6.2 Charts, tables, time series and scatter

Name: _____ Class: _____ Date: _____ **Total: 24 marks**

KEY WORDS time series • correlation

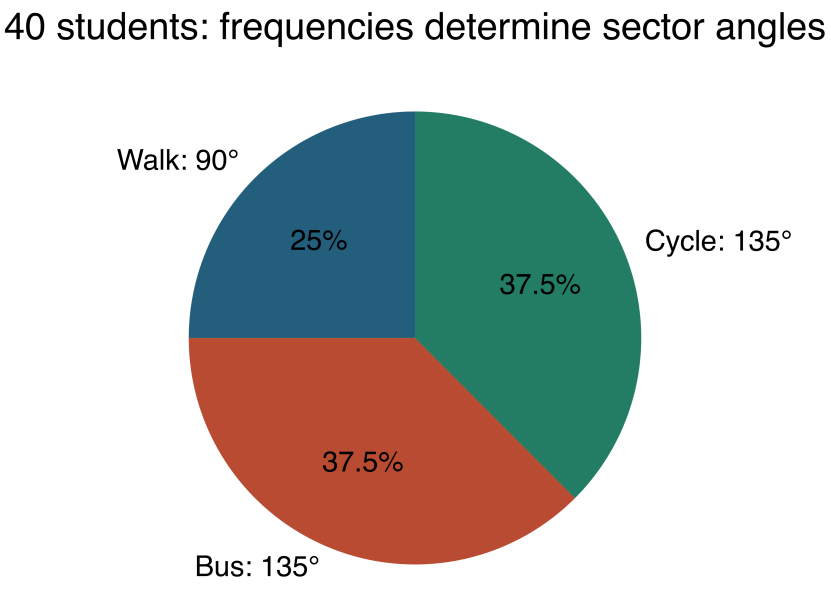
Charts, tables, time series and scatter

Objective

Interpret and construct tables, charts and diagrams – bar, pie, pictogram, vertical line, time series – construct and interpret histograms and cumulative frequency graphs, apply statistics to describe a population, and use scatter graphs with correlation and best-fit lines (rows S2–S3, S5–S6).

1 Key knowledge and worked examples

Displays and bivariate data. Pie angle $= \frac{f}{n} \times 360°$; histogram area is frequency, so height (density) = frequency ÷ class width; cumulative frequency plots at UPPER class boundaries. Correlation has direction (positive, negative, none) and strength (strong, weak) – and never proves causation. Best-fit lines interpolate safely and extrapolate dangerously.



Original native-lesson illustration; labels belong to its worked example.

2 Practice

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]

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]

3 Exam-style questions

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 $4 \times$ mean + percentage, where the percentage is the sector's share. [4]

3.2 *(Original, Higher.)* Classes $0 \le x < 10$, $10 \le x < 20$, $20 \le x < 40$ 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]

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]

Solutions

2.1 $\frac{10}{40} \times 360 = 90°$; $\frac{15}{40} \times 360 = 135°$ each.

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

2.3 Range $= 36 - 32 = 4$; largest value 36.

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

2.5 Strong positive correlation; weak negative correlation.

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.

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

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 $\frac{f}{n} \times 360°$ 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.