

EXERCISE 23.2

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1. A die was thrown 20 times and the following scores were recorded:

5, 2, 1, 3, 4, 4, 5, 6, 2, 2, 4, 5, 5, 6, 2, 2, 4, 5, 5, 1

Prepare the frequency table of the scores on the upper face of the die and find the mean score.

**Solution:**

The frequency table for the given data is as follows:

x:	1	2	3	4	5	6
f:	2	5	1	4	6	2

To compute arithmetic mean we have to prepare the following table:

Scores ( $x_i$ )	Frequency ( $f_i$ )	$x_i f_i$
1	2	2
2	5	10
3	1	3
4	4	16
5	6	30
6	2	12
Total	$\Sigma f_i = 20$	$\Sigma f_i x_i$

$$\begin{aligned} \text{Mean score} &= \frac{\Sigma f_i x_i}{\Sigma f_i} \\ &= \frac{73}{20} \\ &= 3.65 \end{aligned}$$

2. The daily wages (in Rs) of 15 workers in a factory are given below:

200, 180, 150, 150, 130, 180, 180, 200, 150, 130, 180, 180, 200, 150, 180

Prepare the frequency table and find the mean wage.

**Solution:**

Wages ( $x_i$ )	130	150	180	200
Number of workers ( $f_i$ )	2	4	6	3

To compute arithmetic mean we have to prepare the following table:

$x_i$	$f_i$	$x_i f_i$
130	2	260
150	4	600
180	6	1080
200	3	600
Total	$\Sigma f_i = N = 15$	$\Sigma f_i x_i = 2540$

$$\begin{aligned} \text{Mean score} &= \Sigma f_i x_i / \Sigma f_i \\ &= 2540/15 \\ &= 169.33 \end{aligned}$$

3. The following table shows the weights (in kg) of 15 workers in a factory:

Weight (in Kg)	60	63	66	72	75
Number of workers	4	5	3	1	2

Calculate the mean weight.

**Solution:**

Calculation of mean:

$x_i$	$f_i$	$x_i f_i$
60	4	240
63	5	315
66	3	198
72	1	72
75	2	150
Total	$\Sigma f_i = N = 15$	$\Sigma f_i x_i = 975$

$$\begin{aligned} \text{Mean score} &= \Sigma f_i x_i / \Sigma f_i \\ &= 975/15 \\ &= 65 \text{ kg} \end{aligned}$$

4. The ages (in years) of 50 students of a class in a school are given below:

Age (in years)	14	15	16	17	18
Number of students	15	14	10	8	3

Find the mean age.

**Solution:**

Calculation of mean:

$x_i$	$f_i$	$x_i f_i$
14	15	210
15	14	210
16	10	160
17	8	136
18	3	54
Total	$\Sigma f_i = N = 50$	$\Sigma f_i x_i = 770$

$$\begin{aligned} \text{Mean score} &= \Sigma f_i x_i / \Sigma f_i \\ &= 770/50 \\ &= 15.4 \text{ years} \end{aligned}$$

5. Calculate the mean for the following distribution:

<b>x:</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>f:</b>	<b>4</b>	<b>8</b>	<b>14</b>	<b>11</b>	<b>3</b>

Solution:

$x_i$	$f_i$	$x_i f_i$
5	4	20
6	8	48
7	14	98
8	11	88
9	3	27
Total	$\Sigma f_i = N = 40$	$\Sigma f_i x_i = 281$

$$\begin{aligned} \text{Mean score} &= \Sigma f_i x_i / \Sigma f_i \\ &= 281/40 \\ &= 7.025 \end{aligned}$$

6. Find the mean of the following data:

<b>x:</b>	<b>19</b>	<b>21</b>	<b>23</b>	<b>25</b>	<b>27</b>	<b>29</b>	<b>31</b>
<b>f:</b>	<b>13</b>	<b>15</b>	<b>16</b>	<b>18</b>	<b>16</b>	<b>15</b>	<b>13</b>

Solution:

$x_i$	$f_i$	$x_i f_i$
19	13	247
21	15	315
23	16	368
25	18	450
27	16	432
29	15	435
31	13	403
Total	$\Sigma f_i = N = 106$	$\Sigma f_i x_i = 2650$

$$\begin{aligned} \text{Mean score} &= \frac{\Sigma f_i x_i}{\Sigma f_i} \\ &= \frac{2650}{106} \\ &= 25 \end{aligned}$$

7. The mean of the following data is 20.6. Find the value of p.

<b>x:</b>	<b>10</b>	<b>15</b>	<b>p</b>	<b>25</b>	<b>31</b>
<b>f:</b>	<b>3</b>	<b>10</b>	<b>25</b>	<b>7</b>	<b>5</b>

**Solution:**

$x_i$	$f_i$	$x_i f_i$
10	3	30
15	10	150
P	25	25p
25	7	175
31	5	175
Total	$\Sigma f_i = N = 50$	$\Sigma f_i x_i = 530 + 25p$

$$\begin{aligned} \text{Mean score} &= \frac{\Sigma f_i x_i}{\Sigma f_i} \\ 20.6 &= \frac{530 + 25p}{50} \\ 530 + 25p &= 20.6 \times 50 \\ 25p &= 1030 - 530 \\ p &= \frac{500}{25} \\ p &= 20 \end{aligned}$$

8. If the mean of the following data is 15, find p.

<b>x:</b>	<b>5</b>	<b>10</b>	<b>15</b>	<b>20</b>	<b>25</b>
<b>f:</b>	<b>6</b>	<b>p</b>	<b>6</b>	<b>10</b>	<b>5</b>

**Solution:**

$x_i$	$f_i$	$x_i f_i$
5	6	30
10	P	10p
15	6	90
20	10	200
25	5	125
Total	$\Sigma f_i = 27 + p$	$\Sigma f_i x_i = 445 + 10p$

$$\text{Mean score} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$15 = \frac{445 + 10p}{27 + p}$$

$$445 + 10p = 405 + 15p$$

$$5p = 445 - 405$$

$$p = \frac{40}{5}$$

$$p = 8$$

**9. Find the value of p for the following distribution whose mean is 16.6**

<b>x:</b>	<b>8</b>	<b>12</b>	<b>15</b>	<b>p</b>	<b>20</b>	<b>25</b>	<b>30</b>
<b>f:</b>	<b>12</b>	<b>16</b>	<b>20</b>	<b>24</b>	<b>16</b>	<b>8</b>	<b>4</b>

**Solution:**

$x_i$	$f_i$	$x_i f_i$
8	12	96
12	16	192
15	20	300
P	24	24p
20	16	320
25	8	200
30	4	120
Total	$\Sigma f_i = N = 100$	$\Sigma f_i x_i = 1228 + 24p$

$$\text{Mean score} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$16.6 = 1228 + 24p/100$$

$$1228 + 24 p = 16.6 \times 100$$

$$24 p = 1660 - 1228$$

$$p = 432/24$$

$$p = 18$$

**10. Find the missing value of p for the following distribution whose mean is 12.58**

<b>x:</b>	<b>5</b>	<b>8</b>	<b>10</b>	<b>12</b>	<b>p</b>	<b>20</b>	<b>25</b>
<b>f:</b>	<b>2</b>	<b>5</b>	<b>8</b>	<b>22</b>	<b>7</b>	<b>4</b>	<b>2</b>

**Solution:**

$x_i$	$f_i$	$x_i f_i$
5	2	10
8	5	40
10	8	80
12	22	264
P	7	7p
20	4	80
25	2	50
Total	$\Sigma f_i = N = 50$	$\Sigma f_i x_i = 524 + 7p$

$$\text{Mean score} = \Sigma f_i x_i / \Sigma f_i$$

$$12.58 = 524 + 7p/50$$

$$524 + 7 p = 12.58 \times 50$$

$$7 p = 629 - 524$$

$$p = 105/7$$

$$p = 15$$

**11. Find the missing frequency (p) for the following distribution whose mean is 7.68**

<b>x:</b>	<b>3</b>	<b>5</b>	<b>7</b>	<b>9</b>	<b>11</b>	<b>13</b>
<b>f:</b>	<b>6</b>	<b>8</b>	<b>15</b>	<b>p</b>	<b>8</b>	<b>4</b>

**Solution:**

$x_i$	$f_i$	$x_i f_i$
3	6	18
5	8	40
7	15	105
9	P	9p
11	8	88
13	4	52
Total	$\Sigma f_i = N = 41 + p$	$\Sigma f_i x_i = 303 + 9p$

$$\text{Mean score} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$7.68 = \frac{303 + 9p}{41 + p}$$

$$303 + 9p = 314.88 + 7.68p$$

$$1.32p = 314.88 - 303$$

$$p = \frac{11.88}{1.32}$$

$$p = 9$$

12. Find the value of p, if the mean of the following distribution is 20

x:	15	17	19	20 + p	23
f:	2	3	4	5p	6

Solution:

$x_i$	$f_i$	$x_i f_i$
15	2	30
17	3	51
19	4	76
20 + p	5P	$(20 + p) 5p$
23	6	138
Total	$\Sigma f_i = 15 + 5p$	$\Sigma f_i x_i = 295 + (20 + p) 5p$

$$\text{Mean score} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$20 = \frac{295 + (20 + p) 5p}{15 + 5p}$$

$$295 + 100p + 5p^2 = 300 + 100p$$

$$5p^2 = 300 - 295$$

$$5p^2 = 5$$

$$p^2 = 1$$

$$p = 1$$