

## A Averages from a Frequency Table

- 2 Priya rolls a die 10 times.  
The table shows the results.

|           |   |   |   |   |   |   |
|-----------|---|---|---|---|---|---|
| Score     | 1 | 2 | 3 | 4 | 5 | 6 |
| Frequency | 2 | 1 | 0 | 2 | 0 | 5 |

- (a) Find the mode.

..... 6 ..... [1]

- (b) Find the interquartile range.

1, 1, 2, 4, 4, 6, 6, 6, 6, 6  
 $\uparrow$   $\uparrow$   $\uparrow$   
 $Q_1$  median  $Q_3$

..... 4 ..... [2]

$$\begin{aligned} \text{IQR} &= 6 - 2 \\ &= 4 \end{aligned}$$

- 4 Aklima records the masses,  $m$  kg, of 120 parcels.  
The results are shown in the table.

|              |                |                |                |                |                 |
|--------------|----------------|----------------|----------------|----------------|-----------------|
| Mass, $m$ kg | $0 < m \leq 2$ | $2 < m \leq 4$ | $4 < m \leq 6$ | $6 < m \leq 8$ | $8 < m \leq 10$ |
| Frequency    | 35             | 30             | 40             | 12             | 3               |

Find

c.f. 35 65

- (a) the modal class

..... 4 <  $m$  ≤ 6 ..... [1]

- (b) the class which contains the median.

$$\frac{120 + 1}{2} = 60.5^{\text{th}} \text{ piece of data}$$

→ lies in  $2 < m \leq 4$

..... 2 <  $m$  ≤ 4 ..... [1]

- 6 The table shows the marks scored by 40 students in a test.

|              |    |    |    |    |    |    |
|--------------|----|----|----|----|----|----|
| Mark         | 5  | 6  | 7  | 8  | 9  | 10 |
| Frequency    | 8  | 5  | 11 | 7  | 5  | 4  |
| $f \times x$ | 40 | 30 | 77 | 56 | 45 | 40 |

Calculate the mean mark.

$$\begin{aligned}
 \text{mean} &= \frac{\text{sum of } fx}{\text{sum of } f} \\
 &= \frac{40 + 30 + 77 + 56 + 45 + 40}{40} = 7.2 \dots\dots\dots [3] \\
 &= \underline{7.2}
 \end{aligned}$$

- (c) The test scores of 200 students are shown in the table.

|              |    |    |     |     |     |     |
|--------------|----|----|-----|-----|-----|-----|
| Score        | 5  | 6  | 7   | 8   | 9   | 10  |
| Frequency    | 3  | 10 | 43  | 75  | 48  | 21  |
| $f \times x$ | 15 | 60 | 301 | 600 | 432 | 210 |

Calculate the mean.

$$\begin{aligned}
 \text{mean} &= \frac{\text{sum of } fx}{\text{sum of } f} \\
 &= \frac{15 + 60 + 301 + 600 + 432 + 210}{200} = 8.09 \dots\dots\dots [3] \\
 &= \underline{8.09}
 \end{aligned}$$

- 3 (a) The table shows information about the marks gained by each of 10 students in a test.

|               |    |    |    |    |    |    |
|---------------|----|----|----|----|----|----|
| Mark $x$      | 15 | 16 | 17 | 18 | 19 | 20 |
| Frequency $f$ | 4  | 1  | 2  | 1  | 0  | 2  |
| $fx$          | 60 | 16 | 34 | 18 | 0  | 40 |

- (i) Calculate the range.

$$20 - 15 = 5$$

5 ..... [1]

- (ii) Calculate the mean.

$$\begin{aligned} \text{mean} &= \frac{\text{sum of } fx}{\text{sum of } f} \\ &= \frac{60 + 16 + 34 + 18 + 40}{10} \\ &= 16.8 \end{aligned}$$

16.8 ..... [3]

- (iii) Find the median.

$$\frac{10+1}{2} = 5.5^{\text{th}} \text{ piece of data (ie. between } 5^{\text{th}} \text{ and } 6^{\text{th}})$$

$$\frac{16+17}{2} = 16.5$$

- (iv) Write down the mode.

15 ..... [1]

- 9 The table shows some information about the marks scored by a group of students in a test.

|               |   |    |      |
|---------------|---|----|------|
| Test mark $x$ | 4 | 5  | 8    |
| Frequency $f$ | 2 | 4  | $n$  |
| $f \times x$  | 8 | 20 | $8n$ |

The mean mark is 6.

Work out the value of  $n$ .

$$\begin{aligned} \text{mean} &= \frac{\text{sum of } fx}{\text{sum of } f} \\ 6 &= \frac{8 + 20 + 8n}{2 + 4 + n} \\ 6 &= \frac{28 + 8n}{6 + n} \quad \times (6+n) \\ 6(6+n) &= 28 + 8n \\ 36 + 6n &= 28 + 8n \\ -6n \quad -6n \\ 36 &= 28 + 2n \\ -28 \quad -28 \\ 8 &= 2n \\ \div 2 \quad \div 2 \\ 4 &= n \\ n &= \underline{4} \quad [3] \end{aligned}$$

- 2 (a) Daisy records her 50 homework marks.  
The table shows the results.

|                   |    |    |     |     |     |     |
|-------------------|----|----|-----|-----|-----|-----|
| Homework mark $x$ | 15 | 16 | 17  | 18  | 19  | 20  |
| Frequency $f$     | 1  | 3  | 19  | 11  | 10  | 6   |
| $fx$              | 15 | 48 | 323 | 198 | 190 | 120 |

- (i) Write down the range.

$$20 - 15 = 5$$

..... 5 [1]

- (ii) Write down the mode.

..... 17 [1]

- (iii) Find the median.

$\frac{50+1}{2} = 25.5^{\text{th}}$  piece of data  
(between 25<sup>th</sup> and 26<sup>th</sup>)

..... 18 [1]

- (iv) Calculate the mean.

$$\text{Mean} = \frac{\text{Sum of } fx}{\text{Sum of } f}$$

$$= \frac{15 + 48 + 323 + 198 + 190 + 120}{50}$$

..... 17.88 [3]

$$= 17.88$$

- 17 Some students were asked how many books they each had in their school bags.  
The table shows some of this information.

|                     |    |    |      |    |    |    |
|---------------------|----|----|------|----|----|----|
| Number of books $x$ | 5  | 6  | 7    | 8  | 9  | 10 |
| Frequency $f$       | 4  | 5  | $x$  | 11 | 7  | 5  |
| $fx$                | 20 | 30 | $7x$ | 88 | 63 | 50 |

The mean number of books is 7.6.

Calculate the value of  $x$ .

$$\text{Mean} = \frac{20 + 30 + 7x + 88 + 63 + 50}{4 + 5 + x + 11 + 7 + 5}$$

$$7.6 = \frac{7x + 251}{x + 32}$$

$$7.6(x + 32) = 7x + 251$$

$$\begin{aligned} 7.6x + 243.2 &= 7x + 251 \\ -7x & \quad -7x \\ 0.6x + 243.2 &= 251 \\ -243.2 & \quad -243.2 \\ 0.6x &= 7.8 \\ \div 0.6 & \quad \div 0.6 \\ x &= 13 \end{aligned}$$

$x =$  ..... 13 [3]

- 15 The table shows the amount of money, \$x\$, given to a charity by each of 60 people.

|              |                 |                  |                  |                  |                   |
|--------------|-----------------|------------------|------------------|------------------|-------------------|
| mid. pt. (x) | 10              | 22.5             | 30               | 42.5             | 75                |
| Amount (\$x) | $0 < x \leq 20$ | $20 < x \leq 25$ | $25 < x \leq 35$ | $35 < x \leq 50$ | $50 < x \leq 100$ |
| Frequency f  | 21              | 16               | 6                | 10               | 7                 |
| f × x        | 210             | 360              | 180              | 425              | 525               |

Calculate an estimate of the mean.

$$\text{Mean} = \frac{\text{Sum of } fx}{\text{Sum of } f}$$

$$= \frac{210 + 360 + 180 + 425 + 525}{21 + 16 + 6 + 10 + 7}$$

$$= \frac{1700}{60}$$

$$= 28.33$$

\$ 28.33 [4]

- (b) Matilda records the distances that 80 different cars can travel with a full tank of fuel.  
The table shows this information.

|                 |                    |                    |                    |                    |                    |
|-----------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| mid. pt. (x)    | 275                | 350                | 410                | 435                | 475                |
| Distance (d km) | $250 < d \leq 300$ | $300 < d \leq 400$ | $400 < d \leq 420$ | $420 < d \leq 450$ | $450 < d \leq 500$ |
| Frequency f     | 7                  | 13                 | 19                 | 21                 | 20                 |
| f × x           | 1925               | 4550               | 7790               | 9135               | 9500               |

- (i) Write down the class interval that contains the median.

$$\frac{80+1}{2} = 40.5^{\text{th}} \text{ piece of data}$$

(ie. between 40<sup>th</sup> and 41<sup>st</sup>)

$$420 < d \leq 450 [1]$$

- (ii) Calculate an estimate of the mean.

$$\text{Mean} = \frac{1925 + 4550 + 7790 + 9135 + 9500}{7 + 13 + 19 + 21 + 20}$$

$$= \frac{32900}{80}$$

$$= 411.25$$

411.25 km [4]

- 13 The heights,  $h$  cm, of 100 plants are measured.  
The table shows the results.

| mid pt.<br>( $x$ ) | Height, $h$ cm    | Frequency $f$ | $f \times x$ |
|--------------------|-------------------|---------------|--------------|
| 20                 | $0 < h \leq 40$   | 15            | 300          |
| 60                 | $40 < h \leq 80$  | 40            | 2400         |
| 100                | $80 < h \leq 120$ | 45            | 4500         |

Calculate an estimate for the mean height of the plants.

$$\text{mean} = \frac{300 + 2400 + 4500}{100}$$

$$= \frac{7200}{100}$$

$$= 72$$

72

..... cm [3]

- 13 (a) 100 students solve a puzzle.

The table shows information about the time taken by each student to solve the puzzle.

| mid. - pt. ( $x$ )  | 30               | 50               | 80                |
|---------------------|------------------|------------------|-------------------|
| Time ( $t$ seconds) | $20 < t \leq 40$ | $40 < t \leq 60$ | $60 < t \leq 100$ |
| Frequency $f$       | 30               | 40               | 30                |
| $f \times x$        | 900              | 2000             | 2400              |

- (i) Work out an estimate of the mean.

$$\text{mean} = \frac{900 + 2000 + 2400}{100}$$

$$= \frac{5300}{100}$$

$$= 53$$

53

..... s [4]

- 5 The time,  $t$  minutes, taken by each of 80 people to travel to work is recorded. The table shows information about these times.

|                        |                |                 |                  |                  |                  |
|------------------------|----------------|-----------------|------------------|------------------|------------------|
| Time<br>( $t$ minutes) | $0 < t \leq 5$ | $5 < t \leq 10$ | $10 < t \leq 20$ | $20 < t \leq 35$ | $35 < t \leq 60$ |
| Frequency $f$          | 3              | 7               | 18               | 28               | 24               |
| $f \times x$           | 7.5            | 52.5            | 270              | 770              | 1140             |

- (a) (i) Write down the class interval containing the median time.

$$\frac{80+1}{2} = 40.5^{\text{th}} \text{ piece of data} \\ \text{(between } 40^{\text{th}} \text{ and } 41^{\text{st}})$$

$$20 < t \leq 35 \quad [1]$$

- (ii) Calculate an estimate of the mean time.

$$\text{mean} = \frac{7.5 + 52.5 + 270 + 770 + 1140}{80}$$

$$= \frac{2240}{80}$$

$$= 28$$

$$28 \text{ min} \quad [4]$$

- 2 The heights,  $h$  metres, of the 120 boys in an athletics club are recorded. The table shows information about the heights of the boys.

|                         |                    |                    |                    |                    |                    |                    |
|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Height<br>( $h$ metres) | $1.3 < h \leq 1.4$ | $1.4 < h \leq 1.5$ | $1.5 < h \leq 1.6$ | $1.6 < h \leq 1.7$ | $1.7 < h \leq 1.8$ | $1.8 < h \leq 1.9$ |
| Frequency $f$           | 7                  | 18                 | 30                 | 24                 | 27                 | 14                 |
| $f \times x$            | 9.45               | 26.1               | 46.5               | 39.6               | 47.25              | 25.9               |

- (a) (i) Write down the modal class.

$$1.5 < h \leq 1.6 \quad [1]$$

- (ii) Calculate an estimate of the mean height.

$$\text{mean} = \frac{9.45 + 26.1 + 46.5 + 39.6 + 47.25 + 25.9}{120}$$

$$= \frac{194.8}{120}$$

$$= 1.62$$

$$1.62 \text{ m} \quad [4]$$