



- 1 A fair six-sided dice is rolled once.

Write down the probability that the dice lands on a number less than 3.

(1 mark)

The numbers less than 3 are 1 and 2, so there are 2 successful outcomes out of 6 equally likely outcomes

$$P(\text{less than 3}) = \frac{2}{6} = \frac{1}{3}$$

$$\frac{1}{3}$$

- 2 A spinner can land on red, blue, green or yellow.

The table shows the probabilities for three of the colours.

Colour	red	blue	green	yellow
Probability	0.2	0.35	0.1	

Work out the probability that the spinner lands on yellow.

(2 marks)

The four probabilities must add up to 1

$$0.2 + 0.35 + 0.1 = 0.65$$

$$P(\text{yellow}) = 1 - 0.65 = 0.35$$

$$0.35$$

- 3 A bag contains 5 red counters, 3 blue counters and 2 yellow counters.

A counter is taken from the bag at random.

Write down the probability that the counter is blue.

(1 mark)

$$\text{Total counters} = 5 + 3 + 2 = 10$$

3 are blue

$$P(\text{blue}) = \frac{3}{10}$$

4

Here are some words that describe probability.

impossible unlikely even chance likely certain

Choose the best word to describe each event.

- A fair six-sided dice is rolled and lands on a number less than 7.
- A fair coin lands on heads.
- A bag contains only blue counters. A red counter is taken from the bag.

(3 marks)

a)

All of 1 to 6 are less than 7

certain

b)

Heads and tails are equally likely

even chance

c)

There is no red counter in the bag

impossible

5

Here is a probability scale, labelled from 0 to 1.

- Mark with a cross the probability that a fair coin lands on tails.
- Mark with a cross the probability that an ordinary fair dice lands on the number 8.



(2 marks)

A fair coin lands on tails with probability $\frac{1}{2}$, so the cross goes exactly halfway between 0 and 1

An ordinary dice only shows 1 to 6, so landing on 8 is impossible and the cross goes at 0

6

Priya buys 12 tickets in a school raffle.

A total of 400 tickets are sold.

One ticket is picked at random to win the prize.

Work out the probability that Priya does **not** win the prize.

(2 marks)

The number of tickets that are not Priya's is $400 - 12 = 388$

$$P(\text{Priya does not win}) = \frac{388}{400} = \frac{97}{100}$$

$$\boxed{\frac{97}{100}}$$

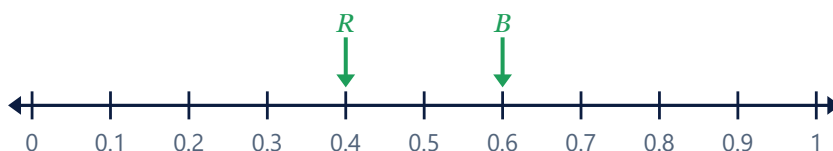
7

A bag contains 10 counters: 4 red, 3 blue and 3 yellow. One counter is taken from the bag at random.

On the probability scale, mark with an arrow

a. the probability that the counter is red. Label the arrow *R*.

b. the probability that the counter is blue or yellow. Label the arrow *B*.



(2 marks)

a) 4 red out of 10 counters

$$P(\text{red}) = \frac{4}{10} = 0.4$$

b) $3 + 3 = 6$ blue or yellow out of 10

$$P(\text{blue or yellow}) = \frac{6}{10} = 0.6$$

$$\boxed{R \text{ at } 0.4, B \text{ at } 0.6}$$

8

A box contains 24 chocolates: 8 milk, 6 dark and 10 white.

Hana takes one chocolate from the box at random.

- Work out the probability that the chocolate is dark.
- Work out the probability that the chocolate is not white.

(3 marks)

a)

$$\frac{6}{24} = \frac{1}{4}$$

$$P(\text{dark}) = \frac{1}{4}$$

b)

$$\text{Not white} = \text{milk} + \text{dark} = 8 + 6 = 14$$

$$\frac{14}{24} = \frac{7}{12}$$

$$P(\text{not white}) = \frac{7}{12}$$

9

A bag contains 4 green counters, 7 yellow counters and 9 white counters.

A counter is taken from the bag at random.

Find the probability that the counter is **not** green.

(2 marks)

$$\text{Total number of counters} = 4 + 7 + 9 = 20$$

$$\text{Counters that are not green} = 7 + 9 = 16$$

$$P(\text{not green}) = \frac{16}{20} = \frac{4}{5}$$

$$\frac{4}{5}$$

10

The probability that Dan's bus is late on any school day is 0.15

- Work out the probability that Dan's bus is not late on a school day.
- There are 40 school days in a term. Work out how many days you would expect Dan's bus to be late.

(3 marks)

a)

Probabilities add up to 1

$$1 - 0.15 = 0.85$$

$$0.85$$

b)

$$0.15 \times 40 = 6$$

$$6 \text{ days}$$

- 11 A bag contains only red, blue and green counters.

$\frac{1}{6}$ of the counters are green.

The rest of the counters are red and blue in the ratio red : blue = 3 : 2.

A counter is taken from the bag at random.

Work out the probability that the counter is blue.

(3 marks)

The fraction of counters that are red or blue = $1 - \frac{1}{6} = \frac{5}{6}$

Blue counters are 2 parts out of 5, so the blue fraction of the rest = $\frac{2}{5}$

$$P(\text{blue}) = \frac{2}{5} \times \frac{5}{6} = \frac{10}{30} = \frac{1}{3}$$

$$\boxed{\frac{1}{3}}$$

- 12 A fair six-sided dice is rolled.

Is it more likely to land on an even number or on a number greater than 4?

You must show how you decide.

(2 marks)

Even: 2, 4, 6 so $P = \frac{3}{6}$

Greater than 4: 5, 6 so $P = \frac{2}{6}$

$$\frac{3}{6} > \frac{2}{6}$$

An even number is more likely

- 13 A fair eight-sided spinner has sections numbered 1 to 8.

The spinner is spun once.

a. Write down the word that best describes the probability that the spinner lands on 9.

b. Find the probability that the spinner lands on a multiple of 3.

(2 marks)

The spinner only shows 1 to 8, so landing on 9 cannot happen: it is impossible

The multiples of 3 from 1 to 8 are 3 and 6, so $P(\text{multiple of 3}) = \frac{2}{8} = \frac{1}{4}$

14

A fair six-sided dice is rolled.

- Write down the probability that the dice lands on an even number.
- Work out the probability that the dice lands on a factor of 12.
- Work out the probability that the dice does not land on a factor of 12.

(3 marks)

a)

Even: 2, 4, 6 so $\frac{3}{6}$

$$\frac{1}{2}$$

b)

Factors of 12: 1, 2, 3, 4, 6

$$\frac{5}{6}$$

c)

$$1 - \frac{5}{6} = \frac{1}{6}$$

$$\frac{1}{6}$$

15

Ben has these notes and coins in a tin:

two £10 notes, three £5 notes, four £2 coins and one £1 coin.

Ben takes one note or coin from the tin at random.

Work out the probability that its value is less than £5.

(3 marks)

Total number of notes and coins = $2 + 3 + 4 + 1 = 10$

The items worth less than £5 are the four £2 coins and the one £1 coin, which is 5 items

$$P(\text{value less than £5}) = \frac{5}{10} = \frac{1}{2}$$

$$\frac{1}{2}$$

- 16 Here are the numbers of goals a team scored in its last 10 matches.

2 0 1 3 2 2 1 0 2 4

- a. Write down the mode.
b. One of the 10 matches is chosen at random. Work out the probability that the team scored exactly 2 goals in that match.

(3 marks)

a)

2 appears 4 times, 0 twice, 1 twice, 3 once, 4 once

Mode = 2

b)

4 matches out of 10

$$\frac{4}{10} = \frac{2}{5}$$

$$\frac{2}{5}$$

- 17 A spinner can land on red, blue or green only.

$P(\text{red}) = 0.3$ and $P(\text{blue}) = 0.25$.

- a. Work out the probability that the spinner lands on red or blue.
b. Work out the probability that the spinner lands on green.

(3 marks)

$$P(\text{red or blue}) = 0.3 + 0.25 = 0.55$$

The probabilities of red, blue and green must add up to 1

$$P(\text{green}) = 1 - 0.55 = 0.45$$

- 18 Box A contains 12 balls. 3 of the balls are red.

Box B contains 18 balls. 5 of the balls are red.

Leah takes one ball at random from each box.

From which box is she more likely to take a red ball?

You must show your working.

(3 marks)

$$P(\text{red from Box A}) = \frac{3}{12} = 0.25$$

$$P(\text{red from Box B}) = \frac{5}{18} = 0.277... \text{ (to 3 decimal places } 0.278)$$

$0.278 > 0.25$, so she is more likely to take a red ball from Box B

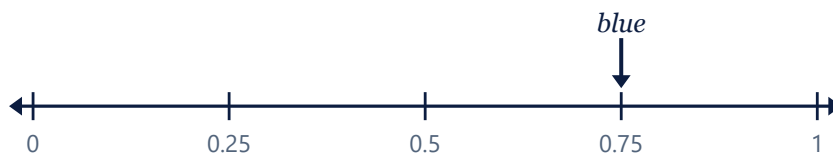
Box B

19

A spinner has 8 equal sections. Some sections are blue and the rest are white.

The arrow on the probability scale shows the probability that the spinner lands on blue.

- Write down the probability that the spinner lands on blue, as a fraction.
- How many of the 8 sections are blue?



(2 marks)

a) Arrow is 3 of the 4 equal steps along

$$P(\text{blue}) = \frac{3}{4}$$

b) Find $\frac{3}{4}$ of 8

$$8 \div 4 = 2$$

$$2 \times 3 = 6$$

a) $\frac{3}{4}$ b) 6 sections

20

Here are the probabilities of three events.

Event A: $\frac{2}{5}$ Event B: 0.35 Event C: 30%

- Write the events in order, starting with the least likely.
- Event B is a spinner landing on blue. The spinner is spun 200 times. Work out an estimate for the number of times it lands on blue.

(4 marks)

a)

$$A: \frac{2}{5} = 0.4$$

$$B: 0.35$$

$$C: 30\% = 0.3$$

C, B, A

b)

$$0.35 \times 200 = 70$$

70 times

21

A bag contains only red, blue and green counters.

$$P(\text{green}) = 0.4$$

$$P(\text{red}) = P(\text{blue})$$

There are 20 green counters in the bag.

Work out the number of red counters in the bag.

(4 marks)

$P(\text{green}) = 0.4$ and there are 20 green counters, so the total number of counters is

$$20 \div 0.4 = 50$$

$$P(\text{red}) + P(\text{blue}) = 1 - 0.4 = 0.6, \text{ and } P(\text{red}) = P(\text{blue}), \text{ so } P(\text{red}) = 0.3$$

$$\text{Number of red counters} = 0.3 \times 50 = 15$$

15
