

E9.4 Statistical charts and diagrams

Name: _____ Class: _____ Date: _____ **Total: 20 marks**

KEY WORDS correlation 相关性 • line of best fit 最佳拟合线 • pie chart 饼图
• scatter diagrams 散点图 • statistical charts and diagrams 统计图表

Objective

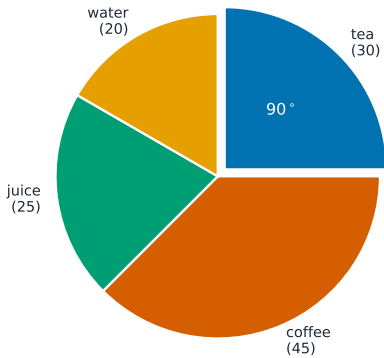
Build the skills to answer Extended exam questions on **statistical charts and diagrams** 统计图表 — the **pie chart** 饼图, and **scatter diagrams** 散点图 with **correlation** 相关性.

You must be able to:

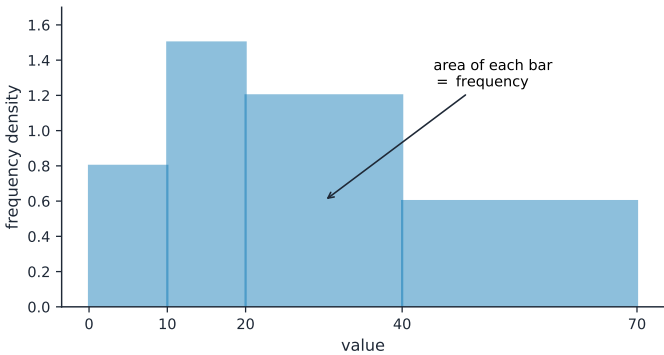
- find the angle of a pie-chart slice
- describe the correlation shown by a scatter diagram
- use a line of best fit to predict

1 Worked examples

■ Pie charts and scatter diagrams



A pie chart splits 360°; a scatter diagram shows a link



$$\text{density} = \text{freq} / \text{width} \cdot \text{area} = \text{frequency}$$

A histogram is another statistical chart

- **Pie chart:** slice angle = $\frac{\text{frequency}}{\text{total}} \times 360^\circ$. Tea 30 of 120 $\rightarrow \frac{30}{120} \times 360 = 90^\circ$.
- **Correlation** 相关性: **positive** (rise together), **negative** (one rises as the other falls), **zero** (no link).
- **Line of best fit** 最佳拟合线: one straight line through the middle of the points — use it to predict.

Answer shapes: M1 a correct method, A1 the correct answer.

2 Practice

2.1 Out of 90 people, 30 chose coffee. Find the angle of the coffee slice on a pie chart.[2]

2.2 A scatter diagram shows that as temperature rises, ice-cream sales rise. State the type of correlation. [1]

2.3 State what a **line of best fit** is used for. [1]

3 Exam-style questions

3.1 In a survey of 72 people, 18 walk to work. Find the angle of the "walk" slice on a pie chart.

[2]

3.2 A pie chart slice for "bus" has an angle of 120°. The total number of people is 90. Find how many travel by bus.

[3]

3.3 180 students each chose one favourite subject.

Subject	Maths	Science	English	Art
Students	60	45	50	25

(a) Calculate the angle for each sector of a pie chart.

[3]

(b) A second school of 300 students draws a pie chart in which Maths has an angle of 120°. State whether more students chose Maths in the second school, showing a calculation.

[3]

(c) A scatter diagram of "hours revised" against "test score" shows points rising from bottom left to top right, close to a straight line. Describe the correlation, and explain what the line of best fit is used for.

[3]

(d) A student uses the line of best fit to predict the score for 20 hours of revision, well beyond the plotted data. Explain why this is unreliable.

[2]

Solutions

Marking: **M1** a correct method, **A1** the correct answer.

2.1 $\frac{30}{90} \times 360^\circ = 120^\circ$.

2.2 positive correlation.

2.3 to predict a value (read one variable from the other).

3.1 $\frac{18}{72} \times 360^\circ = 90^\circ$.

3.2 $\frac{120}{360} \times 90 = \frac{1}{3} \times 90 = 30$ people.

3.3 (a) Each student is worth $\frac{360}{180} = 2^\circ$; Maths 120° , Science 90° , English 100° , Art 50° .

(b) In the second school 120° represents $\frac{120}{360} = \frac{1}{3}$ of the students; $\frac{1}{3} \times 300 = 100$ students; that is more than 60, so yes — even though the two sectors have the same angle, the totals differ.

(c) Strong **positive** correlation — as hours revised increase, test score increases. The line of best fit summarises the trend and lets a score be estimated for a number of hours not in the data.

(d) 20 hours is outside the range of the data collected, so this is **extrapolation**; the pattern is not known to continue beyond the data — scores cannot exceed 100, so the trend must flatten.