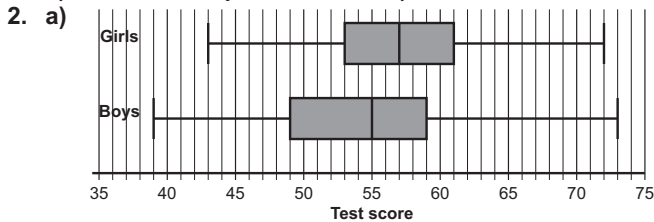


Worksheet 4.8A

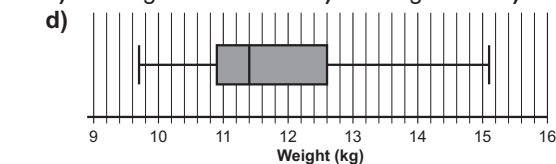
- $LQ = 7$ $UQ = 12$ $IQR = 5$ $Range = 10$
 - $LQ = 5$ $UQ = 8$ $IQR = 3$ $Range = 6$
- $42 - 21 = 21$ minutes
 - 24 minutes
 - 30 minutes
 - $30 - 24 = 6$ minutes
- $46 - 3 = 43$ minutes
 - 11 minutes
 - 31 minutes
 - $31 - 11 = 20$ minutes
- $10 - 0 = 10$
 - 3
 - 5
 - $5 - 3 = 2$

Worksheet 4.8B

- 23 years old
 - $53 - 16 = 37$ years
 - $31 - 19 = 12$ years
 - Positive skew



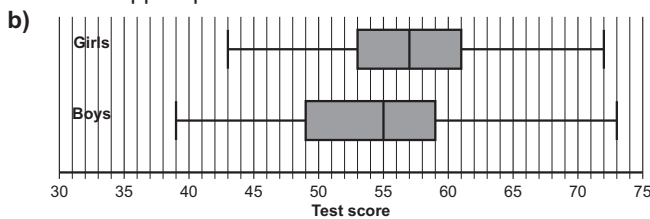
- b) Girls' box plot is symmetrical. Boys' box plot nearly symmetrical, but with slight negative skew.
- c)
 - Girls
 - The girls' box length is shorter.
3. a) 11.4 kg b) 10.9 kg c) 12.6 kg



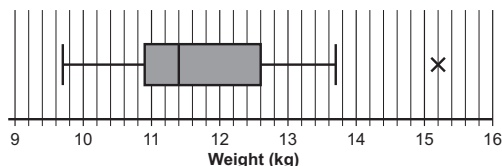
- e) The distribution is positively skewed.

Worksheet 4.8C

- 23 years old
 - $53 - 16 = 37$ years
 - It is an outlier.
 - $31 - 19 = 12$ years
 - Positive skew
- Outliers are more than $1.5 \times IQR$ below lower quartile or above upper quartile.



- c) Girls' box plot is symmetrical. Boys' box plot has slight negative skew.
- d)
 - Girls
 - The girls' box length is shorter.
3. a) $LQ = 10.9$ kg, $UQ = 12.6$ kg, median = 11.4kg
- b) 15.2kg (15.2kg is just an outlier – the limit is 15.15kg)
- c)



- d) The distribution is positively skewed.



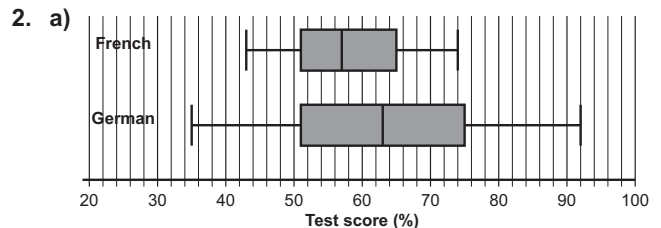
The distribution is positively skewed.

Worksheet 4.8D

- $18 \div 12 = 1.5$
 - $\frac{50}{12} - 1.5^2 = 1.92$
 - 1.38
- 60.4 kg
 - 6.23 kg
- $331 \div 60 = 5.5$
 - $\sqrt{\frac{1933}{60} - 5.5^2} = 1.34$
- £119250
 - £4260
 - $\sqrt{\frac{671687000}{28} - 4260^2} = £2420$
 - The actual values are not known – the data are grouped.

Worksheet 4.11A

- Median waiting time 2 minutes longer at Surgery B on average (median 8 minutes cf 6 minutes).
 - Greater variation in waiting time at Surgery A (IQR 7.5 mins cf 5.5 mins and range 16 mins cf 13.5 mins). *Converse statements are fine.*



- b) German score higher on average (median 6% higher). Or German test is found easier. French scores are more consistent (IQR 14% cf 24%; also seen by range). German scores symmetrical; French scores show a small positive skew. *Converse statements are fine.*
3. Sample grown with fertiliser are taller on average and heights are more consistent. Control group are shorter on average and show greater variation. (Tallest and shortest seedlings are in the control group.)
4. Mean and median very similar for both Supplier A and Supplier B. Sample from Supplier B shows greater variation (shown by both range and IQR), so choose Supplier A.

Worksheet 4.11B

- Team B (higher mean)
 - Team A (lower standard deviation).
- The same on average. Quick Cabs are more consistent (lower standard deviation).
 - Both unlikely to arrive in time. Greater chance with Speedy Cabs because the greater variation means more will be arriving in shorter (and longer) times, so more likely to be as low as 12 minutes.
- Mean = $833 \div 6 = 139$ g;

$$\text{Standard deviation} = \sqrt{\frac{116523}{6} - 139^2} = 12.1 \text{ g (using}$$

accurate figure for mean). *Note: using the rounded '139' gives s.d. = 9.97g; must avoid rounding error in this formula.*

- b) Mean = $1100 \div 8 = 137.5$ g;

$$\text{Standard deviation} = \sqrt{\frac{151562}{8} - 137.5^2} = 6.24 \text{ g}$$

- c) Weight of Variety X is slightly more on average (by 1.5g), but nearly twice the variation (s.d. 12 cf 6). *Converse statements are fine.*