

NCERT Solutions for Class 10 Maths Chapter 14 Statistics

EXERCISE 14.2:

1. The following table shows the ages of the patients admitted in a hospital during a year:

Age (in years)	5 - 15	15 - 25	25 - 35	35 - 45	45 - 55	55 - 65
Number of patients	6	11	21	23	14	5

Find the mode and the mean of the data given above. Compare and interpret the two measures of central tendency

Solution: As per the question:

Modal class = 35 -45

$l = 35$

$h = 10$

$f_1 = 23$

$f_0 = 21$

$f_2 = 14$

$$\begin{aligned} \text{Mode} &= l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) h \\ &= 35 + \left(\frac{23-21}{2 \times 23 - 21 - 14} \right) 10 \\ &= 35 + \frac{2}{11} \times 10 \\ &= 36.8 \end{aligned}$$

The above given data can be represented in the form of table as below:

Class Interval	f_i	x_i	fix_i
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5-15	6	10	60
15-25	11	20	220
25-35	21	30	630
35-45	23	40	920
45-55	14	50	700
55-65	5	60	300
	$\Sigma f_i=80$		$\Sigma fix_i=2830$

$$\bar{x} = \frac{\Sigma fix_i}{\Sigma f_i}$$

$$= \frac{2830}{80}$$

$$= 35.37$$

The mode of the data shows that maximum number of patients in the age group of 26.8, whereas the average age of all the patients is 35.37

2. The following data gives the information on the observed lifetimes (in hours) of 225 electrical components:

Lifetimes (in hours)	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	100 - 120
Frequency	10	35	52	61	38	29

Determine the modal lifetimes of the components

Solution: As per the question:

Modal class = 60-80

$l = 60$

$$h = 20$$

$$f_1 = 61$$

$$f_0 = 52$$

$$f_2 = 38$$

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) h$$

$$= 60 + \left(\frac{61 - 52}{2 \times 61 - 52 - 38} \right) 20$$

$$= 60 + \frac{6}{32} \times 20$$

$$= 65.62$$

3. The following data gives the distribution of total monthly household expenditure of 200 families of a village. Find the modal monthly expenditure of the families. Also, find the mean monthly expenditure:

Expenditure (in Rs)	Number of families
1000 – 1500	24
1500 - 2000	40
2000 - 2500	33
2500 - 3000	28
3000 - 3500	30
3500 - 4000	22
4000 - 4500	16
4500 – 5000	7

Solution: As per the question:

Modal class = 1500-2000

$l = 1500$

$h = 500$

$f_1 = 40$

$f_0 = 24$

$f_2 = 33$

$$\begin{aligned} \text{Mode} &= l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) h \\ &= 1500 + \left(\frac{40 - 24}{2 \times 40 - 24 - 33} \right) 500 \\ &= 1500 + \frac{16}{23} \times 5000 \\ &= 1847.82 \end{aligned}$$

The above given data can be represented in the form of table as below:

Class interval	f_i	x_i	$d_i = x_i - a$	u_i	$f_i u_i$
1000-1500	24	1250	-1500	-3	-72
1500-2000	40	1750	-1000	-2	-80
2000-2500	33	2250	-500	-1	-33
2500-3000	28	2750	0	0	0

3000-3500	30	3250	500	1	30
3500-4000	22	3750	1000	2	44
4000-4500	16	4250	1500	3	48
4500-5000	7	4750	2000	4	28
	Σf_i =200				$\Sigma f_i u_i$ = -35

Hence, the mean can be calculated as below:

$$\begin{aligned}
 \bar{x} &= a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h \\
 &= 2750 + \frac{-35}{200} \times 500 \\
 &= 2750 - 87.5 \\
 &= 2662.50
 \end{aligned}$$

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4. The following distribution gives the state-wise teacher-student ratio in higher secondary schools of India. Find the mode and mean of this data. Interpret the two measures

Number of students per teacher	Number of states / U.T.
15 – 20	3

20 – 25	8
25 – 30	9
30 – 35	10
35 – 40	3
40 – 45	0
45 – 50	0
50 – 55	2

Solution: As per the question:

Modal class = 30-35

$l = 30$

$h = 5$

$f_1 = 10$

$f_0 = 9$

$f_2 = 3$

$$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) h$$

$$= 30 + \left(\frac{10-9}{2 \times 10 - 9 - 3} \right) 5$$

$$= 30 + \frac{1}{8} \times 5$$

$$= 30.625$$

Class interval	f_i	x_i	$d_i = x_i - a$	u_i	$f_i u_i$
15-20	3	17.5	-15	-3	-9
20-25	8	22.5	-10	-2	-16

25-30	9	27.5	-5	-1	-9
30-35	10	32.5	0	0	0
35-40	3	37.5	5	1	3
40-45	0	42.5	10	2	0
45-50	0	47.5	15	3	0
50-55	2	52.5	20	4	8
	$\Sigma f_i = 35$				$\Sigma f_i u_i = -23$

Hence, the mean can be calculated as below:

$$\begin{aligned}
 \bar{x} &= a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h \\
 &= 32.5 + \frac{-23}{35} \times 5 \\
 &= 32.5 - \frac{23}{7} \\
 &= 29.22
 \end{aligned}$$

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5. The given distribution shows the number of runs scored by some top batsmen of the world in one-day international cricket matches

Runs scored	Number of batsmen
3000 – 4000	4
4000 – 5000	18
5000 – 6000	9

6000 – 7000	7
7000 – 8000	6
8000 – 9000	3
9000 – 10000	1
10000 – 11000	1

Find the mode of the data

Solution: As per the question:

Modal class = 4000-5000

$l = 4000$

$h = 1000$

$f_1 = 18$

$f_0 = 4$

$f_2 = 9$

$$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) h$$

$$= 4000 + \left(\frac{18-4}{2 \times 18 - 4 - 9} \right) 1000$$

$$= 4000 + \frac{14}{23} \times 1000$$

$$= 4608.70s$$

6. A student noted the number of cars passing through a spot on a road for 100 periods each of 3 minutes and summarized it in the table given below.

Find the mode of the data:

Number of cars	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60- 70	70- 80
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Frequency	7	14	13	12	20	11	15	8
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Solution: As per the question:

Modal class = 40-50

$l = 40$

$h = 10$

$f_1 = 20$

$f_0 = 12$

$f_2 = 11$

$$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) h$$

$$= 40 + \left(\frac{20-12}{2 \times 20 - 12 - 11} \right) 10$$

$$= 40 + \frac{8}{17} \times 10$$

$$= 44.70$$

