

Exercise 3F

- 1 Median for motorway A = 76 km/h
Median for motorway B = 72 km/h

$$\begin{aligned} \text{IQR for motorway A} &= 80 - 75 = 5 \text{ km/h} \\ \text{IQR for motorway B} &= 75 - 65 = 10 \text{ km/h} \end{aligned}$$

The median speed is greater on motorway A than on motorway B. The spread of speeds for motorway B is greater than the spread of speeds for motorway A.

- 2 Mean for class 2B = $\frac{\Sigma x}{n} = \frac{650}{20} = 32.5$ minutes
Mean for class 2F = $\frac{\Sigma x}{n} = \frac{598}{22} = 27.2$ minutes (to 3 s.f.)

$$\begin{aligned} \text{Standard deviation for class 2B} &= \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2} \\ &= \sqrt{\frac{22000}{20} - \left(\frac{650}{20}\right)^2} \\ &= 6.61 \text{ (to 3 s.f.)} \end{aligned}$$

$$\begin{aligned} \text{Standard deviation for class 2F} &= \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2} \\ &= \sqrt{\frac{19100}{22} - \left(\frac{598}{22}\right)^2} \\ &= 11.4 \text{ (to 3 s.f.)} \end{aligned}$$

The mean time for Class 2B is higher than the mean time for Class 2F, showing that Class 2F are generally faster at completing the puzzle. The standard deviation for Class 2F is bigger than for Class 2B, showing that the times are more spread out.

3 a The median is the $\frac{n+1}{2} = \frac{22+1}{2} = 11.5$ th piece of data.

Therefore the median lies halfway between the 11th and 12th pieces of data.

$$\frac{26+27}{2} = 26.5 \text{ years}$$

To find the lower quartile

$$\frac{n}{4} = \frac{22}{4} = 5.5$$

Since this is not a whole number round up, so the lower quartile is the 6th piece of data, therefore

$$Q_1 = 22 \text{ years}$$

To find the upper quartile

$$\frac{3n}{4} = \frac{66}{4} = 16.5$$

Since this is not a whole number round up, so the upper quartile is the 17th piece of data, therefore

$$Q_3 = 39 \text{ years}$$

$$\text{IQR} = Q_3 - Q_1$$

$$= 39 - 22$$

$$= 17 \text{ years}$$

b Any of the following:

- The median for both groups is similar but the median for females is higher.
- Both males and females have most of their members in their 20s.
- Male range is greater.
- Generally, females are younger than the males.

- 4 • Median marks for students taking their exam for the first time are lower than for students retaking their exam.
- There is more variability for students retaking their exam. This is shown by the interquartile range being smaller for students taking the exam for the first time compared to students retaking.
- The range of marks for students taking the exam for the first time is lower than that for students retaking the exam.
- Both groups marks are positively skewed.