Exercise walk-through

6.1.99

Independent transfer: Foundation then Higher

AQA · GCSE · Mathematics

Samples and data

- **Primary data** is collected by you; **secondary data** was collected by someone else.
- **Categorical data** is in words, such as favourite colour.
- **Discrete** data can take only certain values, such as the number of brothers and sisters.
- **Continuous data** can take any value in a **range**, such as a time or a height, even if it is rounded when it is recorded.

Histograms, cumulative frequency and box plots (H)

- **Histograms.** In a **histogram** the area of each bar, not its height, shows the frequency.
- When the **class intervals** have different widths, the height is the **frequency density**:
- **Worked example 6 (H).** Classes $0 \leq x < 10$, $10 \leq x < 20$ and $20 \leq x < 40$ have frequencies 20, 30 and 20.
- The **class width** of the last class is 20, so the frequency densities are $20 \div 10 = 2$, $30 \div 10 = 3$ and $20 \div 20 = 1$.

$$\text{frequency density} = \frac{\text{frequency}}{\text{class width}}$$

Sources for this lesson

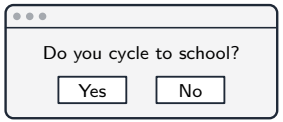
- AQA, *GCSE Mathematics (8300) specification*, subject content section 3.6 (Statistics).
- "Landon, 1,293,669; Roosevelt, 972,897", *The Literary Digest* (31 October 1936).
- P. Squire, "Why the 1936 Literary Digest poll failed", *Public Opinion Quarterly* 52 (1988), pages 125 to 133.
- AQA, *GCSE Mathematics* Higher Papers 1, 2 and 3 (June 2024), the **pie chart**, frequency table and **box plot** questions, adapted.

Exercises 2.1·2.2

2.1 For the numbers on the card, work out the mean, median, mode and range. [2]

4, 7, 7, 9, 13

2.2 A school puts a survey about cycling on its website. 70% of the people who answer cycle to school. Explain why this may not be true for the whole school. Suggest a better way to collect the data. [2]



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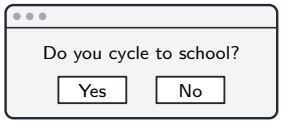
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2.1

- mean **8**, median **7**
- mode **7**, range **9**

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2.2

- people who cycle are more likely to choose to answer, so the sample is biased
- choose a random sample from the school list and ask all of them

Exercise 2.3

2.3 90 students choose an after-school club. 25 choose art. Work out the angle for art in a pie chart. [2]

club	art	music	sport	drama	total
students	25	18	32	15	90

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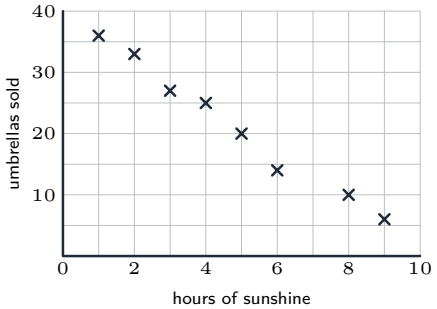
club	art	music	sport	drama	total
students	25	18	32	15	90

2.3

- $\frac{25}{90} \times 360$
- **100°**

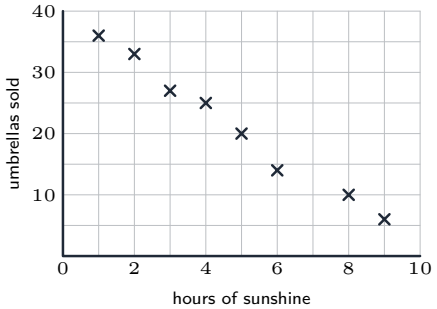
Exercise 2.4

2.4 The scatter graph shows the hours of sunshine and the umbrellas sold on 8 days. Describe the correlation. Explain why the graph should not be used for a day with 15 hours of sunshine. [2]



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2.4

- negative correlation: more sunshine, fewer umbrellas sold
- 15 hours is outside the data

Exercise 3.1

3.1 The table shows the times of 30 students in a test. Work out an estimate of the mean time. [3]

time t (min)	frequency
$0 < t \leq 10$	8
$10 < t \leq 30$	12
$30 < t \leq 35$	10

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time t (min)	frequency
$0 < t \leq 10$	8
$10 < t \leq 30$	12
$30 < t \leq 35$	10

3.1

- midpoints 5, 20, 32.5
- $\dfrac{40 + 240 + 325}{30}$
- **20.2** minutes

Exercise 3.2 (a)

3.2 The table shows the journey times to school of 60 students.

(a) Write down the modal class and the class that contains the median. [2]

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(a) modal class $\mathbf{20 < t \leq 30}$; running totals $6, 24, 44$: median class $\mathbf{20 < t \leq 30}$

Exercise 3.2 (b)

3.2 The table shows the journey times to school of 60 students.

(b) Work out an estimate of the mean journey time. [3]

time t (min)	frequency
$0 < t \leq 10$	6
$10 < t \leq 20$	18
$20 < t \leq 30$	20
$30 < t \leq 50$	12
$50 < t \leq 60$	4

Exercise 3.2 (b)

3.2 The table shows the journey times to school of 60 students.

(b) Work out an estimate of the mean journey time. [3]

time t (min)	frequency
$0 < t \leq 10$	6
$10 < t \leq 20$	18
$20 < t \leq 30$	20
$30 < t \leq 50$	12
$50 < t \leq 60$	4

(b) midpoints $5, 15, 25, 40, 55$; $\dfrac{30 + 270 + 500 + 480 + 220}{60} = \dfrac{1500}{60}$; **25** minutes

Exercise 3.2 (c)

3.2 The table shows the journey times to school of 60 students.

(c) Write down the cumulative frequencies. Estimate the median by working through its class. Estimate the percentage of students whose journey is longer than 40 minutes. [4]

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(c) $6, 24, 44, 56, 60$; $20 + \frac{6}{20} \times 10 = \mathbf{23}$ minutes; $6 + 4 = 10$ students, $\mathbf{16.7}\%$

Exercise 3.2 (d)

3.2 The table shows the journey times to school of 60 students.

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(d) 0.6, 1.8, 2.0; 0.6, 0.4; $Q_1 = 10 + \frac{9}{18} \times 10 = 15$ and $Q_3 = 30 + \frac{1}{12} \times 20 = 31.7$, IQR **16.7** minutes; this school has shorter journeys on average (23 against 28) and slightly more consistent times (16.7 against 18)