

Exercise walk-through

Conditional probability ■ E8.4

eXercise

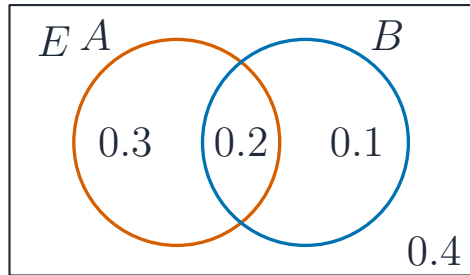
You must be able to

- find a conditional probability from a Venn diagram or table
- restrict attention to the part that matches the condition
- combine with without-replacement reasoning

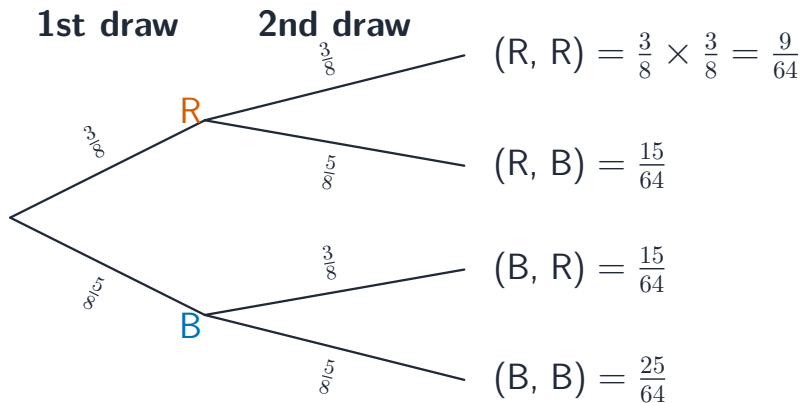
Method — Conditional probability

- **Worked:** 30 students, 18 study French, of whom 7 also study German.
- A French student is picked $\rightarrow$
 $P(\text{German} \mid \text{French}) = \frac{7}{18}$ (look only at the 18 French students).

Answer shapes: **M1** a correct method,
A1 the correct answer.



Method — Conditional probability



A tree diagram handles conditional probability

Practice 2.1 ■ 2 marks

Of 20 people, 12 own a dog and, of those, 5 also own a cat. A dog owner is chosen. Find the probability they also own a cat.

Solution 2.1

Method: Conditional probability

Worked steps

look only at the 12 dog owners: $\frac{5}{12}$ **M1** **A1** *for using 12 as the total; for $\frac{5}{12}$.*

Practice 2.2 ■ 2 marks

In a Venn diagram, $P(A) = 0.5$ and $P(A \cap B) = 0.2$. Find $P(B \mid A)$.

Solution 2.2

Method: Conditional probability

Worked steps

$$P(B | A) = \frac{P(A \cap B)}{P(A)} = \frac{0.2}{0.5} = 0.4 \quad \text{M1} \quad \text{A1} \quad \text{for } \frac{0.2}{0.5}; \text{ for } 0.4.$$

Practice 2.3 ■ 2 marks

A two-way table shows 40 students; 24 walk to school and 9 of those are girls. A walker is chosen. Find the probability the walker is a girl.

Solution 2.3

Method: Conditional probability

Worked steps

look only at the 24 walkers: $\frac{9}{24} = \frac{3}{8}$ **M1** **A1** *for using 24; for $\frac{3}{8}$.*

Exam-style 3.1 ■ 2 marks

A box has 5 red and 3 blue pens. Two are taken **without replacement**.

- (a) Find the probability that the first is red and the second is blue.
- (b) Find the probability that both are the same colour.

Solution 3.1

Worked steps

(a) $\frac{5}{8} \times \frac{3}{7} = \frac{15}{56}$ **M1** **A1** for $\frac{5}{8} \times \frac{3}{7}$; for $\frac{15}{56}$. (b) $P(\text{red, red}) = \frac{5}{8} \times \frac{4}{7} = \frac{20}{56}$; $P(\text{blue, blue}) = \frac{3}{8} \times \frac{2}{7} = \frac{6}{56}$; total = $\frac{26}{56} = \frac{13}{28}$ **M1** **M1** **A1** for both same-colour products; for adding; for $\frac{13}{28}$.