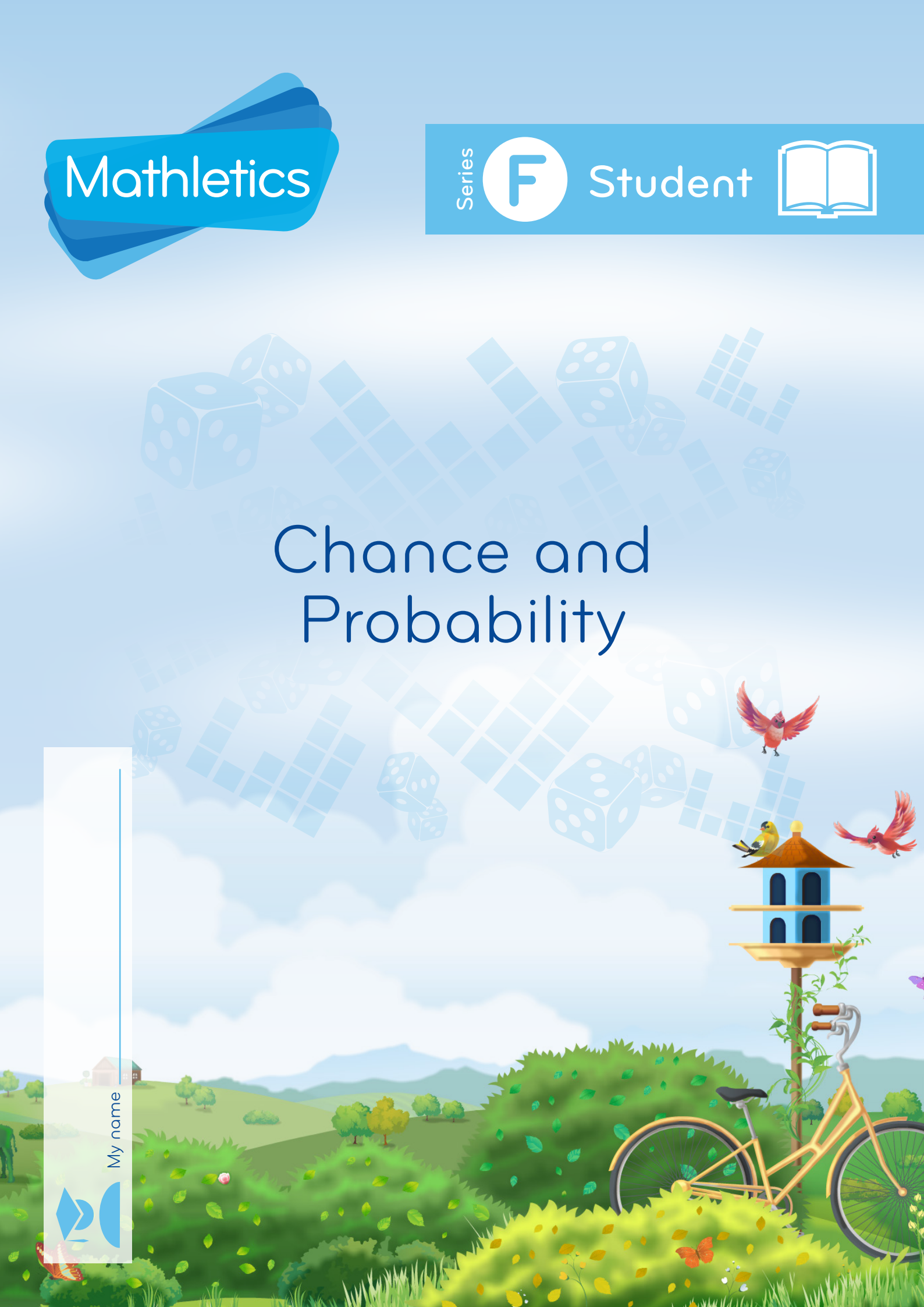




Chance and Probability

My name _____

A vertical bar containing a name label and decorative icons at the bottom, including a blue arrow and a blue circle.

Copyright © 2009 3P Learning. All rights reserved.

First edition printed 2009 in Australia.

A catalogue record for this book is available from 3P Learning Ltd.

ISBN 978-1-921860-81-2

Ownership of content The materials in this resource, including without limitation all information, text, graphics, advertisements, names, logos and trade marks (Content) are protected by copyright, trade mark and other intellectual property laws unless expressly indicated otherwise.

You must not modify, copy, reproduce, republish or distribute this Content in any way except as expressly provided for in these General Conditions or with our express prior written consent.

Copyright Copyright in this resource is owned or licensed by us. Other than for the purposes of, and subject to the conditions prescribed under, the Copyright Act 1968 (Cth) and similar legislation which applies in your location, and except as expressly authorised by these General Conditions, you may not in any form or by any means: adapt, reproduce, store, distribute, print, display, perform, publish or create derivative works from any part of this resource; or commercialise any information, products or services obtained from any part of this resource.

Where copyright legislation in a location includes a remunerated scheme to permit educational institutions to copy or print any part of the resource, we will claim for remuneration under that scheme where worksheets are printed or photocopied by teachers for use by students, and where teachers direct students to print or photocopy worksheets for use by students at school. A worksheet is a page of learning, designed for a student to write on using an ink pen or pencil. This may lead to an increase in the fees for educational institutions to participate in the relevant scheme.

Published 3P Learning Ltd

For more copies of this book, contact us at: www.3plearning.com/contact/

Designed 3P Learning Ltd

Although every precaution has been taken in the preparation of this book, the publisher and authors assume no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of this information contained herein.

Series F – Chance and Probability

Contents

Topic 1 – Chance and Probability (pp. 1–10)

Date completed

- ordering events _____
- relating fractions to likelihood _____
- chance experiments _____
- fair or unfair _____
- the athletics cup – *create* _____
- greedy pig – *solve* _____

Series Authors:

Rachel Flenley

Nicola Herringer

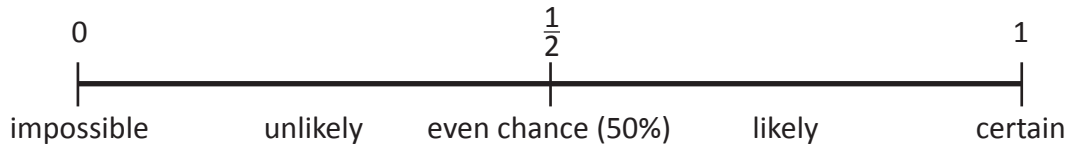
Chance and probability – ordering events

Probability measures how likely something is to happen.

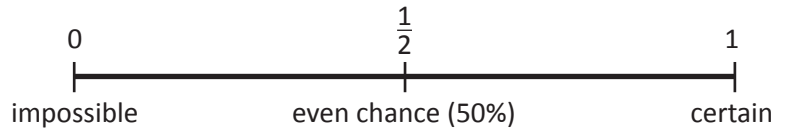
An event that is **certain** to happen has a probability of 1.

An event that is **impossible** has a probability of 0.

An event that has an **even** or **equal** chance of occurring has a probability of $\frac{1}{2}$ or 50%.

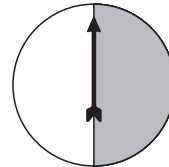
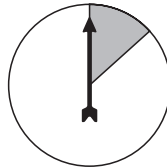
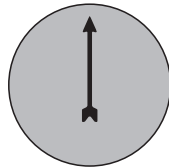


- 1 Are these events impossible, certain or an even chance? Complete this table. The first one has been done for you.



Event	Probability
The month after June will be February.	<i>impossible</i>
You will get an odd number when you roll a single die.	
The year after 2010 will be 2007.	
When you flip a coin it will land on tails.	
The day after Saturday will be Sunday.	

- 2 Draw a line to match each spinner with the correct statement:

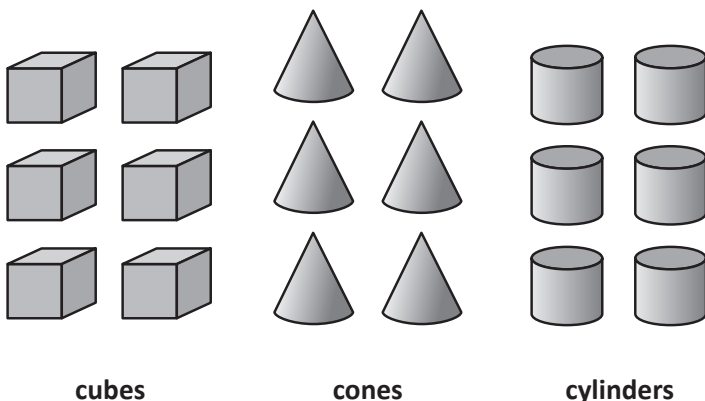


It is **unlikely** that this spinner will stop on grey.

It is **certain** that this spinner will stop on grey.

There is an **even chance** that this spinner will stop on grey.

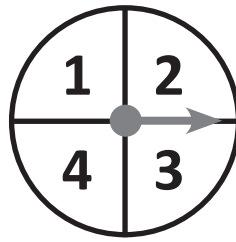
- 3 Matilda has these blocks:



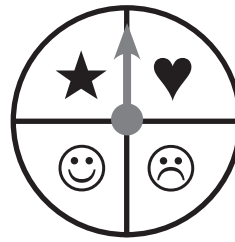
Matilda is going to put 9 blocks in a bag using some of each type and then ask a friend to choose one without looking. If she wants to make it more likely that a cylinder is chosen and less likely that a cube is chosen, how many of each block should she place in the bag? Circle the blocks she could choose.

Chance and probability – ordering events

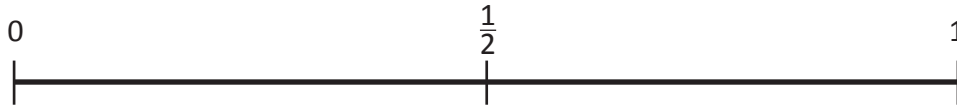
- 4 Show the probability of each event by placing a, b, c and d on the probability scale below:



Spinner 1



Spinner 2



- a You will get an even number when you spin Spinner 1.
 b You will get an odd number when you spin Spinner 2.
 c You will get a number when you spin Spinner 1.
 d You will get a face when you spin Spinner 2.

- 5 This gumball machine dispenses a random gumball each time its button is pressed. Of the 40 gumballs in the machine, 2 are blueberry flavour, 6 are strawberry, 13 are lime and 19 are orange flavour.

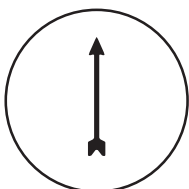


- a Which flavour is most likely to be dispensed? _____
 b Which flavour is least likely to be dispensed? _____
 c Charlie loves lime flavour but hates strawberry. Adrian loves strawberry but hates orange. Who is more likely to get what they want, Charlie or Adrian? Why?

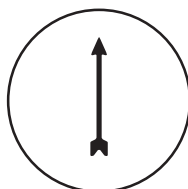
- d Write the flavours in order, from the most likely to the least likely to be dispensed:

- 6 Use red, yellow, green and blue pencils to shade these spinners:

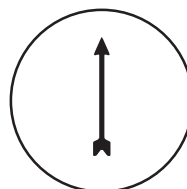
Spinner 1



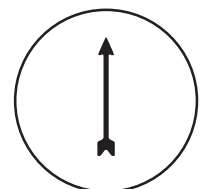
Spinner 2



Spinner 3



Spinner 4



- a Shade Spinner 1 so there is an equal chance of the arrow landing on red or yellow.
 b Shade Spinner 2 so the arrow is most likely to land on yellow.
 c Shade Spinner 3 so there is no chance of the arrow landing on blue.
 d Shade Spinner 4 so the arrow is least likely to land on blue or red.

Chance and probability – relating fractions to likelihood

So far we have looked at the language of chance and outcomes either being at 0 (impossible), $\frac{1}{2}$ (even) or 1 (certain). But what is the likelihood of outcomes in the unlikely range or the likely range? Outcomes in these ranges can be expressed as either fractions, decimals or %. Remember that when finding the chance or likelihood of an event occurring, we must look at all possible outcomes.

$$\text{chance} = \frac{\text{likelihood of event occurring}}{\text{number of possible outcomes}}$$

- 1 There are 20 chocolates in a box that all look the same. There are 6 milk, 4 caramel, 3 mint and 7 dark chocolates.

a If you choose one chocolate without looking, which chocolate are you most likely to get? _____

b Which chocolate are you least likely to get? _____

c Show the chance of selecting each type of chocolate as a fraction:

milk = $\frac{6}{20}$

caramel = $\frac{\square}{\square}$

dark chocolate = $\frac{\square}{\square}$

mint = $\frac{\square}{\square}$

d Colour the word that best describes the chance of selecting a mint chocolate:

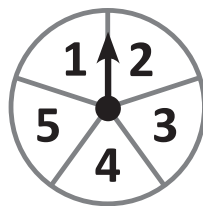
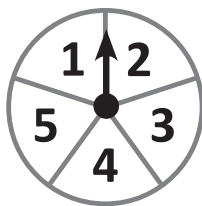
certain

even

unlikely

impossible

- 2 Use this table to work out all the possible totals for a pair of five-sided spinners. Colour match the totals. Make all the 6s yellow, all the 4s blue and so on.



Spinner 1

	1	2	3	4	5
1	2				6
2	3				
3	4		6		
4	5				
5	6				10

- 3 Look at the table above.

a Which total is most likely? _____

b What is the likelihood of this total occurring?
Express your answer as a fraction: $\frac{\square}{\square}$

c Which total is least likely? _____

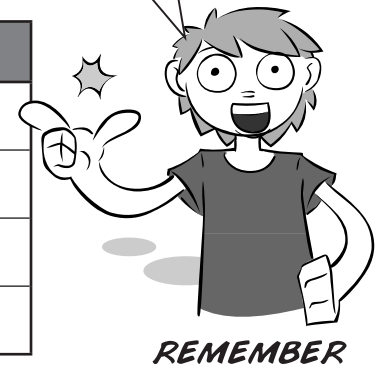
d Express its likelihood as a fraction. $\frac{\square}{\square}$

Chance and probability – relating fractions to likelihood

- 4 Complete these tables to show the probability that this die will land on the following numbers:

Event	Probability	Event	Probability
1		3	
An odd number		5	
A number greater than 2		7	
4		An even number	

Write the probability as a fraction.



- 5 Tamsin is playing a game where she is given a choice of how the die should land to signal that it is her turn. Which option gives her the best chance of getting a turn?

When a number less than 4 is rolled

When a number greater than 4 is rolled

- 6 Tilly and Bec were playing a game with these 5 cards. They laid all the cards face down and then took turns turning 2 over. If the 2 cards turned over were the least likely pair of cards, then they scored 100 points. Which two cards do you think scored 100 points? Let's work it out.



20 Possible Pair Combinations							
😊	A	A	😊	♥	😊	X	😊
😊	♥	A	♥	♥	A	X	A
😊	X	A	X	♥	X	X	♥
😊	★	A	★	♥	★	X	★
★	😊	★	A	★	♥	★	X

- a How many possible combinations are there?

- b Look closely at the table. Colour in the pairs in the following manner:
 symbol/letter – blue
 letter/symbol – red
 letter/letter – yellow
 symbol/symbol – orange

- c Count how many of each colour there are in the table:

blue _____ yellow _____

red _____ orange _____

- d What fraction shows the chance of choosing 2 cards with letters only?

- e What fraction shows the chance of choosing 2 cards with symbols only?

- f Circle the correct ending to this sentence: The pair of cards that should score 100 points because they are the least likely to be turned over are:

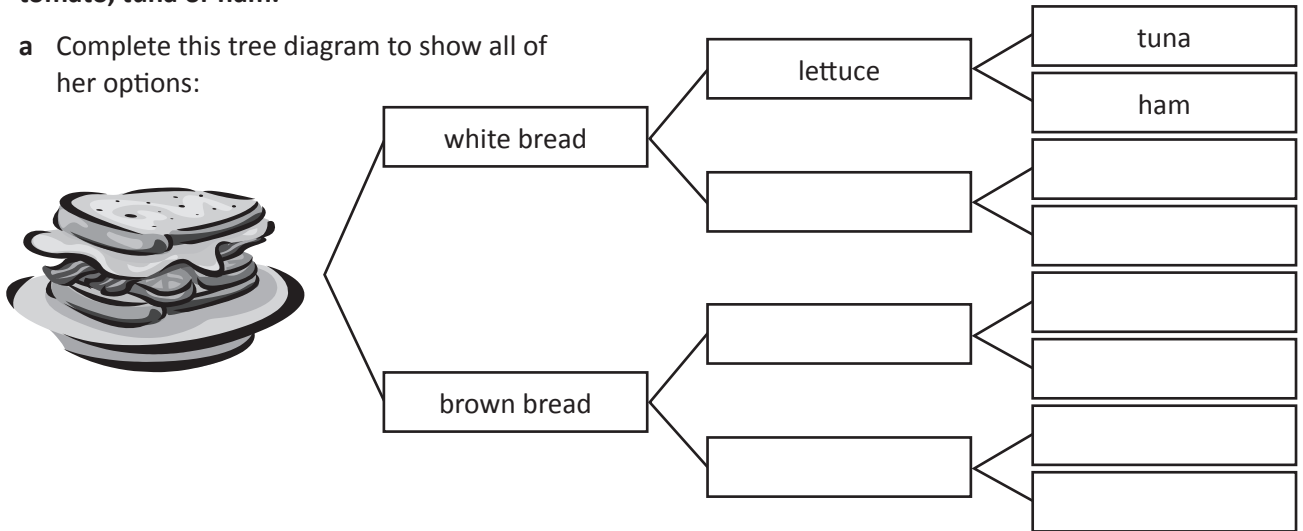
symbol/letter letter/symbol
 letter/letter symbol/symbol

Chance and probability – chance experiments

Before we conduct a chance experiment, we need to work out what all the possible outcomes are. This helps us to look at how likely a particular outcome is and if the results are surprising or not. To do this, we can use a tree diagram. We count the boxes at the end of the diagram to find the total number of options.

1 Lisa is ordering her lunch from the canteen. She has a choice of white bread or brown bread, lettuce or tomato, tuna or ham.

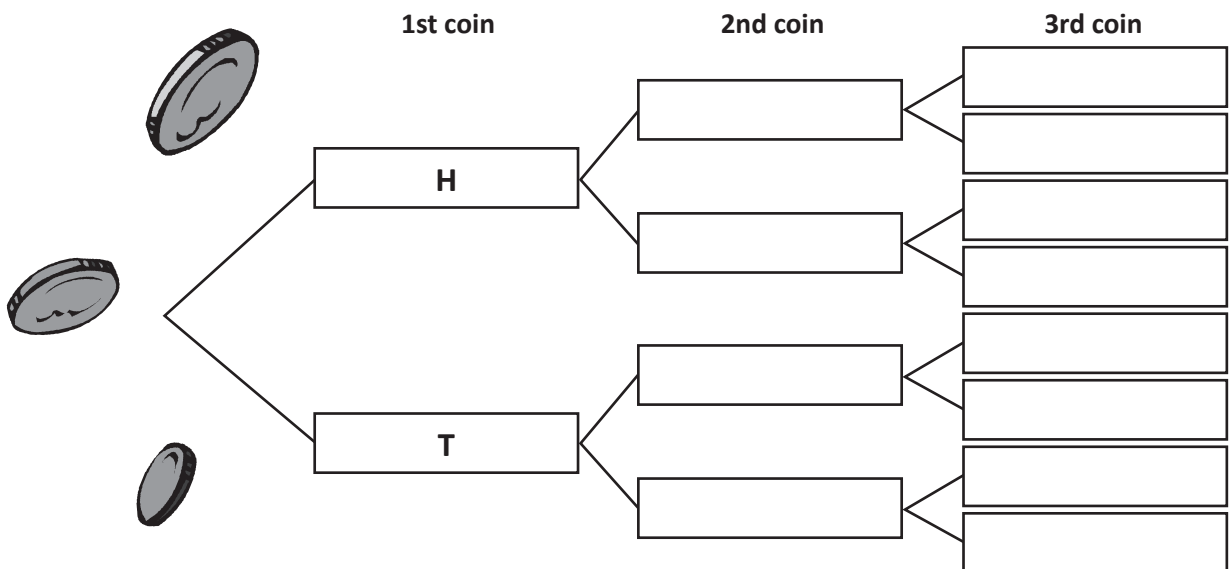
a Complete this tree diagram to show all of her options:



b How many different sandwich combinations does Lisa have to choose from? _____

2 3 coins are tossed together.

a Fill in this tree diagram to work out all the combinations that are possible when 3 coins are tossed.



b Follow the tree branches to find out the possibility of throwing:

3 heads

3 tails

2 heads, 1 tail

1 head, 2 tails

Chance and probability – fair or unfair

When everyone has the same chance of winning a game or competition, it is **fair**.
It is **unfair** when everyone does not have the same chance of winning.



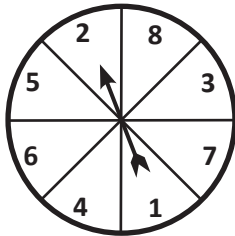
For example look at the cards above. Jack wins if he draws a card with a smiley, Jo wins if she draws a card with a heart shape on it.

Do both players have the same chance of winning?

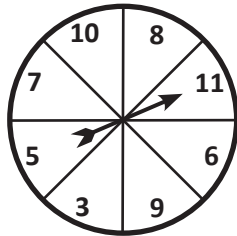
Circle the correct statement:

Yes this is fair No this is unfair

- 1 Jess and Sam play a game with spinners where they each spin their spinner 5 times and add up all the numbers. The person with the biggest total wins.



Jess' spinner

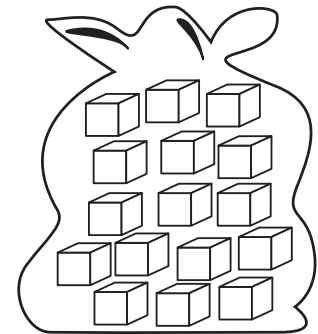
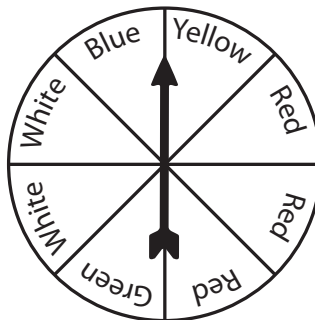


Sam's spinner

a Is this fair or unfair? _____

b Explain why:

- 2 You are playing a game using a spinner and cubes. You are given a cube randomly and then the spinner is spun. If it lands on your colour cube, you are out. Colour the cubes to make the game fair.



- 3 Matty invented a card game for 2 players where each player has 5 cards and turns them over face down. Players then draw a card at the same time. If it has 5 dots you win a point. What should Player 2's cards look like to make the game fair?

Player 1's cards					
Player 2's cards					

Chance and probability – fair or unfair

A game of chance for two players

You will need:

Two six-sided dice and two counters.

How to play:

- 1 Each player places a counter on their own Start space.
- 2 The players take it in turns to roll both dice and calculate the difference between the two numbers they roll.

Player 1 moves UP a space when the difference is 0, 1 or 2.

Player 1 moves DOWN a space when the difference is 3, 4 or 5.

Player 2 moves DOWN a space when the difference is 0, 1 or 2.

Player 2 moves UP a space when the difference is 3, 4 or 5.

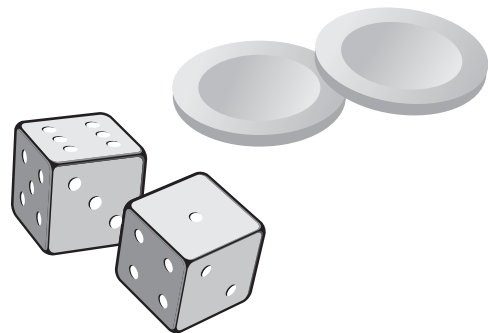
- 3 The players keep taking turns.
The first player to get to Home is the winner.

Home	
Player 1 Start	Player 2 Start

- 4 Use this grid to work out the pairs of numbers that could be rolled using two dice and the differences between them.

Colour the 0, 1 and 2 differences. Circle the 3, 4 and 5 differences.

–	1	2	3	4	5	6
1	0	1	2			
2	1	0	1			
3	2	1	0			
4	3			0		
5					0	
6						0



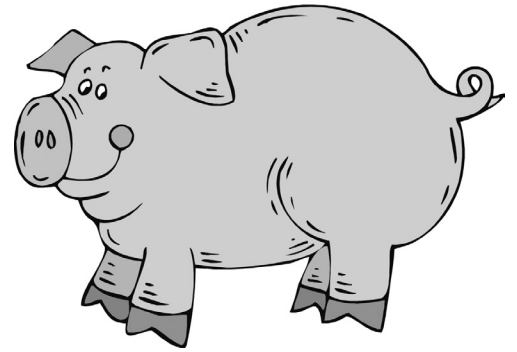
- a Is the game above fair? What did you notice?

- b How could this game be improved?



Getting ready

This is a famous game. It's played with the whole class. Your teacher will need a die and you will need your own tally board set up like this:



Game	Numbers	Score
1		
2		
3		
4		
5		
Total		



What to do

Everyone in the class stands up. Your teacher will roll the die 10 times. You write down the numbers as they are rolled – these will count towards your score.

The trick is that if a 2 is rolled, you lose all your points and you are out of the game. You may sit down at any stage and keep your points but you may not stand up again in the same game. The choice is up to you! The game goes on until the die has been rolled 10 times or everyone is sitting down.

Play 5 games. What is your total score? Did you develop a strategy as the games went on?



What to do next

Discuss your strategy with the class. When do you choose to sit down and why?

After listening to the strategies of others, play 5 games again. Does your score improve?

The theoretical probability of rolling a 2 is 1 in 6. How does that pan out in real life? Is a 2 rolled once every 6 throws? Why or why not?