

Exercise walk-through

Mutually Exclusive Events ■ 4.4

eXercise

You must be able to

- describe the **joint probability** 联合概率 $P(A \cap B)$
- explain why two events are or are not **mutually exclusive** 互斥
- use that mutually exclusive (disjoint) events have $P(A \cap B) = 0$

Method — Joint probability

$P(A \cap B)$ is the probability that **both** A and B occur (the intersection).

Method — Mutually exclusive events

Two events are **mutually exclusive** (disjoint) if they **cannot happen at the same time**, so

$$P(A \cap B) = 0.$$

For example, on one die roll, “roll a 2” and “roll a 5” are mutually exclusive.

Practice 2.1 ■ 1 mark

State what $P(A \cap B)$ means.

Solution 2.1

Worked steps

the probability that both A and B occur **B1**.

Practice 2.2 ■ 1 mark

Define mutually exclusive events.

Solution 2.2

Method: Mutually exclusive events

Worked steps

events that cannot occur at the same time **B1**.

Practice 2.3 ■ 1 mark

State $P(A \cap B)$ for two mutually exclusive events.

Solution 2.3

Method: Mutually exclusive events

Worked steps

0 **B1**.

Exam-style 3.1 ■ 1 mark

Two mutually exclusive events have $P(A \cap B) =$

A 1

B 0

C 0.5

D $P(A) \cdot P(B)$

Solution 3.1

Method: Mutually exclusive events

A 1

B 0



C 0.5

D $P(A) \cdot P(B)$

Worked steps

B.

Exam-style 3.2 ■ 1 mark

$P(A \cap B)$ is called the _____ probability.

A conditional

B joint

C marginal

D complement

Solution 3.2

A conditional

B joint 

C marginal

D complement

Worked steps

B.

Exam-style 3.3 ■ 1 mark

On one die roll, event $A = \text{"roll a 3"}$ and event $B = \text{"roll a 6"}$.

- (a) State whether A and B are mutually exclusive.
- (b) State $P(A \cap B)$.
- (c) Find $P(A)$.

Solution 3.3

Method: Mutually exclusive events

Worked steps

(a) yes **B1**. (b) 0 **B1**. (c) $\frac{1}{6}$ **B1**.