

# 5.3 Probability

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_ **Total: 13 marks**

**KEY WORDS** probability 概率 • independent 独立 • mutually exclusive 互斥  
• conditional probability 条件概率 • independent events 独立事件

## Objective

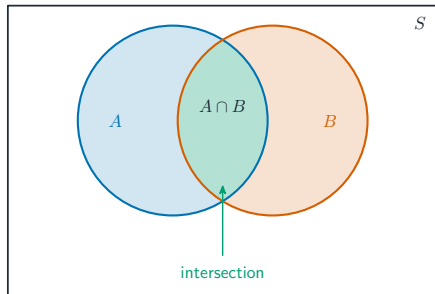
Build the skills to answer exam questions on **probability** 概率 — the addition and multiplication rules, **mutually exclusive** 互斥 and **independent** 独立 events, and **conditional probability** 条件概率.

You must be able to:

- use  $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- test independence with  $P(A \cap B) = P(A)P(B)$
- use  $P(A | B) = \frac{P(A \cap B)}{P(B)}$

## 1 Worked examples

### ■ Rules & independence



The overlap is  $A \cap B$ ; the addition rule subtracts it once so it is not double-counted

$P(A) = 0.5$ ,  $P(B) = 0.4$ ,  $P(A \cap B) = 0.2$ . **Independent?**  $P(A)P(B) = 0.2 = P(A \cap B)$  — yes.

**Conditional:**  $P(A | B) = \frac{0.2}{0.4} = 0.5$ .

## 2 Practice

**2.1** Events are mutually exclusive with  $P(A) = 0.3$ ,  $P(B) = 0.45$ . Find  $P(A \cup B)$ . [2]

**2.2** State the test for two events  $A$  and  $B$  to be independent. [1]

## 3 Exam-style questions

**3.1** For independent events with  $P(A) = 0.6$  and  $P(B) = 0.5$ ,  $P(A \cap B)$  is: [1]

- |   |   |
|---|---|
| A | B |
| C | D |
- A** 1.1  
**B** 0.3  
**C** 0.1  
**D** 0

**3.2** A and B are events with  $P(A) = 0.6$ ,  $P(B) = 0.5$  and  $P(A \cup B) = 0.8$ .

(a) Find  $P(A \cap B)$ . [2]

(b) Determine whether  $A$  and  $B$  are independent. [2]

(c) Find  $P(A | B)$ . [2]

**3.3** A bag has 5 red and 3 blue balls. Two are drawn without replacement. Find the probability that both are red. [3]