

Exercise walk-through

6.2

Charts, tables, time series and scatter (S2, S5–S6)

AQA · GCSE · Mathematics

1. Unit 3.6 at a glance

Unit 3.6 at a glance

Rows S1-S6 in three tiers. Additional foundation: inferring population properties from a sample with the limitations of sampling (S1) and tables plus line graphs for time series (S2). Higher only: histograms with equal and UNEQUAL class intervals and cumulative frequency graphs (S3), with box plots, quartiles and the inter-quartile range added to S4.

Must-know: $\text{mean} = \frac{\sum fx}{\sum f}$ (midpoints for grouped); $\text{range} = \text{max} - \text{min}$; $\text{IQR} = Q3 - Q1$; $\text{pie angle} = \frac{f}{n} \times 360$; $\text{density} = \frac{\text{frequency}}{\text{class width}}$; correlation direction and strength, never causation.

3. Tables, charts and time series

Tables, charts and time series

Frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete data, and time-series tables and line graphs (S2) - including choosing the SUITABLE diagram. Pie angle = $f \text{ over } n \text{ times } 360$: 10, 15, 15 of 40 give 90, 135, 135 degrees.

The 3H Q8 anchor: table mean $(8+9+9+6+9+10)/6 = 8.5$ with a pie sector 162 degrees = 45 percent, so $4 \times 8.5 + 45 = 79$. Time series join in order; scatter graphs never join.

Check yourself

Check yourself

Samples vs census with limitations; primary and secondary, discrete and continuous data.

Tables, bars, pies, pictograms, vertical line charts, time series; the suitable diagram chosen.

Histogram density with unequal widths; cumulative frequency at boundaries with interpolated quartiles.

Mean, median, mode and modal class with range and outliers; box plots with IQR comparisons; correlation, best-fit lines, interpolation versus extrapolation.

Exercises 2.1·2.3

2.1 Of 40 students, 10 walk, 15 take the bus and 15 cycle. Work out the three pie-chart angles. [2]

2.2 A pie-chart sector has angle 162° . What percentage of the total does it represent?[2]

2.3 Daily attendance over a week reads 32, 35, 33, 36, 34. Write down the range and the largest value. [2]

Exercises 2.1·2.3

2.1 Of 40 students, 10 walk, 15 take the bus and 15 cycle. Work out the three pie-chart angles. [2]

$$\mathbf{2.1} \quad \frac{10}{40} \times 360 = 90^\circ; \frac{15}{40} \times 360 = 135^\circ \text{ each.}$$

2.2 A pie-chart sector has angle 162° . What percentage of the total does it represent?[2]

$$\mathbf{2.2} \quad \frac{162}{360} \times 100 = 45\%.$$

2.3 Daily attendance over a week reads 32, 35, 33, 36, 34. Write down the range and the largest value. [2]

$$\mathbf{2.3} \quad \text{Range} = 36 - 32 = 4; \text{ largest value } 36.$$

Exercises 2.4·2.6

2.4 Which display suits categorical data with named categories: a bar chart or a time-series line graph? [2]

2.5 Name the correlation type when points rise together tightly, and when points fall loosely. [2]

2.6 A line of best fit is $\hat{y} = 40 + 4.5x$ for inputs observed from 1 to 5. Predict y at $x = 3.6$ and at $x = 10$, stating which prediction is safer. [3]

Exercises 2.4·2.6

2.4 Which display suits categorical data with named categories: a bar chart or a time-series line graph? [2]

2.4 A bar chart – separate bars for named categories; a time-series line graph needs ordered points in time.

2.5 Name the correlation type when points rise together tightly, and when points fall loosely. [2]

2.5 Strong positive correlation; weak negative correlation.

2.6 A line of best fit is $\hat{y} = 40 + 4.5x$ for inputs observed from 1 to 5. Predict y at $x = 3.6$ and at $x = 10$, stating which prediction is safer. [3]

2.6 $x = 3.6$: $\hat{y} = 40 + 4.5 \times 3.6 = 56.2$ – inside the observed range 1 to 5, so it interpolates and is safer. $x = 10$: $\hat{y} = 85$ – outside the range, an extrapolation whose trend may not continue.

Exercises 3.1·3.3

3.1 (*June 2024 3H Q8, adapted.*) Six table values are 8, 9, 9, 6, 9, 10. (a) Work out their mean. (b) A pie chart of the same data has a 162° sector. Work out $4 \times \text{mean} + \text{percentage}$, where the percentage is the sector's share. [4]

3.2 (*Original, Higher.*) Classes $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ have frequencies 20, 30, 20. Work out the frequency densities and check that the areas recover the frequencies. [3]

3.3 (*Original, Higher.*) For the same data, write down the cumulative frequency points and estimate the median, which reads at cumulative frequency 35. [2]

Exercises 3.1·3.3

3.1 (*June 2024 3H Q8, adapted.*) Six table values are 8, 9, 9, 6, 9, 10. (a) Work out their mean. (b) A pie chart of the same data has a 162° sector. Work out $4 \times \text{mean} + \text{percentage}$, where the percentage is the sector's share. [4]

3.1 (a) $(8 + 9 + 9 + 6 + 9 + 10) \div 6 = 51 \div 6 = 8.5$. (b) Percentage $= \frac{162}{360} \times 100 = 45$; so $4 \times 8.5 + 45 = 34 + 45 = 79$.

3.2 (*Original, Higher.*) Classes $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ have frequencies 20, 30, 20. Work out the frequency densities and check that the areas recover the frequencies. [3]

3.2 Widths 10, 10, 20 give densities $20 \div 10 = 2$, $30 \div 10 = 3$, $20 \div 20 = 1$; areas $2 \times 10 = 20$, $3 \times 10 = 30$, $1 \times 20 = 20$ – the frequencies return.

3.3 (*Original, Higher.*) For the same data, write down the cumulative frequency points and estimate the median, which reads at cumulative frequency 35. [2]

3.3 Points $(0, 0)$, $(10, 20)$, $(20, 50)$, $(40, 70)$. The median at 35 lies in the second class: $10 + \frac{35-20}{30} \times 10 = 15$.

Exercise 3.4

3.4 (*Original.*) A pictogram key says one symbol represents five students. How many symbols represent 12 students, and why must fractional symbols be allowed? [2]

Exercise 3.4

3.4 (*Original.*) A pictogram key says one symbol represents five students. How many symbols represent 12 students, and why must fractional symbols be allowed? [2]

3.4 $12 \div 5 = 2.4$ symbols; data is not always a multiple of the key, so fractional (part-drawn) symbols must be allowed and the key stated.

Local review guidance: the $\frac{f}{n} \times 360^\circ$ or $\frac{162}{360}$ fraction seen before multiplying; densities with unequal widths, height is not frequency; boundaries, not midpoints, with interpolation shown; interpolation vs extrapolation named with the observed range. This is authored classroom guidance.