

Exercise walk-through

Representation of data ■ 5.1

eXercise

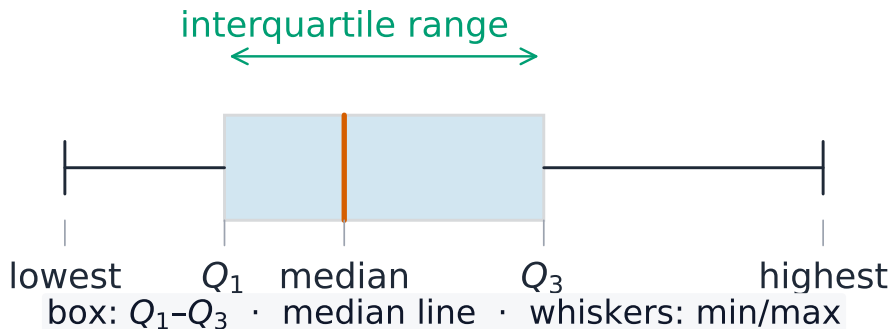
You must be able to

- read a box-and-whisker plot and a cumulative frequency graph
- find the mean, median and mode
- find the standard deviation from $\sum x$ and $\sum x^2$

Method — Spread from totals

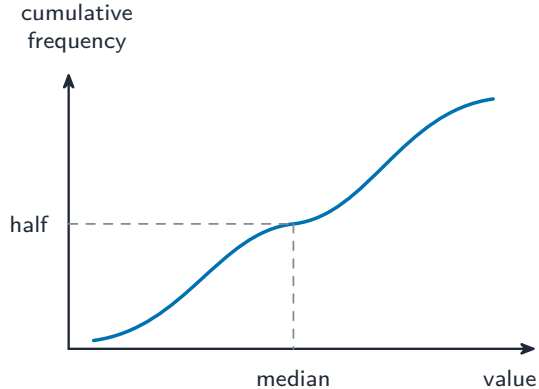
$$n = 10, \sum x = 50, \sum x^2 = 300: \bar{x} = 5; \sigma = \sqrt{\frac{300}{10} - 5^2} = \sqrt{5} = 2.24.$$

Method — Spread from totals



A box-and-whisker plot: box of quartiles, whiskers to extremes

Method — Spread from totals



An S-shaped cumulative frequency curve

Practice 2.1 ■ 1 mark

Find the interquartile range when $Q_1 = 14$ and $Q_3 = 23$.

Solution 2.1

Worked steps

$$\text{IQR} = 23 - 14 = 9 \text{ (B1)}.$$

Practice 2.2 ■ 1 mark

For 8 values, $\sum x = 96$. Find the mean.

Solution 2.2

Worked steps

$$\bar{x} = \frac{96}{8} = 12 \text{ (B1).}$$

Exam-style 3.1 ■ 1 mark

For data with $\sum x = 200$, $\sum x^2 = 4500$ and $n = 10$, the variance is:

A 25

B 50

C 450

D 5

Solution 3.1

A 25

B 50



C 450

D 5

Worked steps

$$\text{B. Variance} = \frac{4500}{10} - \left(\frac{200}{10}\right)^2 = 450 - 400 = 50.$$

Exam-style 3.2 ■ 3 marks

The masses (kg) of 7 parcels are 3, 5, 5, 8, 9, 12, 16.

- (a) Find the median and the interquartile range.
- (b) Find the mean and the standard deviation.

Solution 3.2

Worked steps

(a) ordered already; median (4th) = 8 **M1**; $Q_1 = 5$, $Q_3 = 12$, $IQR = 7$ **A1 A1**.

(b) $\sum x = 58$, $\bar{x} = \frac{58}{7} = 8.29$ **M1**; $\sum x^2 = 9 + 25 + 25 + 64 + 81 + 144 + 256 = 604$

M1; $\sigma = \sqrt{\frac{604}{7} - 8.29^2} = \sqrt{86.29 - 68.7} = \sqrt{17.6} = 4.20$ **M1 A1**.

Exam-style 3.3 ■ 2 marks

A cumulative frequency graph for 200 students rises smoothly. The median is read as 52, $Q_1 = 40$ and $Q_3 = 63$. Estimate how many students scored more than 63.

Solution 3.3

Method: Spread from totals

Worked steps

above Q_3 is the top quarter $= \frac{1}{4} \times 200 = 50$ students **M1** **A1**.