

Exercise 2F

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

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

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

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

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

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

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

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

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

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

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

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

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

b $10.22 + 1.35 = 11.57 \text{ Omani Riyals}$

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

$s = 66.4$

$85 - 66.4 = 18.6$

So 19 students

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

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

$$\text{Standard deviation} = \sqrt{\frac{14\,062.5}{50} - \left(\frac{805}{50}\right)^2} = 4.69 \text{ hours}$$

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.

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

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

$$b \quad 8.1 + 3.41 = 11.51 \text{ kn}$$

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

$$d = 17.33$$

$$30 - d = 12.67$$

So 12 days

c The windspeeds are equally distributed throughout the range.

Challenge

Mean of the number of loaves sold is 0.787.

Each loaf cost \$1.04.

Therefore the mean amount spent on loaves is:

$$\begin{aligned} 0.787 \times 1.04 &= 0.818... \\ &= 81.8 \text{ cents (3 s.f.)} \end{aligned}$$

The standard deviation of the number of loaves is 0.99.

Each loaf cost \$1.04.

Therefore the standard deviation of the amount spent on loaves is:

$$\begin{aligned} 0.99 \times 1.04 &= 1.0296 \\ &= \$1.03 \text{ (3 s.f.)} \end{aligned}$$