Exercise 3B

1 IQR = 68−46 = 22

46 − 1.5 × 22 = 13
68 + 1.5 × 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
Standard deviation = $\sqrt{4.2}$
Mean − 2 × standard deviation = 6.1 − 2 × $\sqrt{4.2}$ = 2.00 (to 3 s.f.)
Mean + 2 × standard deviation = 6.1 + 2 × $\sqrt{4.2}$ = 10.2 (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 Mean = $\frac{\Sigma x}{n} = \frac{92}{9}$ = 10.2 (to 3 s.f.)

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

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

= 7.36 (to 3 s.f.)

b Mean − 2 × standard deviation = −4.50 (to 3 s.f.)
Mean + 2 × standard deviation = 24.9 (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 $\sum x - 30 = 92 - 30 = 62$

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

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

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