

# 2.5 Correlation

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Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

Total: 9 marks

## Objective

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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

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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

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

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

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

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### 3 Exam-style questions

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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
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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
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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]

### 4 Go further

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- work through the **2.5 Correlation** lesson on the **Learn** page;
- read the **Exploring Two-Variable Data** section of the AP Statistics handout on the **Know** page.

## Solutions

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**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.