

**CBSE Class-11 Mathematics**  
**NCERT Solutions**  
**Chapter - 15 Statistics**  
**Exercise 15.1**

Find the mean deviation about the mean for the data in Exercises 1 and 2.

1. 4, 7, 8, 9, 10, 12, 13, 17

Ans. Mean of the given data  $\bar{x} = \frac{4+7+8+9+10+12+13+17}{8} = \frac{80}{8} = 10$

$x_i$	$ x_i - \bar{x} $
4	6
7	3
8	2
9	1
10	0
12	2
13	3
17	7
Total	24

Mean deviation about mean =  $\frac{1}{n} \sum_{i=1}^n |x_i - \bar{x}| = \frac{1}{8} \times 24 = 3$

2. 38, 70, 48, 40, 42, 55, 63, 46, 54, 44

Ans. Mean of the given data

$$\bar{x} = \frac{38+70+48+40+42+55+63+46+54+44}{10} = \frac{500}{10} = 50$$

$x_i$	$ x_i - \bar{x} $
38	12
70	20
48	2
40	10
42	8
55	5
63	13
46	4
54	4
44	6
Total	84

$$\text{Mean deviation about mean} = \frac{1}{n} \sum_{i=1}^n |x_i - \bar{x}|$$

$$= \frac{1}{10} \times 84 = 8.4$$

**Find the mean deviation about the median for the data in Exercises 3 and 4.**

**3. 13, 17, 16, 14, 11, 13, 10, 16, 11, 18, 12, 17**

**Ans.** Arranging the data in ascending order, 10, 11, 11, 12, 13, 13, 14, 16, 16, 17, 17, 18

Here,  $n = 12$  (even number)

$$\therefore \text{Median} = \frac{1}{2} (6^{\text{th}} \text{ term} + 7^{\text{th}} \text{ term})$$

$$= \frac{1}{2} (13 + 14) = \frac{27}{2} = 13.5$$

$x_i$	$ x_i - M $
10	3.5
11	2.5
11	2.5
12	1.5
13	0.5
13	0.5
14	0.5
16	2.5
16	2.5
17	3.5
17	3.5
18	4.5
Total	28

$$\text{Mean deviation about median} = \frac{1}{n} \sum_{i=1}^n |x_i - M|$$

$$= \frac{1}{12} \times 28 = 2.33$$

4. 36, 72, 46, 42, 60, 45, 53, 46, 51, 49

**Ans.** Arranging the data in ascending order, 36, 42, 45, 46, 46, 49, 51, 53, 60, 72

Here,  $n = 10$  (even number)

$$\therefore \text{Median} = \frac{1}{2} (5^{\text{th}} \text{ term} + 6^{\text{th}} \text{ term}) = \frac{1}{2} (46 + 49) = \frac{95}{2} = 47.5$$

$x_i$	$ x_i - M $
36	11.5
42	5.5
45	2.5
46	1.5
46	1.5
49	1.5
51	3.5
53	5.5
60	12.5
72	24.5
Total	70

$$\text{Mean deviation about median} = \frac{1}{n} \sum_{i=1}^n |x_i - M|$$

$$= \frac{1}{10} \times 70 = 7$$

Find the mean deviation about the mean for the data in Exercises 5 and 6.

5.

$x_i$	5	10	15	20	25
$f_i$	7	4	6	3	5

Ans.

$x_i$	$f_i$	$f_i x_i$	$ x_i - 14 $	$f_i  x_i - 14 $
5	7	35	9	63
10	4	40	4	16
15	6	90	1	6
20	3	60	6	18
25	5	125	11	55
	25	350		158

$$\text{Mean } (\bar{x}) = \frac{1}{N} \sum f_i x_i$$

$$= \frac{1}{25} \times 350 = 14$$

$$\text{Mean deviation about mean} = \frac{1}{N} \sum_{i=1}^n f_i |x_i - \bar{x}|$$

$$= \frac{158}{25} = 6.32$$

6.

$x_i$	10	30	50	70	90
$f_i$	4	24	28	16	8

Ans.

$x_i$	$f_i$	$f_i x_i$	$ x_i - 50 $	$f_i  x_i - 50 $
10	4	40	40	160
30	24	720	20	480
50	28	1400	0	0
70	16	1120	20	320
90	8	720	40	320
	80	4000		1280

$$\text{Mean } (\bar{x}) = \frac{1}{N} \sum f_i x_i$$

$$= \frac{1}{80} \times 4000 = 50$$

$$\text{Mean deviation about mean} = \frac{1}{N} \sum_{i=1}^n f_i |x_i - \bar{x}|$$

$$= \frac{1}{80} \times 1280 = 16$$

Find the mean deviation about the median for the data in Exercises 7 and 8.

7.

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

Ans.

$x_i$	$f_i$	$cf$	$ x_i - 7 $	$f_i  x_i - 7 $
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
	26			84

Here,  $N = 26$  (even number)

$$\text{Therefore, Median} = \frac{\frac{26}{2}^{\text{th}} \text{ term} + \left(\frac{26}{2} + 1\right)^{\text{th}} \text{ term}}{2} = \frac{13^{\text{th}} \text{ term} + 14^{\text{th}} \text{ term}}{2} = \frac{7+7}{2} = 7$$

$$\therefore \text{Median} = 7$$

$$\text{Mean deviation about median} = \frac{1}{N} \sum_{i=1}^n f_i |x_i - M|$$

$$= \frac{1}{26} \times 84 = 3.23$$

8.

$x_i$	15	21	27	30	35
$f_i$	3	5	6	7	8

Ans.

$x_i$	$f_i$	$cf$	$ x_i - 30 $	$f_i  x_i - 30 $
15	3	3	15	45
21	5	8	9	45
27	6	14	3	18
30	7	21	0	0
35	8	29	5	40
	29			148

Here,  $N = 29$  (odd number)

$$\text{Median} = \left( \frac{29+1}{2} \right)^{th} \text{ term} = 15^{th} \text{ term} = 30$$

$$\therefore \text{Median} = 30$$

$$\text{Mean deviation about median} = \frac{1}{N} \sum_{i=1}^n f_i |x_i - M|$$

$$= \frac{1}{29} \times 148 = 5.1$$

Find the mean deviation about the mean for the data in Exercises 9 and 10.

9.

Income per day	0-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800
No. of persons	4	8	9	10	7	5	4	3

Ans.

Income per day	Mid values $x_i$	$f_i$	$f_i x_i$	$ x_i - 358 $	$f_i  x_i - 358 $
0 – 100	50	4	200	308	1232
100 – 200	150	8	1200	208	1664
200 – 300	250	9	2250	108	972
300 – 400	350	10	3500	8	80
400 – 500	450	7	3150	92	644
500 – 600	550	5	2750	192	960
600 – 700	650	4	2600	292	1168
700 – 800	750	3	2250	392	1176
		50	17900		7896

$$\text{Mean } (\bar{x}) = \frac{1}{N} \sum f_i x_i$$

$$= \frac{1}{50} \times 17900 = 358$$

$$\text{Mean deviation about mean} = \frac{1}{N} \sum_{i=1}^n f_i |x_i - \bar{x}|$$

$$= \frac{1}{50} \times 7896 = 157.92$$

10.

Height (in cms)	95-105	105-115	115-125	125-135	135-145	145-155
Number of boys	9	13	26	30	12	10

Ans.



Height in cms	Mid values $x_i$	$f_i$	$f_i x_i$	$ x_i - 125.3 $	$f_i  x_i - 125.3 $
95 - 105	100	9	900	25.3	227.7
105 - 115	110	13	1430	15.3	198.9
115 - 125	120	26	3120	5.3	137.8
125 - 135	130	30	3900	4.7	141
135 - 145	140	12	1680	14.7	176.4
145 - 155	150	10	1500	24.7	247
		100	12530		1128.8

$$\text{Mean } (\bar{x}) = \frac{1}{N} \sum f_i x_i$$

$$= \frac{1}{100} \times 12530 = 125.3$$

$$\text{Mean deviation about mean} = \frac{1}{N} \sum_{i=1}^n f_i |x_i - \bar{x}|$$

$$= \frac{1}{100} \times 1128.8 = 11.288$$

**11. Find the mean deviation about median for the following data:**

Marks	0-10	10-20	20-30	30-40	40-50	50-60
Number of Girls	6	8	14	16	4	2

**Ans.**

Marks	Mid Values (xi)	fi	cf	$ x_i - M $	$f_i  x_i - M $
0-10	5	6	6	22.86	137.16
10-20	15	8	14	12.86	102.88
20-30	25	14	28	2.86	40.04
30-40	35	16	44	7.14	114.24

40-50	45	4	48	17.14	68.56
50-60	55	2	50	27.14	54.28
<b>Total</b>		<b>50</b>			<b>517.16</b>

Here,  $\frac{N}{2} = \frac{50}{2} = 25$

$\therefore$  Median class = 20 – 30

$\therefore$  Median (M) =  $20 + \frac{25-14}{14} \times 10$

$M = 20 + 7.86 = 27.86$

Mean deviation about median =  $\frac{1}{N} \sum_{i=1}^n f_i |x_i - M|$

$= \frac{1}{50} \times 517.16 = 10.34$

**12. Calculate the mean deviation about median for the age distribution of 100 persons given below:**

Age	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55
Number	5	6	12	14	26	12	16	9

**Ans. Firstly the data is to be made continous by making classes 15.5-20.5, 20.5-25.5, 25.5-30.5, 30.5-35.5, 35.5-40.5, 40.5-45.5, 45.5-50.5, 50.5-55.5**

otal

Age	Mid Value ( $x_i$ )	$f_i$	cf	$ x_i - M $	$f_i  x_i - M $
15.5-20.5	18	5	5	20	100
20.5-25.5	23	6	11	15	90
25.5-30.5	28	12	23	10	120
30.5-35.5	33	14	37	5	70
35.5-40.5	38	26	63	0	0

40.5-45.5	43	12	75	5	60
45.5-50.5	48	16	91	10	160
50.5-55.5	53	9	100	15	135
<b>Total</b>		<b>100</b>			<b>735</b>

Here,  $\frac{N}{2} = \frac{100}{2} = 50$

$\therefore$  Median class = 35.5 – 40.5

$\therefore$  Median =  $35.5 + \frac{50-37}{26} \times 5$

= 35.5 + 2.5 = 38

Mean deviation about median =  $\frac{1}{N} \sum_{i=1}^n f_i |x_i - M|$

=  $\frac{1}{100} \times 735 = 7.35$