Exercise walk-through

6.2.1 Statistical Displays

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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 $20 \div 20 = 1$.

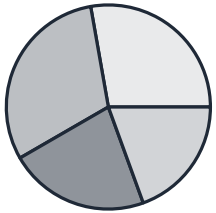
$$\text{frequency density} = \frac{\text{frequency}}{\text{class width}}$$

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.

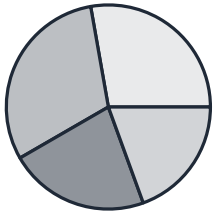
Exercise 2.1

2.1 A pie chart shows 60 people. 15 of them choose tea. Work out the angle for tea. [1]



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2.1 A pie chart shows 60 people. 15 of them choose tea. Work out the angle for tea. [1]



2.1

- $\frac{15}{60} \times 360° = \mathbf{90}°$

Setup for exercise 2.2

2.2 Use the worked example. What fraction of the students take the bus? [1]



Exercise 2.2

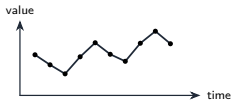
2.3 36 people choose a colour: red 12, blue 15, green 9. Work out the three pie chart angles. [2]



2.4 In a pie chart, a sector of 72° represents 18 people. How many people does the whole pie chart show? [2]



2.5 Name a suitable display for the temperature at noon each day for a month. [1]



Exercise 2.2

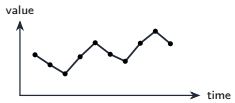
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2.2

- $\frac{135}{360} = \mathbf{\frac{3}{8}}$

2.3

Full solution on next slide

Full solution 2.2

2.2

- $\frac{135}{360} = \mathbf{\frac{3}{8}}$

2.3

- angle per person $= \frac{360^\circ}{36} = 10^\circ$
- red $\mathbf{120}^\circ$, blue $\mathbf{150}^\circ$, green $\mathbf{90}^\circ$

2.4

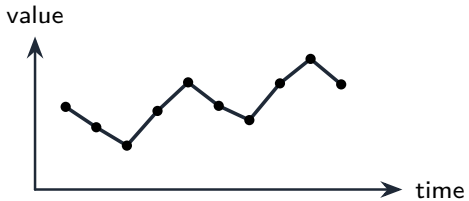
- 72° is $\frac{72}{360} = \frac{1}{5}$ of the pie
- total $= 18 \times 5 = \mathbf{90}$ people

2.5

- a **line graph** (time series)

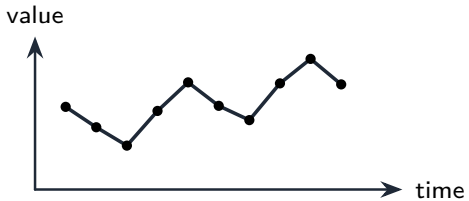
Exercise 3.1

3.1 A bar chart of sales has a vertical axis that starts at 900. Explain why it may be misleading. [1]



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3.1 A bar chart of sales has a vertical axis that starts at 900. Explain why it may be misleading. [1]



3.1

- starting at 900 cuts off the bottom of every bar, so small differences look much larger than they are

Setup for exercise 3.2

3.2 A shop's sales (in £1000s) for each quarter are: 2023: 20, 35, 50, 25; 2024: 24, 40, 58, 30. Describe the trend and the seasonal pattern. [2]



Exercise 3.2

3.3 Pie chart A shows 40 students, with 135° for cycling. Pie chart B shows 100 students, with 90° for cycling. Zoe says more students cycle in A. Is she right? Show your working. [2]



3.4 Work out the angle for each category if 24 cats, 30 dogs and 18 rabbits are shown in a pie chart. [2]



3.5 One pie chart shows 120 boys, with 150° for football. Another shows 80 girls, with 108° for football. What percentage of all 200 students chose football? [4]



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3.2

- trend: sales **increase** from 2023 to 2024 (each quarter is higher)
- seasonal: sales are highest in the **third quarter** and lowest in the first each year

3.3

Full solution on next slide

Full solution 3.2 (1/2)

3.2

- trend: sales **increase** from 2023 to 2024 (each quarter is higher)
- seasonal: sales are highest in the **third quarter** and lowest in the first each year

3.3

- A: $\frac{135}{360} \times 40 = 15$; B: $\frac{90}{360} \times 100 = 25$
- **no**: 25 cycle in B but only 15 in A; A's angle is bigger because its total is smaller

3.4

Full solution 3.2 (2/2)

- total $= 72$, so angle per animal $= \dfrac{360^\circ}{72} = 5^\circ$
- cats $\mathbf{120}^\circ$, dogs $\mathbf{150}^\circ$, rabbits $\mathbf{90}^\circ$

3.5

- boys: $\dfrac{150}{360} \times 120 = 50$
- girls: $\dfrac{108}{360} \times 80 = 24$
- football $= 50 + 24 = 74$ of 200
- $\dfrac{74}{200} \times 100\% = \mathbf{37}\%$