NCERT Solutions For Class 10 Maths Chapter 14 Statistics Exercise 14.2

Exercise 14.2

Q1. 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.

Ans. For Mode: In the given data, maximum frequency is 23 and it corresponds to the class interval $35-45$.

$\therefore$ Modal class $= 35-45$

And $l = 35, f_1 = 23, f_0 = 21, f_2 = 14$ and $h = 10$

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

$$= 35 + \left[\frac{23-21}{2(23)-21-14}\right] \times 10$$

$$= 35 + \frac{2}{46-35} \times 10$$

$$= 35 + \frac{20}{11}$$

$$= 35 + 1.8$$

$$= 36.8$$

For Mean:

Age (in years)	No. of patients (f_i)	Class Marks (x_i)	$u_i = \frac{x_i - a}{h}$	$f_i u_i$
5 - 15	6	10	- 2	- 12
15 - 25	11	20	- 1	- 11
25 - 35	21	30	0	0
35 - 45	23	40	1	23
45 - 55	14	50	2	28
45 - 65	5	60	3	15
	$\sum f_i = 80$			$\sum f_i u_i = 43$

From given data, Assume mean (a) = 30, Width of the class (h) = 10

$$\therefore \quad \bar{u} = \frac{\sum f_i u_i}{\sum f_i} = \frac{43}{80} = 0.5375$$

Using formula, Mean $\left(\bar{x}\right) = a + h\bar{u}$ = 30 + 10 (0.5375) = 30 + 5.375 = 35.37

Hence mode of given data is 36.8 years and mean of the given data is 35.37 years.

Also, it is clear from above discussion that average age of a patient admitted in the hospital is 35.37 years and maximum number of patients admitted in the hospital are of age 36.8 years.

Q2. The following data gives the information on the observed lifetimes (in hours) of 225 electrical components:

Life times (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.

Ans. Given: Maximum frequency is 61 and it corresponds to the class interval 60 – 80.

$\therefore$ Modal class = 60 – 80

And $l = 60, f_1 = 61, f_0 = 52, f_2 = 38$ and $h = 20$

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

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

$= 60 + \dfrac{9}{122 - 52 - 38} \times 20$

$= 60 + \dfrac{9}{32} \times 20$

$= 60 + 5.625$

$= 65.625$

Hence modal lifetimes of the components is 65.625 hours.

Q3. 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

Ans. For Mode: Here, Maximum frequency is 40 and it corresponds to the class interval 1500 – 2000.

$\therefore$ Modal class = 1500 – 2000

And $l = 1500, f_1 = 40, f_0 = 24, f_2 = 33$ and $h = 500$

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

$$= 1500 + \left[\frac{40 - 24}{2(40) - 24 - 33} \right] \times 500$$

$$= 1500 + \frac{16}{80 - 24 - 33} \times 500$$

$$= 1500 + \frac{8000}{23}$$

$$= 1500 + 347.83$$

$$= 1847.83$$

For Mean:

Expenditure (in Rs.)	No. of families (f_i)	Class Marks (x_i)	$u_i = \frac{x_i - a}{h}$	$f_i u_i$
1000 - 1500	24	1250	- 3	- 72
1500 - 2000	40	1750	- 2	- 80
2000 - 2500	33	2250	- 1	- 33
2500 - 3000	28	2750	0	0
3000 - 3500	30	3250	1	30
3500 - 4000	22	3750	2	44
4000 - 4500	16	4250	3	48
4500 - 5000	7	4750	4	28
	$\sum f_i = 200$			$\sum f_i u_i = -35$

From given data, Assume mean (a) = 2750, Width of the class (h) = 500

$$\therefore \quad \bar{u} = \frac{\sum f_i u_i}{\sum f_i} = \frac{-35}{200} = -0.175$$

Using formula, Mean $\left(\bar{x}\right) = a + h\bar{u}$ = 2750 + 500 (– 0.175) = 2750 – 87.50 = 2662.50

Hence the modal monthly expenditure of family is Rs. 1847.83 and the mean monthly expenditure is Rs. 2662.50.

********** END **********