D3.4 Calculating probabilities

This spread will show you how to:

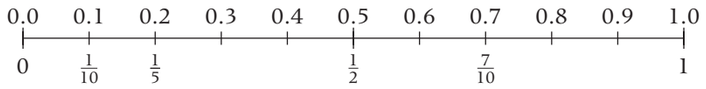
- Calculate probabilities
- Understand and use the probability scale

Keywords
Probability
Probability scale

You can measure how likely it is that an outcome will happen by using a number between 0 and 1 called the **probability**.

0 means impossible.
1 means certain.

The probability can be represented on a **probability scale**.



You can use decimals or fractions.

You can calculate the probability using this formula.

- **Probability of an outcome happening** $= \frac{\text{number of ways the outcome can happen}}{\text{total number of all possible outcomes}}$

This formula was introduced on page 138.

The probability of an outcome can be written as P(outcome).

Example

The numbers 1 to 10 are put into a bag.

1	2	3	4	5	6	7	8	9	10

Karen picks one number out of the bag without looking.
Calculate the probability she picks

a the number 6
b a number greater than 7
c a multiple of 4
d a square number.

a There are 10 possible outcomes.
There is one 6.
P(6) = $\frac{1}{10}$

b There are three numbers greater than 7.
P(greater than 7) = $\frac{3}{10}$

7 is not included in 'greater than 7'

c There are two numbers that are multiples of 4 (4, 8).
P(multiple of 4) = $\frac{2}{10} = \frac{1}{5}$

d There are three square numbers (1, 4, 9).
P(square number) = $\frac{3}{10}$

Exercise D3.4

For the following questions, the outcomes are equally likely.

1 A bag contains one yellow ball and four red balls. One ball is taken out of the bag. Calculate the probability that the ball is

a red **b** yellow **c** blue.

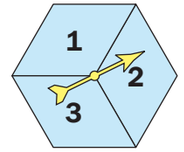
2 A bag contains five red balls. One ball is taken out of the bag. Calculate the probability that the ball is

a red **b** blue.

3 A bag contains three red and two yellow balls. One ball is taken out of the bag. Calculate the probability that the ball is

a red **b** yellow **c** blue.

4 This spinner is spun. Calculate the probability that the arrow lands on



a a 2 **b** an odd number
c a square number **d** a prime number
e a number 3 or less.

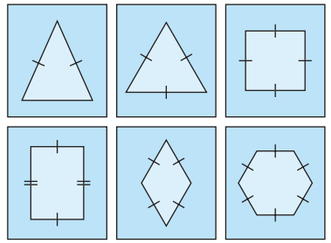
5 If one letter is chosen at random from the word ISOSCELES, what is the probability that the letter is

a a C **b** an E **c** an S
d a vowel **e** a consonant?

6 If one letter is chosen at random from the word PARALLELOGRAM, what is the probability that the letter is

a an O **b** an A **c** an L
d a vowel **e** a consonant?

7 These shapes are drawn on six cards.
One card is picked at random.
What is the probability that the shape on the card



a is an isosceles triangle **b** is a triangle
c is a quadrilateral **d** is a square
e is an octagon **f** has more than four sides
g has all of its sides equal **h** is a regular shape?

8 There are 14 boys and 16 girls in a class. If one student is chosen at random, what is the probability that the student is

a a boy **b** a girl?