\ &= 9x - 4x \\ &= 5x\end{aligned}$$

Therefore,

$$\text{Mode: Mean} = 5x:2x \text{ or } 5:2$$

**Question 2:** If the ratio of mode and median of a certain data is 6 : 5, then find the ratio of its mean and median.

**Solution:** We know, Empirical formula: Mode = 3 Median - 2 Mean

Since, ratio of mode and median of a certain data is 6:5.

$$\Rightarrow \text{Mode/Median} = 6/5$$

$$\text{or Mode} = (6 \text{ Median})/5$$

Now,

$$(6 \text{ Median})/5 = 3 \text{ Median} - 2 \text{ Mean}$$

$$(6 \text{ Median})/5 - 3 \text{ Median} = - 2 \text{ Mean}$$

$$\text{or } 9/10 (\text{Median}) = \text{Mean}$$

$$\text{or Mean/ Median} = 9/10 \text{ or } 9:10.$$

**Question 3:** If the mean of  $x+2$ ,  $2x+3$ ,  $3x+4$ ,  $4x+5$  is  $x+2$ , find  $x$ .

**Solution:**

Given: Mean of  $x+2$ ,  $2x+3$ ,  $3x+4$ ,  $4x+5$  is  $x+2$

We know, Mean = (Sum of all the observations) / (Total number of observations)

Sum of all the observations =  $x+2 + 2x+3 + 3x+4 + 4x+5 = 10x + 14$

Total number of observations = 4

$\Rightarrow$  Mean =  $(10x + 14)/4$

or  $(x + 2) = (10x + 14)/4$  (using given)

$4x + 8 = 10x + 14$

$x = -1$

**Question 4:** The arithmetic mean and mode of a data are 24 and 12 respectively, then find the median of the data.

**Solution:**

Given: The arithmetic mean and mode of a data are 24 and 12 respectively

We know, Empirical formula: Mode = 3 Median - 2 Mean

or 3 Median = Mode + 2 Mean

Using given values, we get

3 Median =  $12 + 2(24) = 60$

or Median = 20

**Question 5: If the difference of mode and median of a data is 24, then find the difference of median and mean.**

**Solution:**

Given: difference of mode and median of a data is 24.

That is, Mode - Median = 24

or Mode = 24 + Median ... (1)

We know, Empirical formula: Mode = 3 Median - 2 Mean

24 + Median = 3 Median - 2 Mean  
(Using (1))

24 = 2 Median - 2 Mean

or 12 = Median - Mean

Therefore, the difference of median and mean is 12.