

**Measures of location and spread 2E**

1 a Mean =  $\frac{24}{8} = 3$

b Variance =  $\frac{78}{8} - 3^2 = 0.75$

c Standard deviation =  $\sqrt{0.75} = 0.866$

2 Standard deviation =  $\sqrt{\frac{5905}{10} - \left(\frac{241}{10}\right)^2} = 3.11 \text{ kg}$

3 a  $\sum h = 165 + 170 + 190 + 180 + 175 + 185 + 176 + 184 = 1425$

Mean =  $\frac{1425}{8} = 178.125 \approx 178$

b Variance =  $\frac{254307}{8} - 178.125^2 = 59.9$

c Standard deviation =  $\sqrt{59.9} = 7.74$

4  $\sum x = 50 + 86 = 136$

$\sum x^2 = 310 + 568 = 878$

Mean =  $\frac{136}{25} = 5.44$

Standard deviation =  $\sqrt{\frac{878}{25} - \left(\frac{136}{25}\right)^2} = 2.35$

5 a Mean =  $\frac{869}{85} = 10.22$

Standard deviation =  $\sqrt{\frac{9039}{85} - \left(\frac{869}{85}\right)^2} = 1.35$

b  $10.22 + 1.35 = \text{£}11.57$

$$\frac{11.57 - 11.50}{12.50 - 11.50} = \frac{s - 65}{85 - 65}$$

$s = 66.4$

$85 - 66.4 = 18.6$

So 19 students

6 Standard deviation =  $\sqrt{\frac{203}{54} - \left(\frac{81}{54}\right)^2} = 1.23$

7 Mean =  $\frac{805}{50} = 16.1$  hours

Standard deviation =  $\sqrt{\frac{14062.5}{50} - \left(\frac{805}{50}\right)^2} = 4.69$  hours

One standard deviation below mean =  $16.1 - 4.69 = 11.41$  hours.

$$\frac{11.41 - 10}{15 - 10} = \frac{p - 5}{19 - 5}$$

$p = 8.948$

$50 - p = 41.052$

41 parts tested (82%) lasted longer than one standard deviation below the mean.

According to the manufacturers, this should be 45 parts (90%), so the claim is false.

8 a Mean =  $\frac{243}{30} = 8.1$  kn

Standard deviation =  $\sqrt{\frac{2317}{30} - \left(\frac{243}{30}\right)^2} = 3.41$  kn

b  $8.1 + 3.41 = 11.51$  kn

$$\frac{11.51 - 4}{17 - 4} = \frac{d - 0}{30 - 0}$$

$d = 17.33$

$30 - d = 12.67$

So 12 days

c The windspeeds are equally distributed throughout the range.