Chapter 9 - Measures of Central Tendency- Arithmetic Mean

Question 1

Following are the marks obtained by 8 students in statistics. Calculate the arithmetic mean.

Marks	15	18	16	45	32	40	30	28

Solution.

Marks (X)
15
18
16
45
32
40
30
28
X= 224

$$\bar{X} = \frac{\sum X}{N} = \frac{X_1+X_2+\ldots+X_{10}}{10} = \frac{224}{8} = 28$$

Average marks of the 8 students = 28

Question 2

A train runs 25 miles at a speed of 30 mph, another 50 miles at a speed of 40 mph, then due to repairs of the track travels for 6 minutes at a speed of10 mph and finally covers the remaining distance of 24 miles at a speed of 24 mph. What is the average speed in mile per hour?

Solution.

Time taken in covering 25 miles as at speed of 30 mph

= 50 minutes (∵ Time = Distance / Speed)

Time taken in covering 50 miles at a speed of 40 mph

= 75 minutes

Distance covered in 6 minutes at a speed of 10 mph = 1 mile

Time taken in covering 24 miles at speed of 24 mph = 60 minutes

Therefore, taking the time taken as weights we have the weighted mean as:

Speed in mph (X)	**Time taken (W)**	**WX**
30	50	1,500
40	75	3,000
10	6	60
24	60	1,440
	∑W= 191	∑WX= 6,000

$$\text{Weighted Mean, } \bar{X}_w = \frac{\sum WX}{\sum W} = \frac{6{,}000}{191} = 31.41$$

Average Speed= 31.41 mph.

Question 3

In a class of 50 students, 10 have failed and their average of marks is 2.5. The total marks secured by the entire class were 281. Find the average marks those who have passed.

Solution.

Given N = 50, failed students = 10

Mean marks of those who failed = 2.5

Total marks of 10 students who have failed = 2.5 x 10 = 2.5

Total marks secured by the entire class = 281

Total marks obtained by those who have passed = 281 – 25 = 256

Average marks obtained by those who have passed = 256/40 = 6.4

Average marks obtained by those who have passed = 6.4

Question 4

Calculate the mean marks from the following data.

Marks	20-25	25-30	30-35	35-40	40-45	45-50	50-55
No. of students	10	12	8	20	11	4	5

Solution

Marks (X)	Mid-value m= $\frac{l_1+l_2}{2}$	No. of students or frequency (f)	Deviation (d=m-A) (A=37.5)	Multiple of Deviation and Frequency (fd)
20-25	22.5	10	-15	-150
25-30	27.5	12	-10	-120
30-35	32.5	8	-5	-40
35-40	37.5	20	0	0
40-45	42.5	11	5	55
45-50	47.5	4	10	40
50-55	52.5	5	15	75
		∑f=70		**∑fd=140**

$$= \bar{X} = \frac{\sum fd}{\sum f}$$

$$= 37.5 + \frac{-140}{70}$$

= 37.5 – 2 = 35.5

Question 5: Calculate the mean weighted mean from the following data

Marks	60	75	63	59	55
Weight	2	1	5	5	3

Solution

Marks (X)	**Weight (W)**	**WX**
60	2	120
75	1	75
63	5	315
59	5	295
55	3	165
	ΣW=16	**ΣWX=970**

$$\bar{X}_w = \frac{\sum WX}{\sum W}$$

$$= \frac{970}{16} = 60.625$$