

## Independent events (the AND rule)

### Starter

1. Without using a calculator, find:

(a)  $\frac{6}{11} \times \frac{5}{11}$

(b)  $\frac{4}{9} \times \frac{3}{5}$

**N.B.** When multiplying fractions, remember to cancel before multiplying so that the calculation is easier.

(c)  $0.6 \times 0.4$

(d)  $0.7 \times 0.1$

### Notes

Events are independent if they are physically independent i.e. the outcome of one event does not affect the outcomes of another event.

**Example:** rolling two dice — they should strictly be rolled separately so they do not touch each other.

### Comparing weather

Weather on two successive days is not independent since the weather on the first day affects the weather on the next day

Weather on days separated by 1 year is independent since the weather on the first day does not affect that on the second day.

If events A and B are independent:

$$P(A \text{ and } B) = P(A) \times P(B).$$

You will often see the “and” replaced by  $\cup$  or a comma.

i.e.  $P(A \text{ and } B) \equiv P(A \cup B) \equiv P(A, B)$

**E.g. 1** A bag contains 4 red, 7 blue and 9 green discs. A disc is removed, its colour noted, and then it is put back in the bag. A second disc is then chosen. Find the probability of getting:

- (a) a red and then a blue
- (b) two green discs
- (c) a blue and then not a blue
- (d) a red and a blue in any order

**Working:** (a)  $P(R, B) = \frac{4}{20} \times \frac{7}{20} = \frac{7}{100}$

**E.g. 2** A coin is flipped 3 times. What is the probability of getting 3 heads?

### Pack of cards

- 52 cards (26 are red, 26 are black)
- 4 suits (diamonds  $\blacklozenge$ , hearts  $\heartsuit$ , clubs  $\clubsuit$  and spades  $\spadesuit$ )
- 13 cards in each suit
- 4 cards of each kind (i.e. 4 aces, 4 8s etc.)
- 2 red suits — diamonds  $\blacklozenge$ , hearts  $\heartsuit$
- 2 black suits — clubs  $\clubsuit$ , spades  $\spadesuit$
- 3 picture cards — king, queen, jack
- 4 honour cards — ace, king, queen, jack

**E.g. 3** A card is removed from a pack. It is then replaced in the pack and a second card is chosen. Find the probability of getting:

- (a) a red card then a spade ♠
- (b) a 7 then a black card
- (c) a picture card then the 2 of hearts (2♥)

**Video:** [Independent events](#)

[Solutions to Starter and E.g.s](#)

### Exercise

9-1 class textbook:	p248 M8.8 Qu 1-12
A*-G class textbook:	p213 M8.6 Qu 1-12
9-1 homework book:	p85 M8.8 Qu 1-8
A*-G homework book:	p61 M8.6 Qu 1-8

### Summary

Independent events:  $P(A \text{ and } B) = P(A) \times P(B)$ .

Notation:  $P(A \text{ and } B) \equiv P(A \cup B) \equiv P(A, B)$

[Homework book answers \(only available during a lockdown\)](#)