Planner

# Experiments and probability

- Exploring the results of a large number of trials
- Using coins and dice to produce random outcomes
- Estimating a probability

Keywords

You should know

explanation 1 — online

**1** **a** In an experiment, a coin is flipped repeatedly and the results recorded. Write down the expected number of heads and tails from these trials.

**i** 10 trials **ii** 50 trials **iii** 100 trials

**b** Copy the table. Work with a partner to carry out the experiment described in part **a**.

**c** Write the percentage of heads and tails after 10, 50 and 100 trials.

| | Heads | Tails |
|---|---|---|
| 10 trials | | |
| 50 trials | | |
| 100 trials | | |

**d** Compare your percentage results with others in the class. Describe how the results for 100 trials are different from the results for 10 trials.

explanation 2 — online

**2** Ali has a large bag of balls. She picks one at random, looks at the colour and puts it back in the bag. She does this 50 times. This table shows Ali's results.

| Red | Blue | Yellow |
|---|---|---|
| 19 | 23 | 8 |

Use the table to estimate the probability that the ball selected at random will be

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

**3** In a survey of 400 customers at a supermarket, 24 prefer full-fat milk, 296 prefer semi-skimmed milk, and 76 prefer skimmed milk. the remainder don't drink milk.

Estimate the probability that a customer selected at random

**a** prefers semi-skimmed milk **b** prefers skimmed milk

**c** prefers full-fat milk **d** doesn't drink milk

## 4 Heads I win!

This is a game for two players.


### How to play

You need a coin and a counter.

Copy the game board making each square large enough for your counter.
Put the counter in the middle.

Take turns to flip the coin. First player is the red player.

Whenever red plays, heads moves the counter one square right and tails moves it left.

Whenever blue plays, heads moves the counter one square left and tails moves it right.

Play continues until one player wins.

### Before you start ...

**a** Is one player more likely to win than the other?

**b** What is the smallest number of flips of the coin needed to find a winner?

**c** Do you think it is very likely that a game will be won with the smallest number of flips?

### Play the game several times

Keep a tally of the number of times the coin is flipped in each game.

**d** What is the largest number of flips needed to complete one of your games? Compare your results with others in the class.

**e** Estimate the probability that a game will be won with the smallest number of flips.

**f** Estimate the probability that at least 20 turns are needed to complete a game.

**g** Change the rules of the game to give one player an advantage.
Play the game several times.

Does the player with the advantage always win?