1. Find the mean deviation about the median for the data

$$36, 72, 46, 42, 60, 45, 53, 46, 51, 49$$

SOLUTION

Arranging the data in ascending order, we get

$$36, 42, 45, 46, 46, 49, 51, 53, 60, 72$$

Here the number of observations is 10, which is even.

Median

$$M = \frac{\left(\frac{10}{2}\right)^{th} observation + \left(\frac{10}{2} + 1\right)^{th} observation}{2}$$

$$= \frac{5^{th} observation + 6^{th} observation}{2}$$

$$= \frac{46 + 49}{2} = \frac{95}{2} = 47.5$$

The deviations of the respective observations from the median i.e. $x_i - M$ are

$$-11.5, -5.5, -2.5, -1.5, -1.5, 1.5, 3.5, 5.5, 12.5, 24.5$$

The absolute values of the deviations $|x_i - M|$ are

$$11.5, 5.5, 2.5, 1.5, 1.5, 1.5, 3.5, 5.5, 12.5, 24.5$$

Thus the required mean deviation about the median is

$$M.D.(M) = \frac{\sum_{i=1}^{10} |x - M|}{10} =$$

$$\frac{11.5 + 5.5 + 2.5 + 1.5 + 1.5 + 1.5 + 3.5 + 5.5 + 12.5 + 24.5}{10}$$

$$= \frac{70}{10} = 7$$

2. Find the mean deviation about the median for the data,

x_i	5	7	9	10	12	15
f_i	8	6	2	2	2	6

Ans) C.F = Cumulative frequency

x_i	f_i	C.F.	$|x_i - M|$	$f|x_i - M|$
5	8	8	2	16
(7)	6	(14)	0	0
9	2	16	2	4
10	2	18	3	6
12	2	20	5	10
15	6	26	8	48
	$N = 26$			84

Here, $N = 26$ (even)

$$\therefore M = \frac{1}{2}\left[\left(\frac{26}{2}\right)^{th} + \left(\frac{26}{2}+1\right)^{th}\right] \text{ observation}$$

$$= \frac{1}{2}[13^{th} + 14^{th}] \text{ observation}$$

$$= \frac{1}{2}[7+7] = 7$$

$$\therefore \text{ M.D. (M)} = \frac{1}{N}\sum_{i}^{6} f_i |x_i - M|$$

$$= \frac{1}{26} \times 84 = 3 \cdot 23$$

3.Find the mean deviation about the median for the data

Class	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	6	8	14	16	4	2

Ans)   Computation of mean deviation from mean:

Classes	mid values x_i	f_i	$d_i = \frac{x_i - 25}{10}$	$f_i d_i$	$\|x_i - \bar{x}\| = \|x_i - 29.8\|$	$f_i \|x_i - \bar{x}\|$
0-10	5	6	-2	-12	24.8	148.8
10-20	10	8	-1	-8	14.8	118.4
20-30	15	14	0	-14	4.8	67.2
30-40	20	16	1	16	5.2	83.2
40-50	25	4	2	8	15.2	60.8
50-60	30	2	3	6	25.2	50.4
		$\Sigma f_i = N$ $= 50$		$\Sigma f_i d_i = 24$		$\Sigma f_i \|x_i - 29.8\| = 528.8$

Here, $N = 50$, $a = 25$, $h = 10$

$\therefore \bar{x} = a + h \left(\frac{\Sigma f_i d_i}{N} \right) = 25 + \frac{24}{50} \times 10 = 29.8$

Now,

$\quad$ Mean deviation $= \frac{1}{N} \Sigma f_i \|x_i - \bar{x}\|$

$\quad\quad\quad\quad\quad\quad = \frac{1}{50} \times 528.8$

$\quad\quad\quad\quad\quad\quad = 10.576.$