

Exercise walk-through

Introduction to Probability ■ 4.3

eXercise

You must be able to

- identify the **sample space** 样本空间 of a random process
- calculate $P(E) = \frac{\text{outcomes in } E}{\text{total outcomes}}$ for equally likely outcomes
- use that a probability is between 0 and 1
- find the **complement**, $P(E') = 1 - P(E)$

Method — Basic probability

The **sample space** is the set of all possible outcomes. If all are equally likely:

$$P(E) = \frac{\text{number of outcomes in } E}{\text{total number of outcomes}}.$$

Method — Range and complement

Every probability satisfies $0 \leq P(E) \leq 1$. The **complement** (not E) has $P(E') = 1 - P(E)$. A probability is the **long-run relative frequency** of the event.

Method — Example

A fair die: $P(\text{even}) = \frac{3}{6} = 0.5$.

Practice 2.1 ■ 1 mark

State the range of any probability.

Solution 2.1

Method: Range and complement

Worked steps

between 0 and 1 (inclusive) **B1**.

Practice 2.2 ■ 1 mark

A fair die is rolled. Find $P(\text{rolling a } 4)$.

Solution 2.2

Method: Example

Worked steps

$$\frac{1}{6} \approx 0.167 \text{ (B1)}.$$

Practice 2.3 ■ 2 marks

If $P(\text{rain}) = 0.3$, find $P(\text{no rain})$.

Solution 2.3

Worked steps

$$P(\text{no rain}) = 1 - 0.3 = 0.7 \quad \text{M1} \quad \text{A1}.$$

Exam-style 3.1 ■ 1 mark

The probability of the complement of E is

A $P(E)$

B $1 - P(E)$

C $1 + P(E)$

D 0

Solution 3.1

Method: Range and complement

A $P(E)$

B $1 - P(E)$



C $1 + P(E)$

D 0

Worked steps

B.

Exam-style 3.2 ■ 1 mark

A probability must be between

A -1 and 1

B 0 and 1

C 0 and 100

D any two values

Solution 3.2

A -1 and 1

B 0 and 1



C 0 and 100

D any two values

Worked steps

B.

Exam-style 3.3 ■ 2 marks

A bag has 3 red and 7 blue balls, drawn at random.

(a) Find $P(\text{red})$.

(b) Find $P(\text{not red})$.

Solution 3.3

Worked steps

$$(a) P(\text{red}) = \frac{3}{10} = 0.3 \quad \text{M1 A1.} \quad (b) 1 - 0.3 = 0.7 \quad \text{B1.}$$