

Representations of data 3A

1 $IQR = 68 - 46 = 22$

$$46 - 1.5 \times 22 = 13$$

$$68 + 1.5 \times 22 = 101$$

a 7 is an outlier as $7 < 13$.

b 88 is not an outlier as $13 < 88 < 101$.

c 105 is an outlier as $105 > 101$.

2 a Outliers are $< 400 - 180 = 220$ or $> 580 + 180 = 760$. So there are no outliers.

b Outliers are $< 260 - 80 = 180$ or $> 340 + 80 = 420$. So 170 g and 440 g are both outliers.

c 760 g

3 a Mean = 6.1 kg

$$\text{Standard deviation} = \sqrt{4.2}$$

$$\text{Mean} - 2 \times \text{standard deviation} = 6.1 - 2 \times \sqrt{4.2} = 2.00 \text{ (to 3 s.f.)}$$

$$\text{Mean} + 2 \times \text{standard deviation} = 6.1 + 2 \times \sqrt{4.2} = 10.2 \text{ (to 3 s.f.)}$$

So 11.5 kg is an outlier.

b The smallest is 2.00 kg.

The largest is 10.2 kg.

4 a $\text{Mean} = \frac{\sum x}{n} = \frac{92}{9} = 10.2 \text{ (to 3 s.f.)}$

$$\text{Standard deviation} = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$

$$= \sqrt{\frac{1428}{9} - \left(\frac{92}{9}\right)^2}$$

$$= 7.36 \text{ (to 3 s.f.)}$$

b $\text{Mean} - 2 \times \text{standard deviation} = -4.50 \text{ (to 3 s.f.)}$

$\text{Mean} + 2 \times \text{standard deviation} = 24.9 \text{ (to 3 s.f.)}$

30 is an outlier, as it is more than 2 standard deviations above the mean ($30 > 24.9$).

c It could be the age of a parent at the party.

d $\sum x - 30 = 92 - 30 = 62$

$$\text{Mean} = \frac{62}{8} = 7.75$$

$$\sum x^2 - 30^2 = 1428 - 900 = 528$$

$$\text{Standard deviation} = \sqrt{\frac{528}{8} - \left(\frac{62}{8}\right)^2} = 2.44 \text{ (to 3 s.f.)}$$