

2.5 Correlation

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

KEY WORDS correlation coefficient 相关系数 • scatterplot 散点图

Objective

Build the skills to answer exam questions on **correlation**.

You must be able to:

- interpret the **correlation coefficient** 相关系数 r as the strength and direction of a **linear** relationship
- explain that r always lies between -1 and 1
- describe how outliers and non-linear patterns make r **misleading**

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ **The correlation coefficient**

r measures the **strength** and **direction** of a **linear** relationship. Always $-1 \leq r \leq 1$:

- near $+1$: strong positive; near -1 : strong negative; near 0 : weak (little linear relationship).

■ **Cautions**

r only describes **linear** patterns. **Outliers** and **curved** relationships can make r misleading, so always look at the scatterplot too.

2 Practice

2.1 State the range of the correlation coefficient r . [1]

2.2 State what $r = -0.9$ tells you about the relationship. [2]

2.3 State one thing that can make r misleading. [1]

3 Exam-style questions

3.1 The correlation coefficient always lies between [1]

- **A** 0 and 1
- **B** -1 and 1
- **C** -100 and 100
- **D** any two values

3.2 A correlation of $r = 0.05$ indicates a [1]

- **A** strong positive relationship
- **B** weak (little linear) relationship
- **C** perfect relationship
- **D** strong negative relationship

3.3 A data set has $r = 0.85$.

(a) State the direction of the relationship. [1]

(b) State the strength. [1]

(c) State whether r describes a curved relationship well. [1]

Solutions

2.1 between -1 and 1 .

2.2 a strong negative linear relationship.

2.3 an outlier or a non-linear (curved) pattern (any one).

3.1 B.

3.2 B.

3.3 (a) positive. (b) strong. (c) no — r only measures linear relationships.