Representations of data 3E

1　Median for motorway A = 76 mph
Median for motorway B = 72 mph

IQR for motorway A = 80 − 75 = 5 mph
IQR for motorway B = 75 − 65 = 10 mph

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 = $\dfrac{\sum x}{n} = \dfrac{650}{20} = 32.5$ minutes

Mean for class 2F = $\dfrac{\sum x}{n} = \dfrac{598}{22} = 27.2$ minutes (to 3 s.f.)

Standard deviation for class 2B = $\sqrt{\dfrac{\sum x^2}{n} - \left(\dfrac{\sum x}{n}\right)^2}$

$$= \sqrt{\dfrac{22000}{20} - \left(\dfrac{650}{20}\right)^2}$$

$$= 6.61 \text{ (to 3 s.f.)}$$

Standard deviation for class 2F = $\sqrt{\dfrac{\sum x^2}{n} - \left(\dfrac{\sum x}{n}\right)^2}$

$$= \sqrt{\dfrac{19100}{22} - \left(\dfrac{598}{22}\right)^2}$$

$$= 11.4 \text{ (to 3 s.f.)}$$

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　Boys median = 163 cm
Girls median = 158 cm

Boys IQR = 171 − 154.5 = 16.5 cm
Girls IQR = 164.5 − 149.5 = 15 cm

The median height for boys is higher than the median height for girls, showing that boys are gnerally taller. Comparing interquartile ranges,,the spread of heights for boys is greater than the spread of heights for girls.

4 a　Leuchars: 89, 91, 94, 98, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100

Q_1 = 4th value = 98

Median = 8th value = 100

Q_3 = 12th value = 100

4 a Camborne: 81, 90, 91, 92, 95, 96, 98, 98, 99, 99, 99, 100, 100, 100, 100

Q_1 = 4th value = 92

Median = 8th value = 98

Q_3 = 12th value = 100

b The median for Leuchars is higher than for Camborne, showing that the humidity in Leuchars is higher. Comparing interquartile ranges, the spread of humidity in Camborne is greater than the spread of humidity in Leuchars.

Large data set

1 a Hurn 1987 mean $= \dfrac{\sum x}{n}$

$\qquad\qquad\quad = \dfrac{1103}{167}$

$\qquad\qquad\quad = 6.60$ kn (to 3 s.f.)

Hurn 2015 mean $= \dfrac{\sum x}{n}$

$\qquad\qquad\quad = \dfrac{1418}{184}$

$\qquad\qquad\quad = 7.71$ kn (to 3 s.f.)

b Hurn 1987 mode = 4 kn
Hurn 2015 mode = 7 kn

c Hurn 1987 standard deviation $= \sqrt{\dfrac{\sum x^2}{n} - \left(\dfrac{\sum x}{n}\right)^2}$

$\qquad\qquad\qquad\qquad\qquad = \sqrt{\dfrac{8793}{167} - \left(\dfrac{1103}{167}\right)^2}$

$\qquad\qquad\qquad\qquad\qquad = 3.00$ kn (to 3 s.f.)

Hurn 2015 standard deviation $= \sqrt{\dfrac{\sum x^2}{n} - \left(\dfrac{\sum x}{n}\right)^2}$

$\qquad\qquad\qquad\qquad\qquad = \sqrt{\dfrac{12410}{184} - \left(\dfrac{1418}{184}\right)^2}$

$\qquad\qquad\qquad\qquad\qquad = 2.84$ kn (to 3 s.f.)

2 The mean and modal windspeeds were higher in 2015 than in 1987. The spread of the speeds was greater in 1987 than in 2015 due to a higher standard deviation.