Ready-Ed Publications

Ebook Code:
RENZ4015

PHOTOCOPY MASTERS

For Years 4 - 6

Book 1

Transport

A look at the history of transport – from skateboards to spaceships – with many interesting ideas and suggestions for class use.

Written by Fiona Rayns. Illustrated by Melinda Brezmen.
Published by Ready-Ed Publications (2003) P.O. Box 276 Greenwood Perth W.A. 6024
Email: info@readyed.com.au Website: www.readyed.com.au

ISBN 1 86397 540 3

Introduction

This book is designed to complement the teaching of the topic "transport" in the Year 4 to 6 classroom. Activities have been designed to be highly motivating for students, promoting learning across several subject areas. The book does not attempt to present everything there is to know on transport – it is more a resource tool, packed full of interesting activities to enhance a transport-based teaching programme.

Each activity stands alone and many of the sheets are suitable for early finishers who wish to complete further research. Some of the more scientific activities may require the teacher to complete the activity as a whole class lesson.

The activities have been arranged according to the method of transport being studied. For ease of use, the relevant subject area has been listed in the Contents on page 3.

Achievement Objectives

Related student achievement objectives have been shown for each page on pages 6 and 7. Teachers can link these objectives to the relevant statements used in the Social Studies curriculum document.

Teachers' Notes

Notes for activity pages are provided on pages 4 and 5. Suitable and relevant Internet references have also been supplied to enable teachers to safely direct students involved in online learning. Many of the web references are provided purely for the teacher to study background information about the particular subject area.

Useful Web Sites

There are plenty of interesting web sites listed on the Teaching Points pages, that refer specifically to the topic for the activity page. The two web sites below provide a wealth of information on a range of aspects concerning the theme of transport.

www.learningon the move.co.uk/virtex Combined resources from five transport museums. Contains some excellent interactive exhibits, timeline and glossary.

www.howstuffworks.com Fantastic site with information about everything technological.

Contents

Teaching Points for Individual Activity Sheets

A Flying Timeline (Page 8)

Students should be given access to books about aviation history from the school library. These websites are useful: **www.flight100.org/history_intro.html** and **www.flight-history.com/**

Air Pollution (Page 9)

Air pollution reports should be available for most cities.
Check out: **www2.epa.nsw.gov.au/airqual/aqupd.asp**

Ship Ahoy (1) and **(2) (Pages 20 - 21)**

This site provides information about ships' markings: **www.plimsoll.com/mark.html**
Find out more about the colourful flags used to send messages at **www.usps.org/f_stuff/sigflags.html**

As Easy as Pi (1) and **(2) (Pages 24 - 25)**

A range of wheeled vehicles could be compared, e.g. bikes (single speed, BMX, trikes, scooters). This exercise could be done in groups at school or using pooled information from measurements taken at home.
Check out: **cad.ucla.edu/repository/useful/PI.txt** (shows a calculation of pi).

Bike Check-Up (Page 26)

Ideally done at school in pairs or small groups. Arrange for a day when all children are able to bring their bikes to school.

Head Hardware (Page 27)

Requirements: Bike helmets.
Check out: **www.safekids.org.nz/factsheets/child_cyclist_injury.html** Contains links to information on child pedestrians and motor vehicle injuries.

Groovy Gears & Crazy Cogs (Pages 28 - 31)

These experiments require an actual set of cog wheels/spur gears so that students can see how they fit together. Students may have such things at home, e.g. Connex or spirographs, which could be used. Gear templates, which can be glued onto cardboard and then cut out, have also been provided on Page 30.

Car Park (1) and **(2) (Pages 32 - 33)**

Requirements: A3 paper. Class challenge to see who can fit the most useable "parking" spaces on the paper sheet. Early roads pre-1850s were only suitable for horse-drawn traffic. As the amount of traffic increased, better, longer lasting roads with a waterproof surface were needed. For detailed background information see **www.abs.gov.au/** and search for "early roads".

Teaching Points for Individual Activity Sheets (Cont.)

Travelling to School (1) and **(2) (Pages 35 - 36)**

Topic could be extended to discuss how children would have travelled to school in the past. Parents and grandparents could be surveyed and results compared with what happens today. What will happen in the future? Will more students work from home using computers and modems?

Sign Language (1) and **(2) (Pages 38 - 39)**

Children can look up the signs on these web sites:
www.nsa.naples.navy.mil/gaetansa/italian%20and%20international%20road%20signs.htm
www.cwi.nl/~dik/english/traffic/

Skateboarding and **The Language of Skateboarding (Pages 41 - 42)**

A chance for class experts to give a demonstration of their skills. The language of inline skates, scooters and surfing, etc. could also be compared. Learn how skateboards are made at:
www.skateboard.com/frontside/101/myride/makinskateboards.asp
www.exploratorium.edu/skateboarding/ Brush up on all the moves and terminology and impress the class!

Achievement Objectives

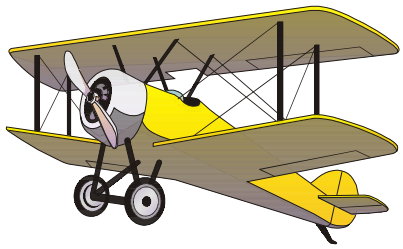
The activities in this book cover a variety of learning areas. Related achievement objectives are as follows and can be matched to the Social Studies curriculum document.

Activity	Related Achievement Objective
A Flying Timeline (Page 8)	Students will research some of the significant events in the history of aviation, using chronological order to display their work.
Air Pollution (Page 9)	Students understand the impact that some transport modes have on the environment, in terms of toxic waste.
Making a Helicopter (1 and 2) (Pages 10, 11)	Students construct their own simple paper helicopter and then work on design improvements, and observation and recording of results.
The Space Race (Page 12)	Students research and explore the significant events in the history of space travel.
Email From Space (Page 13)	Students read and comprehend a diary of a space traveller, understanding that certain basic functions must be performed differently.
Somewhere in a Galaxy (1 & 2) (Pages 14, 15)	Students use multiplication and division to solve problems involving quantities and types of fuel for spacecraft.
Shipping Around (Page 16)	Students understand the purpose of different types of water transport and carry out research on a specific type of ship.
Car Ferry (Page 17)	Students calculate ferry fares based on a given pricing structure.
Battleships (1 and 2) (Pages 18, 19)	Students use their knowledge of grid coordinates and their memory skills, in order to complete a game.
Ship Ahoy (1 and 2) (Pages 20, 21)	Students understand the features of ships and use their knowledge to label ships and anchors.
Density Experiment (1 and 2) (Pages 22, 23)	Students understand the concept of density by conducting simple experiments. They then use this understanding to explore the concept of plimsoll markings on ships.
As Easy As Pi (1 and 2) (Pages 24, 25)	Students use simple measurements (diameter and circumference) to understand the origin of a well-known mathematical symbol.
Bike Check-Up (Page 26)	Students explore the essentials of push-bike safety, marking items off on a checklist.
Head Hardware (Page 27)	Students identify the features of bike helmets and demonstrate the importance of wearing crash helmets when on a scooter, skateboard or bike.

Achievement Objectives (Cont.)

Activity	Related Achievement Objective
Groovy Gears Section (Pages 28 - 31)	Students are introduced to the concept of gears, and how and where they work. Students use gears in observation-based experiments to consider alternatives and draw conclusions.
Car Park (1 and 2) (Pages 32, 33)	Students understand and model ideas about how to most efficiently design an everyday amenity, using a given set of measurements.
Late for School (Page 34)	Students read digital clock faces and bus timetables to calculate simple word problems based on time.
Travelling to School (1 and 2) (Pages 35, 36)	Students gather easily available data, represent it with graphs and interpret their recorded information.
Road Trains (Page 37)	Students calculate solutions to division using a transport theme.
Sign Language (1 and 2) What's That Sign? (Pages 38 - 40)	Students examine the use and language of road signs and what they mean in Australia and overseas.
Skateboarding (Page 41)	Students explore the use of the skateboard and its construction, and safety issues concerned with this method of transport.
The Language of Skateboarding (Page 42)	Students understand, through a current example, how language can develop in a sub-culture.

A Flying Timeline



❑ Use your research skills to complete the missing sections of the timeline below. A key word clue has been given for you to start your research. You can use books in your library or the Internet to help you locate the missing details about significant achievements in the history of flight.

September 19, 1783:
Clue - Montgolfier Brothers

1804:
Clue - Sir George Cayley

March 31, 1903
Clue - New Zealand aviator

December 17, 1903:
Clue - Wright Flyer

November 13, 1907:
Clue - Helicopter

May 20-21, 1932:
Clue - Amelia Earhart

January 15-18, 1957:
Clue - Jet

Air Pollution

Cars are a major cause of air pollution. Their exhaust fumes contain toxic (poisonous) chemicals that can harm human health, wildlife and vegetation. Heart disease, bronchitis and asthma can be caused and worsened by air pollution.

The brown layer you sometimes see in the sky over large cities is caused when some of the exhaust gases react with the sunlight. It is called a "photochemical smog" and it can irritate your eyes, nose and throat.

Sometimes lead *(chemical symbol = Pb)* is added to petrol to make the engines of older cars work better. The tiny particles of lead are released into the environment and can be taken into your body. They can stop the nervous system, including the brain, from developing properly. Babies and young children are most at risk.

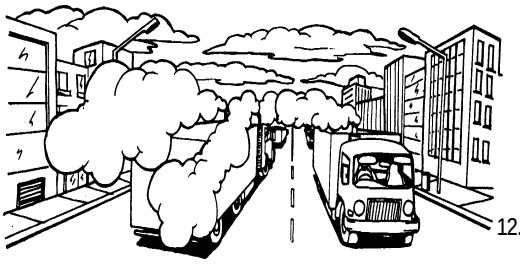
Most new cars (less than 10 years old) run on unleaded petrol – the lead has been removed. It is illegal to use leaded petrol in them.

Catalytic converters can also be used to clean up some types of harmful chemicals before they leave the car. See **www.howstuffworks.com/catalytic-converter.htm** to learn more about this process.

An Acrostic Puzzle

❑ Use the above information to answer the questions and complete the puzzle.

1. ___ A ___ ___
2. I ___ ___ ___ ___ ___ ___
3. ___ ___ ___ ___ ___ R ___ ___ ___
4. P ___
5. ___ O ___ ___ ___
6. ___ ___ L ___ ___ ___ ___ ___
7. L ___ ___ ___
8. ___ U ___ ___ ___
9. ___ ___ T ___ ___ ___
10. ___ ___ ___ I ___
11. ___ ___ O ___
12. ___ ___ ___ ___ ___ ___ ___ N



1. A major cause of air pollution.
2. Against the law.
3. A catalytic _____ helps remove harmful gases.
4. The chemical symbol for lead.
5. Poisonous.
6. Type of petrol used by new cars.
7. Chemical added to some petrol to make old engines run better.
8. Exhaust gases.
9. A disease that may be made worse by air pollution.
10. Part of your body which can be damaged by lead.
11. A brown layer in the sky.
12. Those most at risk from lead poisoning.

Brainstorm other ways to reduce the air pollution caused by cars.

Making a Helicopter (1)

The word "helicopter" comes from Greek words meaning "spiral" and "wing" which are basically what makes the helicopter fly. Helicopters are hoisted into the air, and manage to stay up there, by using the powerful propellers which are actually rotating wings. They are much more versatile than most aircraft as they can move forwards, backwards, straight up and down, or even just stay in the one spot. Helicopters don't need much space to take off or land and they are able to sneak into tight spots such as mountain ranges and valleys.

❑ Experiment with different styles of helicopter flight by creating your own simple helicopter.

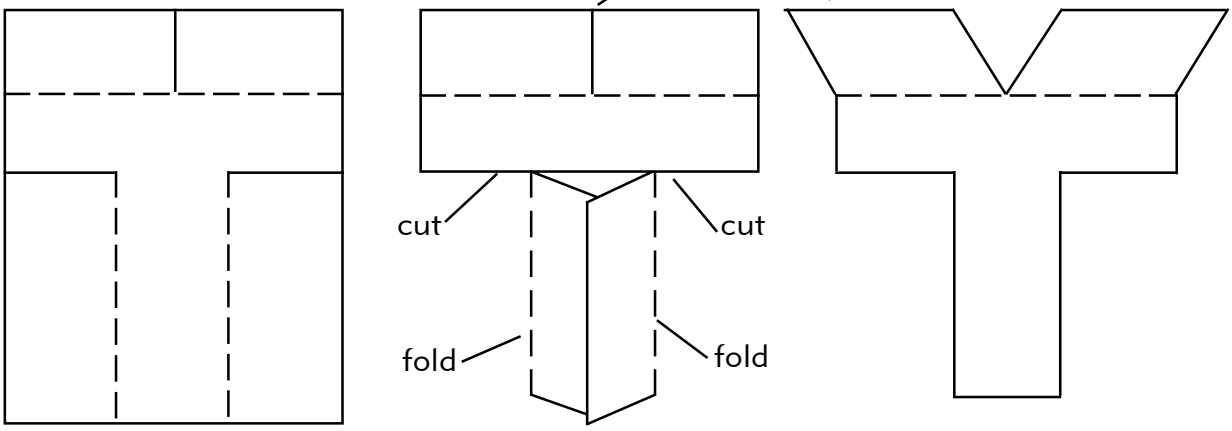
You will need:

A4 paper, scissors,

plastic, pop sticks, Plasticine, feathers (any other suitable materials).

❑ Follow the plan below, using A4 paper.

The Plan



Experiment:

❑ Practise flying your helicopter model and then complete the questions below.

1. What happens if you drop the helicopter from different heights.

_____

_____

2. What happens to the flight of your helicopter if you change the angle of the blades?

_____

_____

Making a Helicopter (2)

3. Using your design from page 10, experiment with the blade length. Construct another helicopter using longer blades and one using shorter blades. Test all three helicopters from the same height.

❑ What differences are made to the flight pattern? Give details of the blade lengths.

_____

_____

_____

4. Make your blades out of different materials, e.g. plastic, popsticks, feathers, Plasticine. What works best? Give reasons why you think certain materials fly better than others.

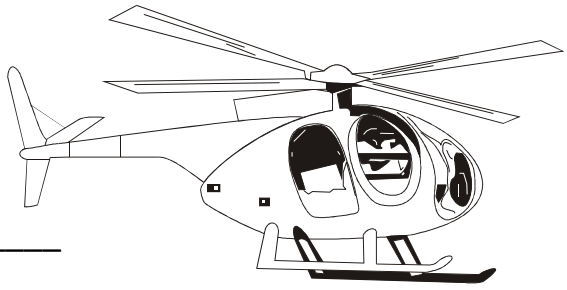
_____

_____

_____

Conclusions:

❑ Write up all of your findings. Decide which of your models was the best, giving reasons to support your answers.



_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

The Space Race

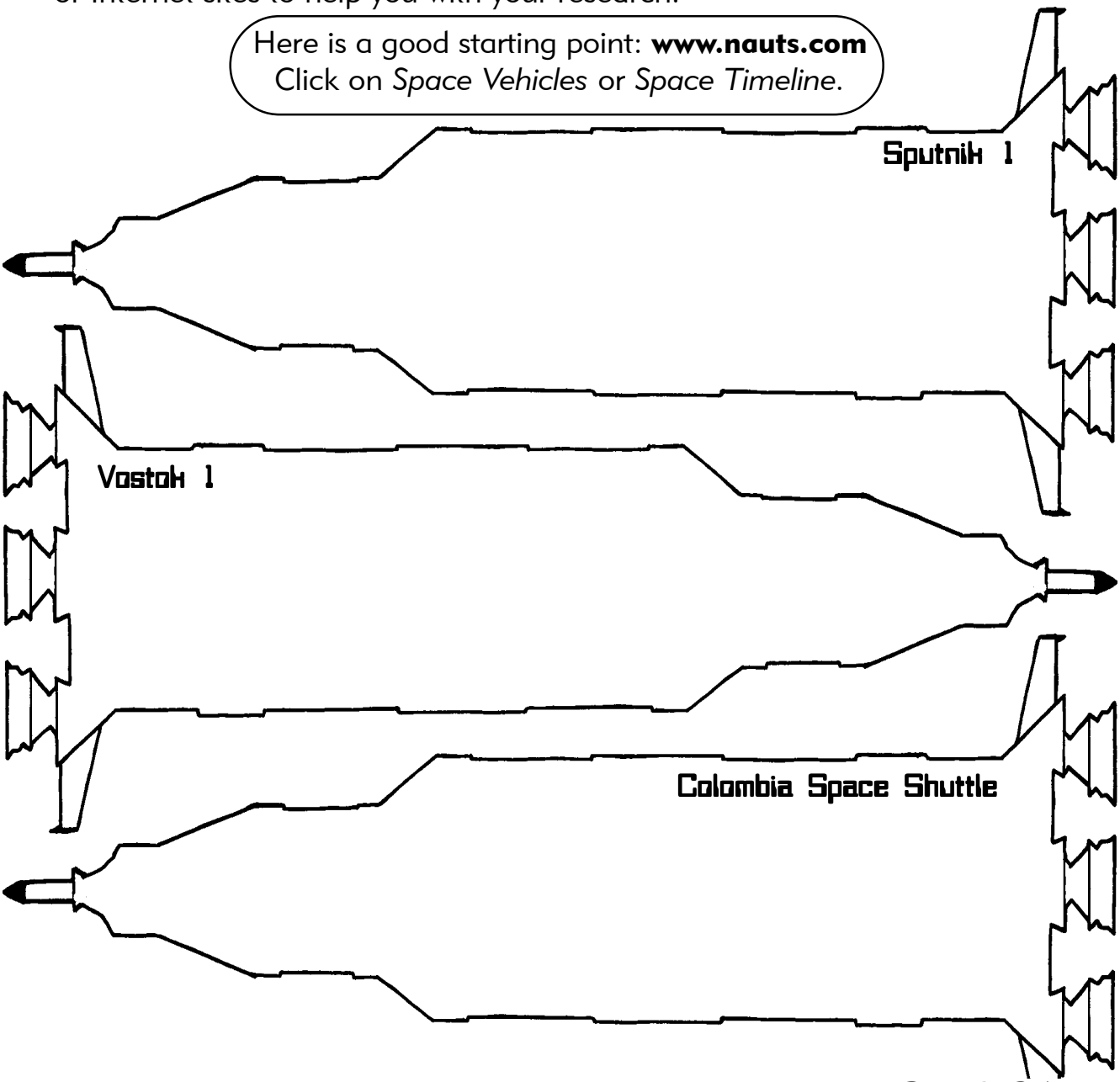
The Space Race officially began on October 4, 1957, when the first man-made object orbited the Earth. Sputnik 1 was launched by the Soviet Union and stayed in orbit until January 4, 1958. Then on November 3, 1957, a dog named Laika was launched into space on Sputnik 2, another Russian space craft. A "Space Race" developed between the Soviet Union and the United States, with both nations responsible for some of the more significant events in space history.

Research Activity

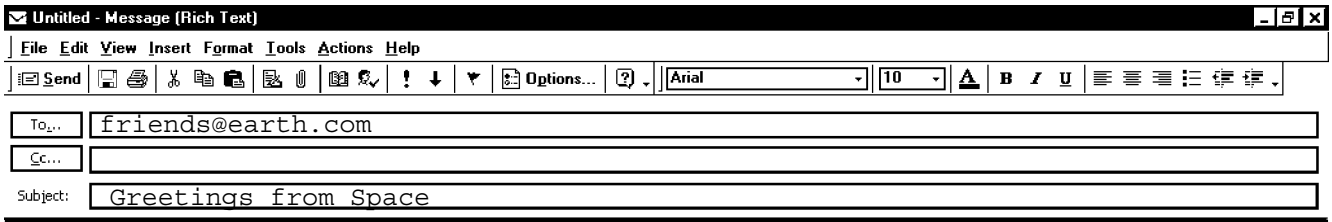
Each of the space craft listed below is remembered for its role in the history of space exploration.

- ❑ Find out what was so significant about each of the missions in which the space craft below were involved. Give details of when each space craft was used in space and list some of the purposes of the missions into space. Use the library or Internet sites to help you with your research.

Here is a good starting point: **www.nauts.com**
Click on *Space Vehicles* or *Space Timeline*.



Email From Space



Dear All, Endeavor, Sat 28th September

Thought I'd try out my pressurised space pen (designed to work in zero gravity) and let you know how life is aboard the space shuttle. The launch last Sunday was incredible. The force was so great (5 times the force of that of a passenger plane taking off) we were all pushed back in our seats.

It's a bit of a tight squeeze up here with six other astronauts but one of the advantages of living in space is that we can use all of the capsule. If things get crowded I simply float to the ceiling. Other passengers aboard include eight little Australians (golden orb spiders). Scientists will be studying how these arachnids build their webs in space.

Astronauts no longer need to eat totally dehydrated food, in fact meals are very similar to those eaten on Earth. With over 250 choices I'm spoilt for meals. I clip several food containers to a tray on my leg and I'm ready to eat. All drinks need straws, even the coffee.

Sandwiches are off the menu though - floating crumbs can get stuck in electrical equipment or inhaled and cause choking.

We are orbiting the Earth every 90 minutes so the sun rises and sets every 45. I can't see any humans down on Earth but I can see twinkling city lights. Pollution and cleared rain forests are also visible.

I've grown about 2.5 cm in the last few days. Without gravity my spine has expanded. I have also become "moonfaced". On Earth body fluids are pulled downwards but up here that doesn't happen - faces become fatter and legs get thinner.

Since water is scarce (it's too heavy to travel into space with large volumes) washing involves a quick wipe over, a dry shampoo and a brush with toothpowder. I've finally mastered the waterless vacuum toilet - everything is sucked up, dried and stored. Everything except our urine - it is filtered and the clean water reused. On space walks, take-off and re-entry we wear nappies!

I sleep zipped up in a bag that hangs on the wall - since there is no up or down it doesn't matter which way I'm facing! Eyeshades and ear plugs help me sleep.

Luckily I haven't had any trouble with space sickness (a bit like car sickness). Vomiting in zero gravity is not something to be recommended!

See you on Wednesday,

Love Kim x

❑ Complete the following sentences.

1. Kim is aboard the space shuttle _____.
2. The force of the lift-off was _____ times that of a passenger plane.
3. There are _____ astronauts including Kim on this trip.
4. Another name for spiders is _____.
5. Eating _____ can cause problems in the space shuttle.
6. It takes _____ minutes for the space shuttle to orbit the Earth.
7. In space, astronaut's faces become _____ and their legs _____.
8. Lack of water means the astronauts' _____is filtered and reused.
9. It doesn't matter which way up astronauts _____ in their sleeping bags.
10. _____ can cause vomiting in space.
11. Kim will be returning to Earth on _____.

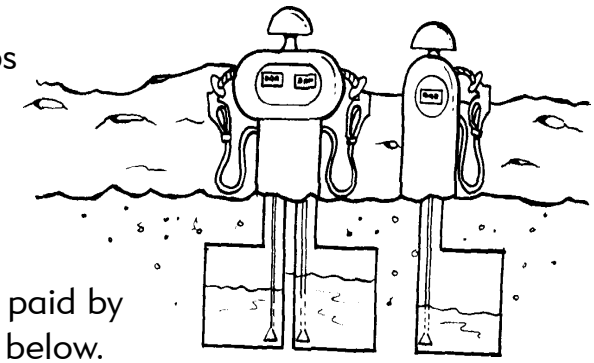
Somewhere in a Galaxy ...(1)

Greetings Earthlings ...
Wherever you live, one of the first things you learn when you own a vehicle is that it won't go if you don't put the right sort of fuel in it.

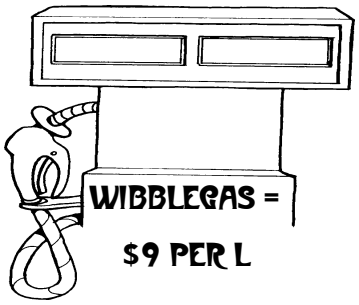
❑ Match the machine with the fuel:

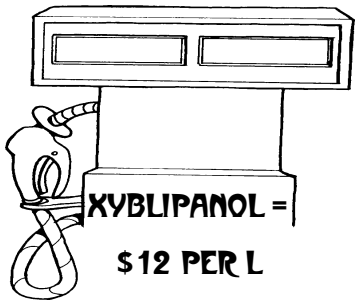
aeroplane	solid rocket fuel
older car	sun
modern car	aviation gas
bus	diesel
solar powered car	petrol and electricity
hybrid car	unleaded petrol
space shuttle	leaded petrol

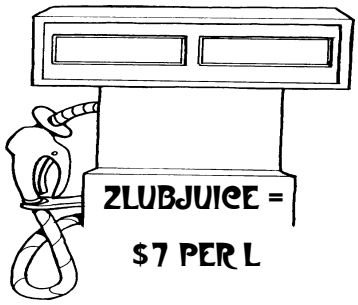
Here on Planet Yaboodaboodoo our spaceships run on three different types of fuel. Like your petrol stations on Earth, the fuel is stored in large underground tanks.



❑ Calculate how much money will need to be paid by each customer based on the prices shown below.







Write your answers below.

1) 50 L of Wibblegas _____

2) 5L of Xyblipanol _____

3) 19L of Zlubjuice _____

4) 26L of Wibblegas _____

5) 30L of Xyblipanol _____

6) 38L of Zlubjuice _____

7) 43L of Wibblegas _____

8) 45L of Xyblipanol _____

9) 23L of Zlubjuice _____

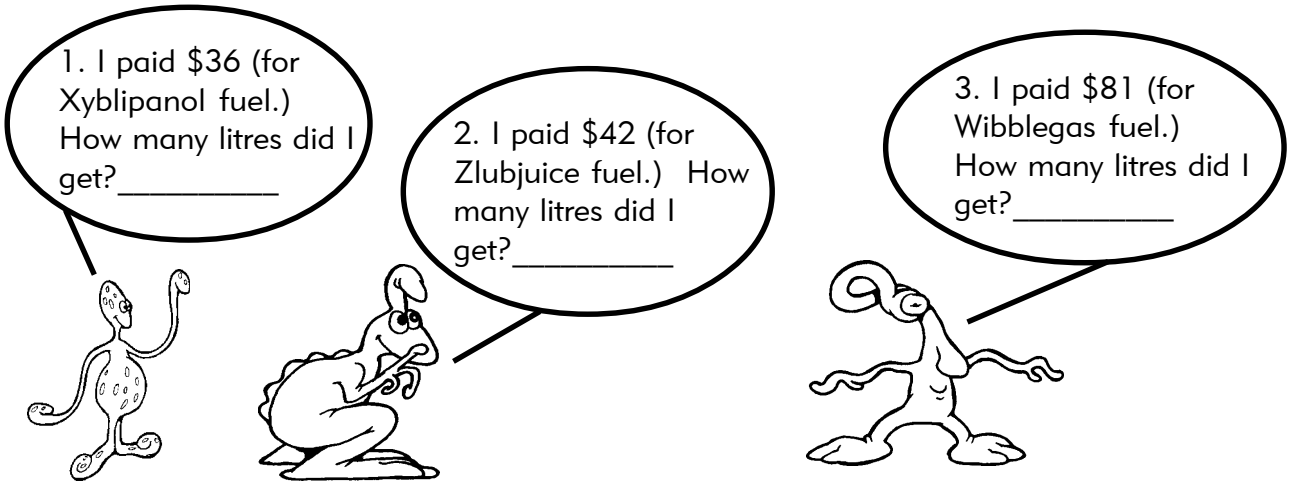
Somewhere in a Galaxy ...(2)

❑ Calculate how many litres of fuel each customer bought. Remember ...

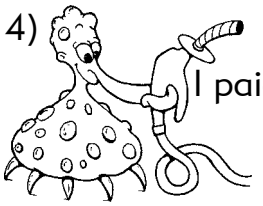
WIBBLEGAS = $9 PER L

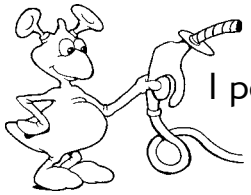
XYBLIPANOL = $12 PER L

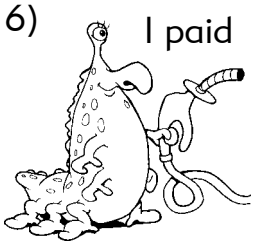
ZLUBJUICE = $7 PER L

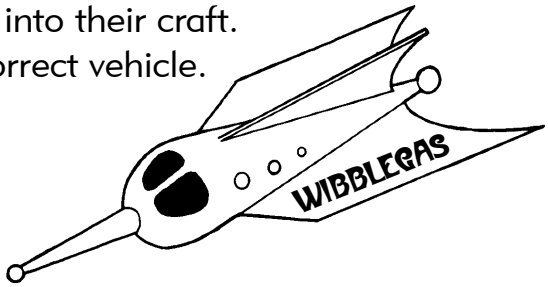


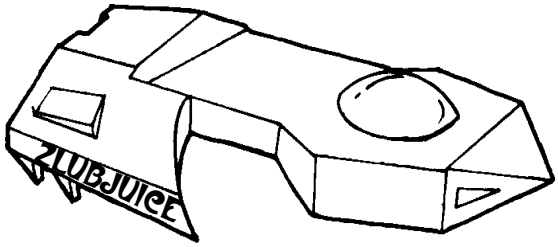
❑ Work out which type of fuel each alien put into their craft.
Draw a line to connect each alien to its correct vehicle.

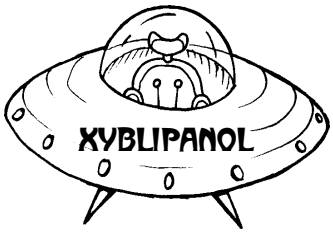
4)  I paid $56 for 8 L.

5)  I paid $132 for 11 L.

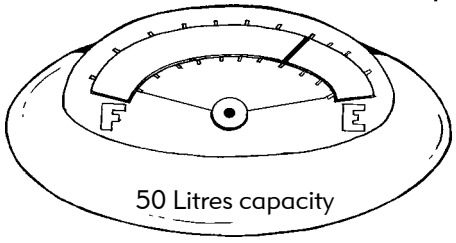
6) I paid $63 for 7 L. 







❑ Look at this fuel gauge.

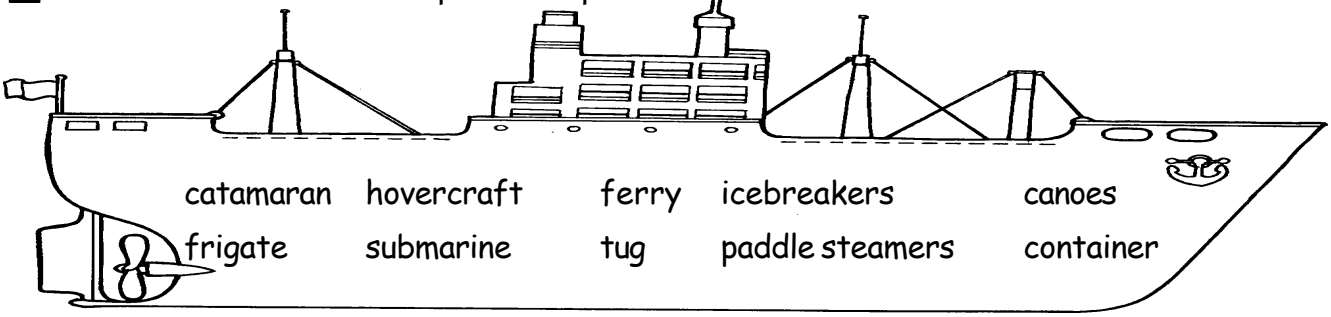


7) How many litres of fuel are left in the tank ? _____

8) How many litres must be added to fill the tank to capacity ? _____

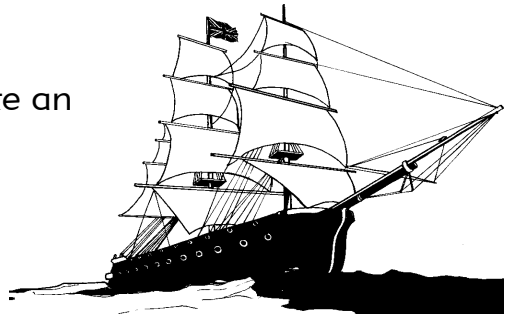
Shipping Around

❑ Use the words in the ship to complete the sentences below:



1. _____ are used in Antarctica to clear the way for larger ships.
2. A _____ is a raft-like boat with two hulls. It is powered by sail or by a motor.
3. If you are likely to be moving overseas, your furniture will probably go onto a _____ ship.
4. The only part of this underwater vessel that you will see is the periscope: _____.
5. _____ _____ were commonly used in early river transport.
6. The Maori arrived in New Zealand using _____ as their method of transport.
7. Between France and England you can travel on a _____ which will even let you take your car with you!
8. A _____ helps guide large ocean liners to the wharf.
9. Riding over the water on a cushion of air is the way a _____ moves.
10. In the navy, a _____ is known as a warship and is able to fire missiles at submarines and aircraft.

Ship Sure?



❑ Choose one of the ship types above and create an information page on this vessel.

Include these sections in your work:

* *History: When was this ship first used?*
* *Purpose: What is the type of ship used for?*
* *Design: What changes have occurred in the design of the vessel over the years?*

Use a separate sheet of paper for your work and copy or draw a picture of this vessel to illustrate your information page.

Car Ferry

Sometimes people who travel across the water need to take their cars with them. It is possible to do this using a car ferry. Car ferries travel between places like England and France, and England and Ireland. Ferries range in size, however some are almost as large as ocean liners.

The *Friendly Ferry* is 148 metres long and has four vehicle decks. Each deck takes three rows of vehicles placed end to end. As captain you have been asked to answer a few questions.

Cars

❑ Find out how many vehicles will almost fill a row if all the vehicles on a row are the length given:

a. 4 m _____

b. 6 m _____

c. 11 m (caravans) _____

d. 5 m _____

e. 13 m (trucks) _____

f. 8 m (trailers) _____

Ticket Prices

It costs $99 a ticket for one adult and $50 per child to travel on the ferry. To take a car across the prices vary according to size:

4 m cars	$120	5 m cars	$150	trucks	$390
car+trailer	$360	car+caravan	$420		

All prices shown are one way, return travel costs double.

❑ Find out the cost involved for the following groups:

1. A family of two adults and two children with a car and trailer for a return trip.

_____

2. Two adults travelling one way only with one truck.

_____

3. One adult and three children on a return trip with a 5 m car.

_____

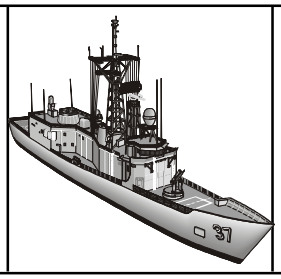
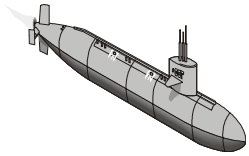
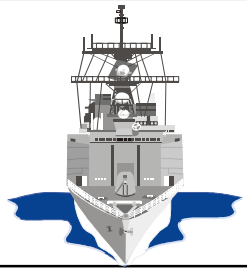
4. Four adults with a 5 m car and caravan going one way.

_____

Battleships (1)

The game of "Battleships" was invented in the Second World War (1939-45) and it has been played millions of times ever since. If you haven't played this game before, the aim is pretty simple – blow up all your opponent's ships on the game grid before they get a chance to do the same to you!

Here is your navy

Aircraft carrier	Battleship	Cruiser	Submarine	Destroyer
				
AAAAA	BBBB	CCC	SSS	DD

(These letters indicate each vessel you have in your "navy".)

The Rules

The rules are also easy:

1. Secretly mark the position of your ships on a grid like the one on page 19. Ships can be placed horizontally, vertically or diagonally but they cannot bend.

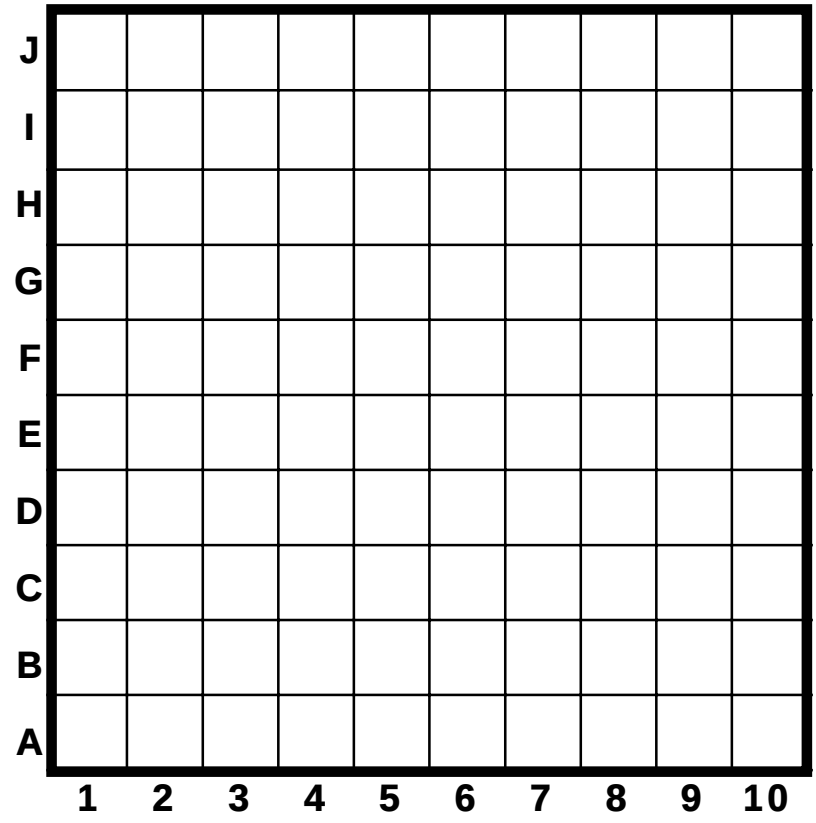
	1	2	3	4	5	6	7	8	9	10	11
F	C									D	
E	C								D		
D	C		A	A	A	A	A				
C									S		
B										S	
A			B	B	B	B					S

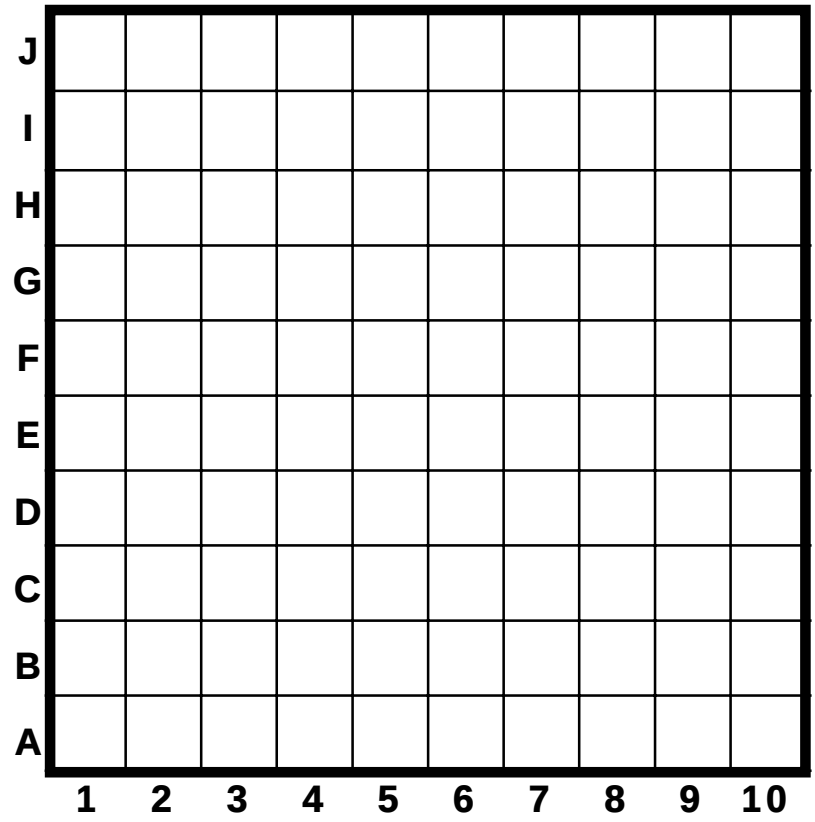
2. The first player calls out a co-ordinate, e.g. F - 6.
3. The second player calls out "hit" or "miss" depending on whether part of their ship is in that position, and marks the spot where the "shot" landed.
4. The first player should record on their grid whether they have been successful or not.
5. Then it's the second player's turn to fire and the process is repeated.
6. When all the spaces for a particular ship have been hit, the ship is destroyed. You must let the other player know this by calling out, e.g. "Hit ... you sunk my carrier."
7. Once a player has sunk all their opponent's ships, they are the winner. *(Hint: Using different coloured pens helps when you're playing this game, e.g. use black to mark your own ships, red to show that you've hit one of your opponent's ships and blue to show you've missed.)*

If you have time you may want to find out more about the types of vessels mentioned and what the navy uses today.

Battleships (2)

❑ Use the grids below to play your game. Mark your locations.





Ship Ahoy (1)

❑ Use the following information to add extra detail to the ship on page 21.

Name of ship: Write its name on either side of the bow and across its stern.

Flags: The flag on the stern shows which country the ship is registered in. For example, a New Zealand registered merchant ship will fly the New Zealand flag. There is often a company's flag flying above the bridge. Colour in the flags.

Other flags you might see are listed at this web site:

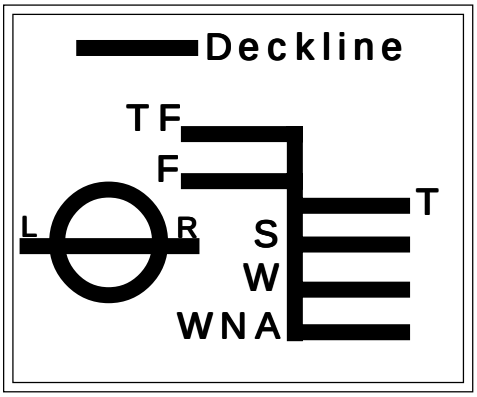
www.usps.org/f_stuff/sigflgs.html

Look up two flags at the web site. Draw them in the boxes below and write down when they would be used.

e.g. 1. Solid red square = danger and is flown when the ship is refuelling.
2. ½ red and white = pilot is on board.

Where used: _____ **Where used:** _____

Plimsoll line: Lines on the hull that show when the ship is fully laden. The crew must stop adding cargo when the water reaches a certain point or else the ship may sink on its voyage. The type of water the ship is sailing in affects how well the ship floats. Ships float higher in cold and salty water and lower in warm fresh water. If a ship was fully laden in a cold sea and then sailed into a warm tropical area – it would be so low in the water it might sink.



The letters on the line show where to load it to. If you want to sail to Tropical Fresh Water load to (TF); Fresh (F); Tropical (T); in Summer (S); in Winter (W); in Winter to the North Atlantic (WNA).

Where do you want the ship (page 20) to sail to? What line can you safely load cargo to?

Lights: Port and starboard lights on the side of the bridge. Imagine you are on the bridge steering the ship – your right side is starboard, the starboard light is green. Your left side is port, the port light is red. These lights enable other mariners to tell if a ship is coming towards or poing away from them – something that is difficult when ships are a long way off and at night.

Anchor: Draw on an anchor. Its shape will depend on what type of surface it meets under the water. The larger the vessel the larger the anchor. An aircraft carrier has one weighing about 27 tonnes.

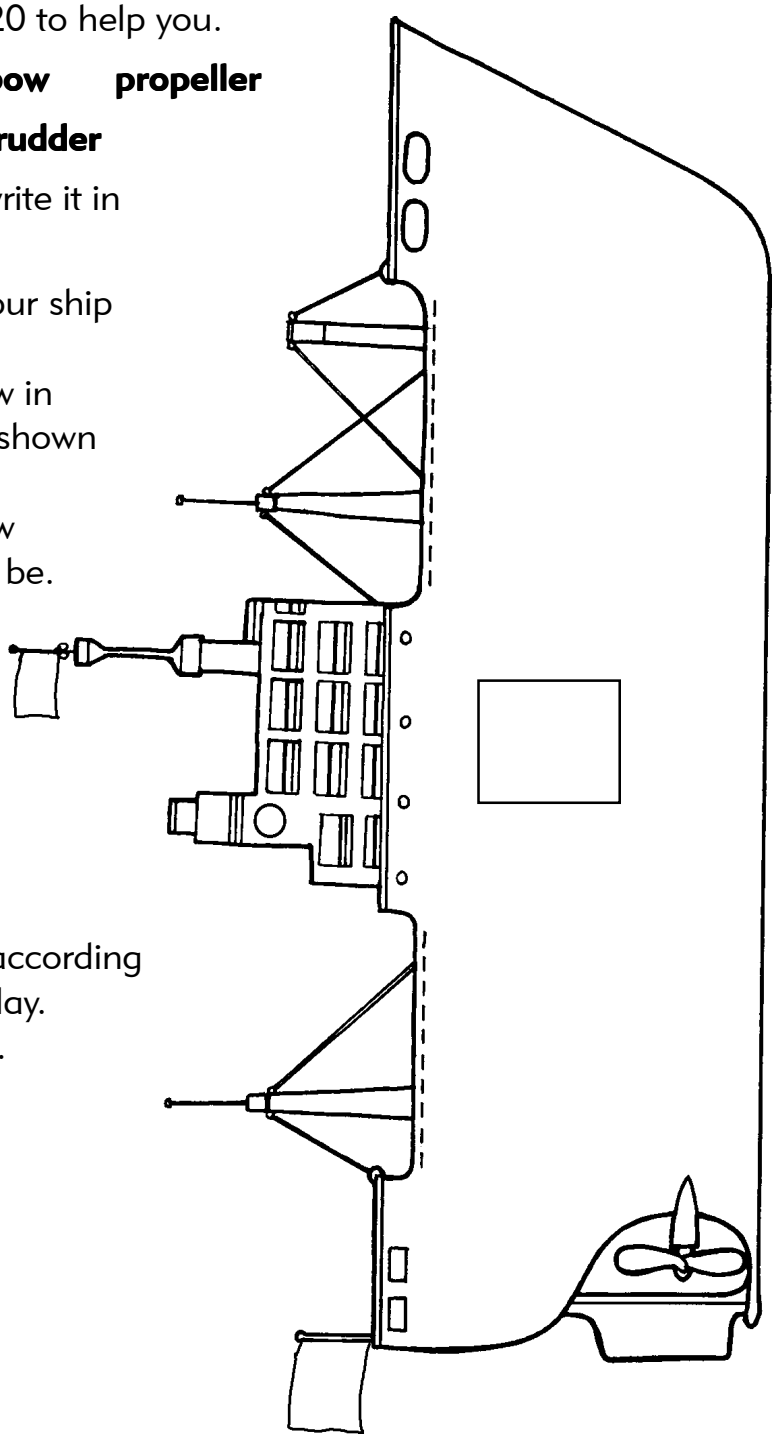
Ship Ahoy (2)

1. Label the following parts on the ship below. Use books from your library as well as the information on page 20 to help you.

   starboard light hull bow propeller

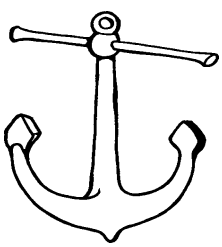
   bridge flags stern rudder

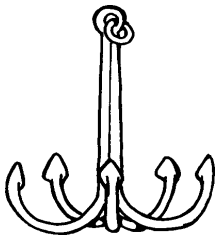
2. Give your ship a name and write it in the correct place.
3. Decide what type of water your ship will sail in (see page 20).
   In the square on the hull draw in the Plimsoll line like the one shown on page 20.
   Mark the Plimsoll line to show where the water level should be.

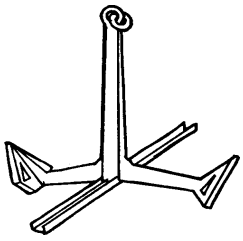


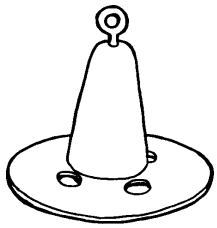
4. Colour the flags on the ship according to the signal you wish to display.
   Use your flags from page 20.
5. Mark the spot where the anchor is attached to the ship. Draw in an anchor.

❑ Label the different types of anchor below. Research to find out when they are used. Make some notes on a separate sheet of paper.





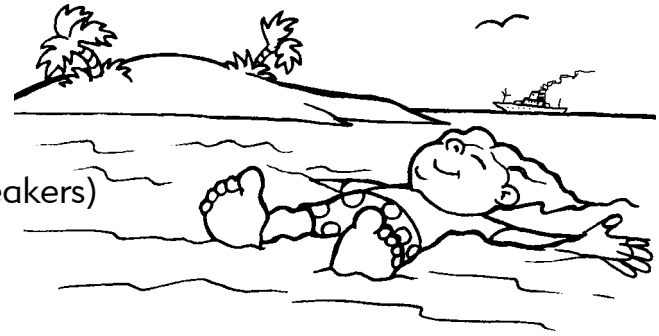




Density Experiment (1)

If you've ever been swimming in the sea you may have noticed that you seem to float better than you do if you go swimming in the local pool.

❑ Let's find out why this happens.



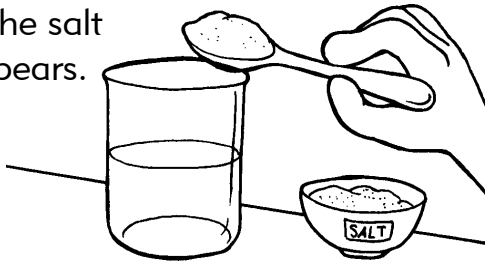
You will need

- 2 clear containers (e.g. glass jars, drinking glasses or beakers)
- 2 eggs (raw)
- Salt
- Teaspoon
- Water

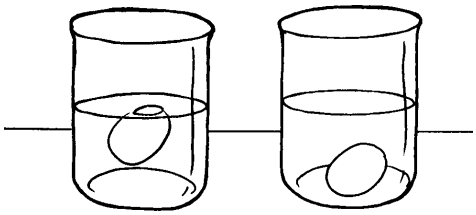
What to do

1. Fill one container about half full with water.

2. Place about 3 teaspoons of salt in the other. Half fill it with water and stir until the salt disappears.



3. Gently drop the eggs into the water. You should notice something different about the way they float.



4. Try swapping the eggs over to check that you haven't got a faulty egg. Do you get the same results?

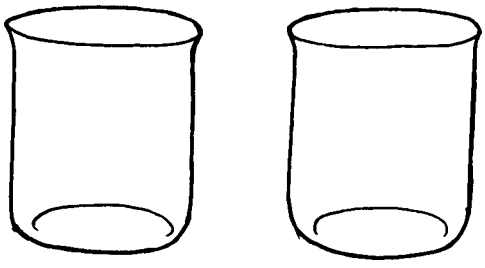
_____

_____

_____

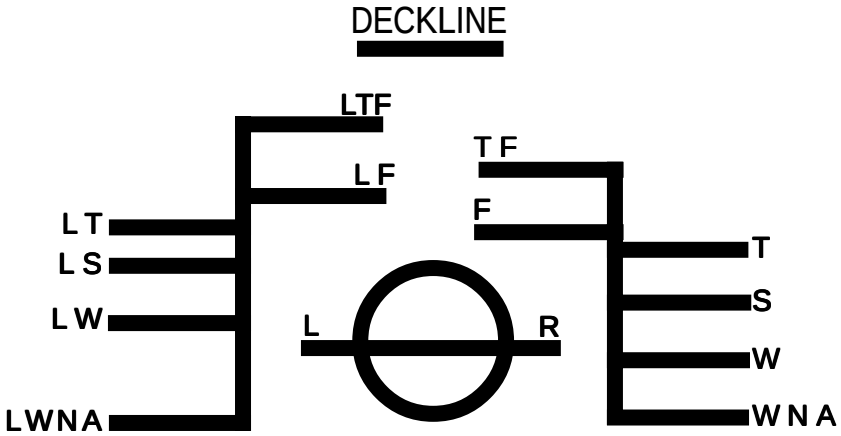
❑ Use the diagram to show what happens to the eggs. Label the eggs' water (fresh or salt).

Adding salt increases the ***density*** of the water and helps the egg to float. Like you, and the eggs used in the experiment, ships float higher in salty water.



Density Experiment (2)

If you have been to a major port you may have seen Plimsoll lines on the hull of large ships.



❑ Find out what the letters below mean by checking out this web site:

www.plimsoll.com/mark.html

TF _____ F _____ S _____

W _____ LT _____ LF _____

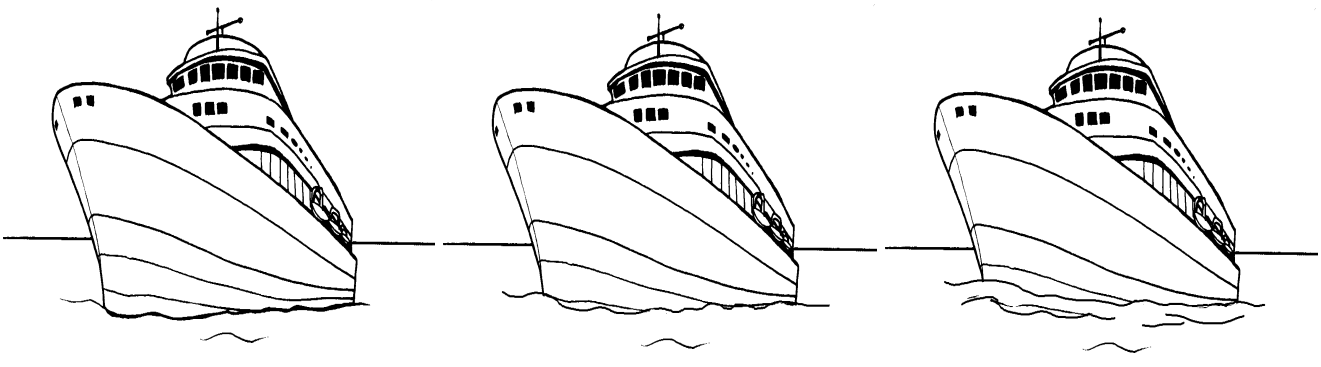
WNA _____

The marking system is named after their inventor Samuel Plimsoll. They help the ship's crew know how much cargo it is safe to carry. Before their use in 1875, sailors sometimes ran into problems when they loaded up their ships in salt water and then sailed into fresh. The salt water helped the heavy load to float, but when the vessel moved into less dense river estuaries, the help wasn't there and so the ships sometimes sunk!

Cold water is also denser than hot water and so the same disasters occurred when sailing from cold to warmer seas.

❑ Here are three identical ships all carrying the same amount of cargo.

Look at their positions in the water. Label the ship travelling in warm fresh water, a warm tropical sea, and a cold sea.



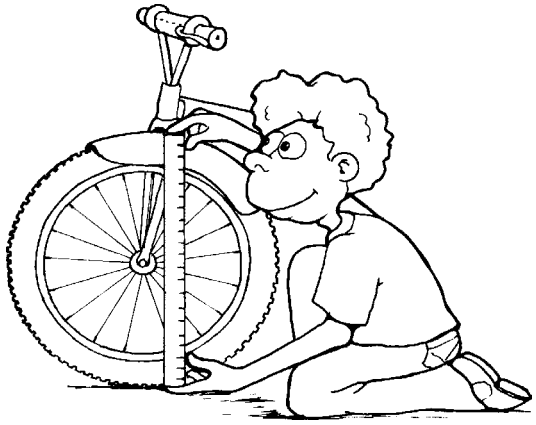
_____ _____ _____

As Easy As Pi (1)

❑ In this experiment you are going to discover why the title doesn't have a spelling mistake.

You will need

- different types of bikes
  (e.g. a trike, a single speed bike, a bike with gears, a BMX bike)
- some chalk
- a metre rule



Method

Step 1. Choose a bike.

Step 2. Measure the height of one wheel. This is the wheel's diameter. Record the diameter on the result table.

Step 3. Use the chalk to mark the side of the **tyre** where it is touching the ground.

Step 4. Draw a chalk line on the **ground** at the back of the tyre.

Step 5. Use your hands to turn the bike pedals until the tyre has turned around once. Your chalk mark on the side of the tyre should be back in the same position.

Step 6. Draw another line on the ground at the back of the tyre to show where the wheel has stopped.

Step 7. Measure the distance between the two lines on the ground to calculate how far the bike has travelled. This distance is also the wheel's circumference. Record the circumference on the results' sheet.

Step 8. Repeat this experiment using the other bikes.

Results

Type of bike	Height of wheel (diameter)	Distance travelled (circumference)	Ratio

As Easy As Pi (2)

❑ Think back to your experiment on page 24 and then answer the following. Did all of the bikes travel the same distance?

_____

What happened to the distance travelled (the circumference of the wheel) as the height (diameter) of the bike tyre increased?

_____

_____

❑ Use a calculator to divide the circumference of the tyres by their diameter.

$$\frac{\textit{Circumference (cm)}}{\textit{Diameter (cm)}}$$

Round your answer to two decimal places, e.g. 1.23456 ≈ 1.23
and fill in the last column of the results' table.

Compare your results with another group's – if you have all measured accurately you should have the same number, which is _____.

This number is called **pi** or **π.**

Long ago the ancient Egyptians and Babylonians discovered **π** and people have been fascinated by it ever since. You rounded pi to two decimal places, but mathematicians using computers have been able to calculate it to more than 100 000 places!

What's My Name?

❑ Complete the "pi" words below:

a. A musical instrument PI __ __ __

b. A tube PI __ __

c. A seed PI __

d. Meal outside PI __ __ __ __

e. A farm animal PI __

f. A cushion PI __ __ __ __

g. A fruit PI __ __ __ __ __ __ __

h. A sea robber PI __ __ __ __

j. A game played with bats PI __ __ __ __ __ _

k. A colour PI __ ___

Bike Check-Up

Someone is always watching out for your health but when was the last time you did the same for your bike?

❑ Work with your partner to see if your bike is healthy enough to be ridden.

Checklist

Tick "pass" or "fail" next to each point:

		Pass	Fail
Size:	When standing astride the bike there should be about a 3 - 8 cm gap between the frame and the rider.		
Saddle:	When sitting the rider should be able to balance with the balls of their feet on the ground. The saddle should not wobble when pushed.		
Handle bars:	Should be tight and about seat level.		
Reflectors:	Should be present on the front and back of the bike.		
Chain:	Shouldn't squeak when pedals are turned.		
Brakes:	Lift up the bike and gently spin the wheels - the brakes should not rub against them. They should make the back wheels skid on a dry pavement.		
Tyres:	Should be properly inflated.		
Bell or horn:	Should be present.		
Wheels:	No loose or missing spokes. Wheels should be straight and not wobble when spun.		

Your findings

Check the box that best fits this bike.

- ❑ I'm surprised you can ride this machine! It's seriously ill.
- ❑ Not bad – but a couple of little things need attention.
- ❑ Wow – this machine is great! It's probably in better shape than your teacher.

Your recommendations: _____

_____

_____

Your signature: Dr _____ Date : _____

Your fee $_____ (Just kidding!)

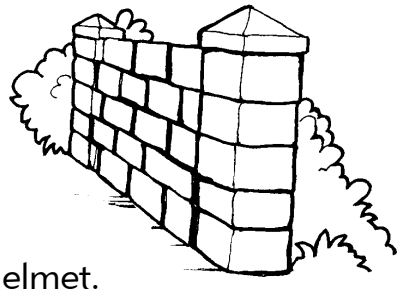
Why can't a bike stand up for itself? Because it is too tyred!

Head Hardware

Your body is made mostly of water. So is a water melon. Imagine the mess if you threw a water melon into something hard – now imagine what would happen if the same thing happened to you. Not a pretty sight!

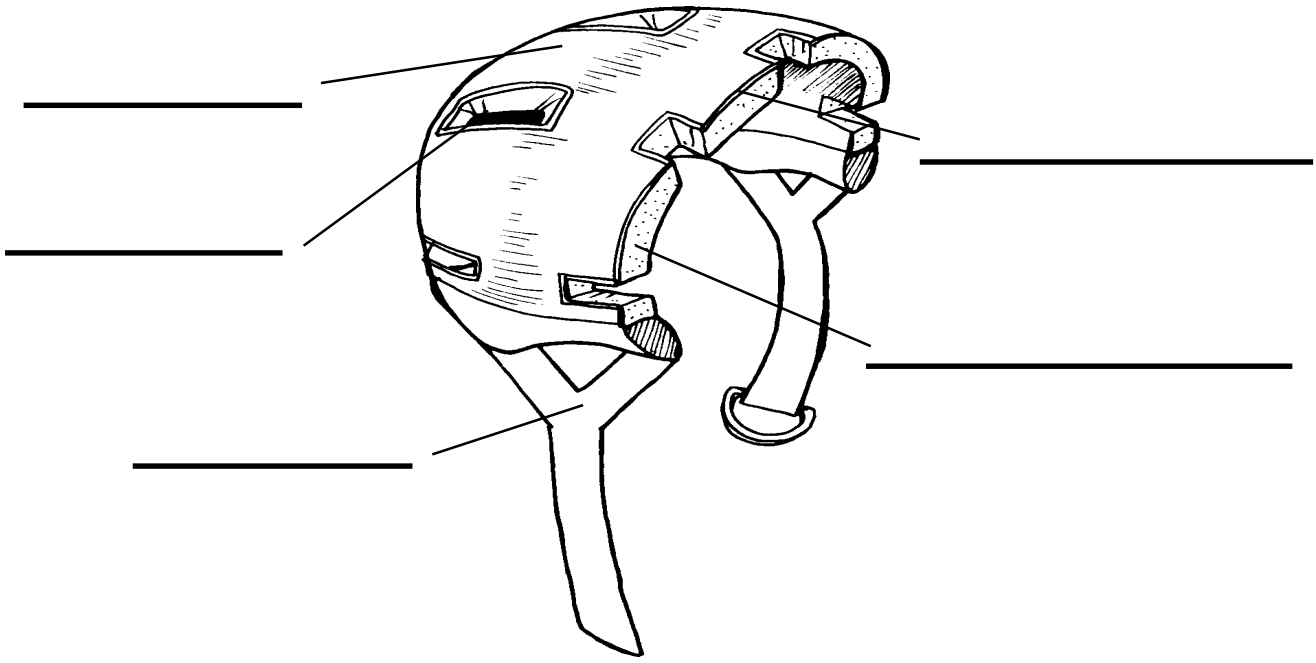
Most people die in bike accidents because of injuries to their head. The head can be damaged from a direct blow and injuries also occur when the brain bangs or twists inside the skull.

Wearing a correctly fitted helmet can help reduce the danger of head injuries if you have a crash.



Here is a picture of a cross section through a typical bike helmet.

❑ Use the words listed below (Parts) to label the parts of the diagram.



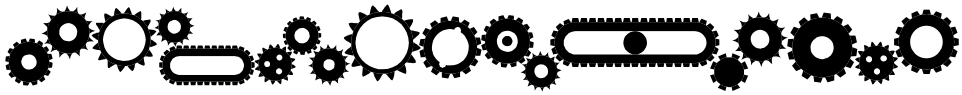
❑ Now draw lines to match each part with its function.

Parts	Function
Hard outer shell ...	makes sure helmet stays on
Crushable liner (usually polystyrene) ...	helps keep head cool
Layer of padding ...	helps resist impact
Straps ...	crumples up instead of your head
Air vents ...	helps with a snug fit

Remember - once a helmet has been involved in an accident it should not be used again.

Groovy Gears

There are many types of gears but basically they are all wheels with teeth. The teeth lock or mesh into each other and so one gear can make another turn around.

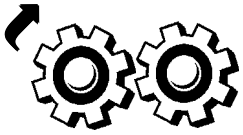


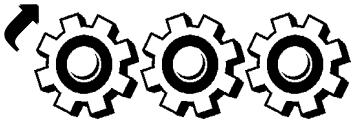
Gears are used in hundreds of ways. Of course they are in a car's gear box, but also in the odometer, speedometer, windscreen wiper mechanism and differential.

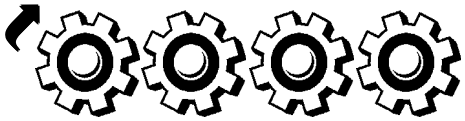
In this series of experiments you're going to find out a little about how gears work and why they are used.

Experiment Time

❑ Set up your own set of spur gears (using the templates on page 31) in the following way. Look at what happens when you turn the first gear in the row. A row of gears is called a gear train.
Draw arrows on the diagrams to show which way each wheel turns.

✻ Two gears of equal size: 

✻ Three gears of equal size: 

✻ Four gears of equal size: 

See the pattern? Draw what you think would happen if you put five gears in a row. Now try it and see if your prediction was correct.

Conclusion

❑ Circle the correct word:

1. When there are an even number of gears, the first and last wheels in the chain move in **same** / **opposite** directions.
2. When there are an odd number of gears, the first and last wheels in the chain move in **same** / **opposite** directions.
3. Gears can be used to change the _____ of movement.

Gears are used as below when cars move forwards or backwards.

Moving forward:

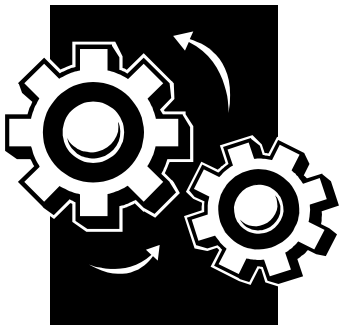
Gear train ➡ **Makes drive shaft turn clockwise** ➡ **Car wheels turn f_____.**

Reversing:

Gear train plus an extra gear ➡ **Makes drive shaft turn _____-clockwise** ➡ **Car wheels turn b_____.**

More Crazy Cogs & Groovy Gears (1)

❑ Work with a partner to discover if all cog wheels turn (rotate) at the same speed.



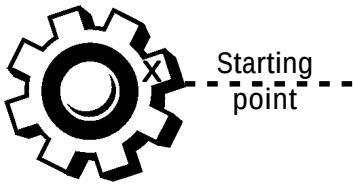
You will need

Some different sized spur gears.

Use the templates on page 31.

Method

1. Mark one of the teeth on each wheel and the place where it starts from so that you can tell when the gear has made one revolution (gone around once).

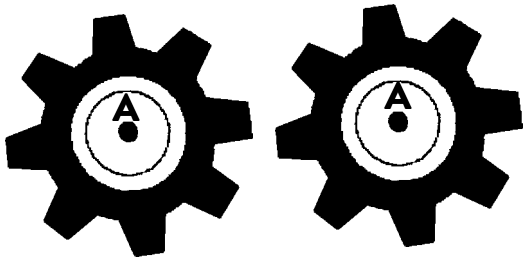


2. Pin the two cog wheels close together so that their teeth interlock. Make sure that they turn together before you start the experiment.

3. Turn the first wheel. Call out when the mark on your wheel arrives back where it started. Your partner will do the same for their wheel.

Experiment 1

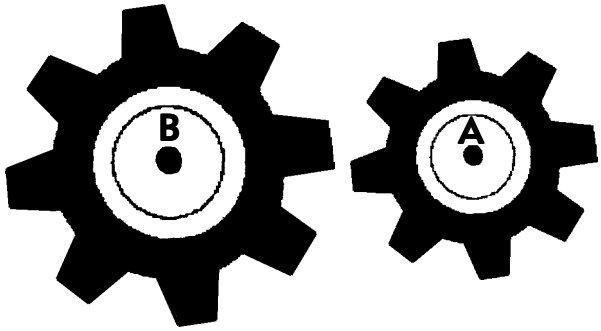
Using two identical sized cogs:



Two identical cog wheels turn at _____ speed.

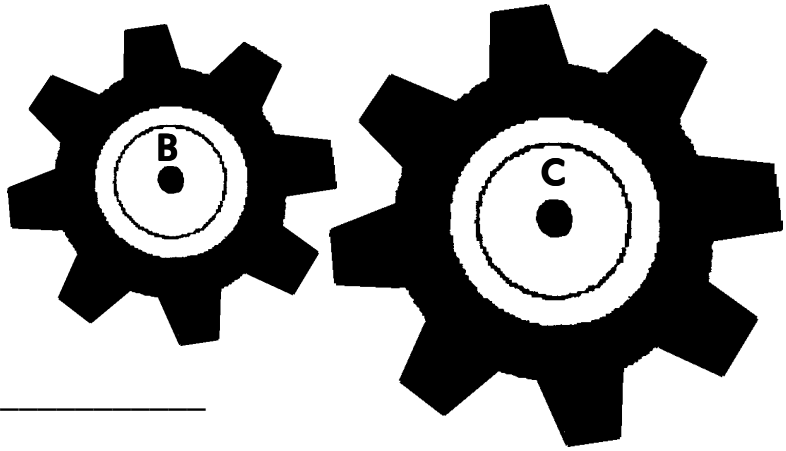
Experiment 2

Using different sized cog wheels.



Label the cog that turns the fastest.

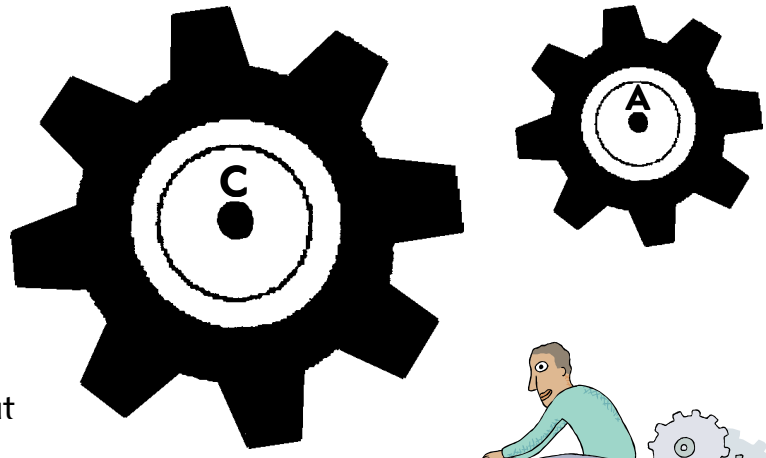
Repeat this experiment using cogs B & C.



Which cog turns the fastest? _____

More Crazy Cogs & Groovy Gears (2)

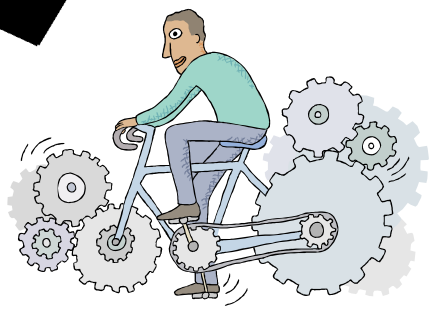
❑ Repeat the experiment on page 28 using cogs A & C.



Which cog turns the fastest?

_____

Different sized cog wheels turn at _____ speeds.



The smaller cog wheel turns _____ than the larger wheel.

On your bike a large sprocket wheel and a smaller cog on the back wheel mean that one turn of the pedals makes the bike's back wheel rotate even faster – you zoom along without much effort.

❑ All of these objects contain cog wheels. How many can you find in the puzzle?

electric screwdrivers
drills
toys
oscillating sprinkler
wind-up alarm clocks
washing machines
can openers
hand winch
ticking wristwatch

E	L	E	C	T	R	I	C	S	C	R	E	W	D	R	I	V	E	R	S	W
T	J	A	M	O	T	O	R	N	E	W	I	L	R	L	F	I	N	E	P	R
U	H	A	P	Y	P	I	N	H	A	N	D	W	I	N	C	H	E	V	U	I
R	S	S	T	S	H	I	S	N	E	W	Y	E	L	A	R	A	N	E	R	S
N	A	S	P	R	O	C	K	E	T	L	L	E	L	E	E	H	W	R	H	T
C	A	N	O	P	E	N	E	R	S	H	A	F	T	E	R	D	R	S	E	W
O	S	C	I	L	L	A	T	I	N	G	S	P	R	I	N	K	L	E	R	A
G	A	E	M	R	R	H	T	W	T	U	R	U	P	Y	S	O	J	Y	X	T
W	I	N	D	U	P	A	L	A	R	M	C	L	O	C	K	S	X	F	A	C
M	L	L	M	E	U	R	O	T	A	T	E	V	E	R	N	O	B	X	L	H
S	E	N	I	H	C	A	M	G	N	I	H	S	A	W	E	I	N	I	T	E
S	W	C	O	T	R	I	G	I	L	L	N	F	O	R	W	A	R	D	D	F

❑ Find some other "gear related" words. List them as you find them:

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

Extra for the Experts!

Find out how the gears on ten speed bikes work. Explain in the space below.

_____

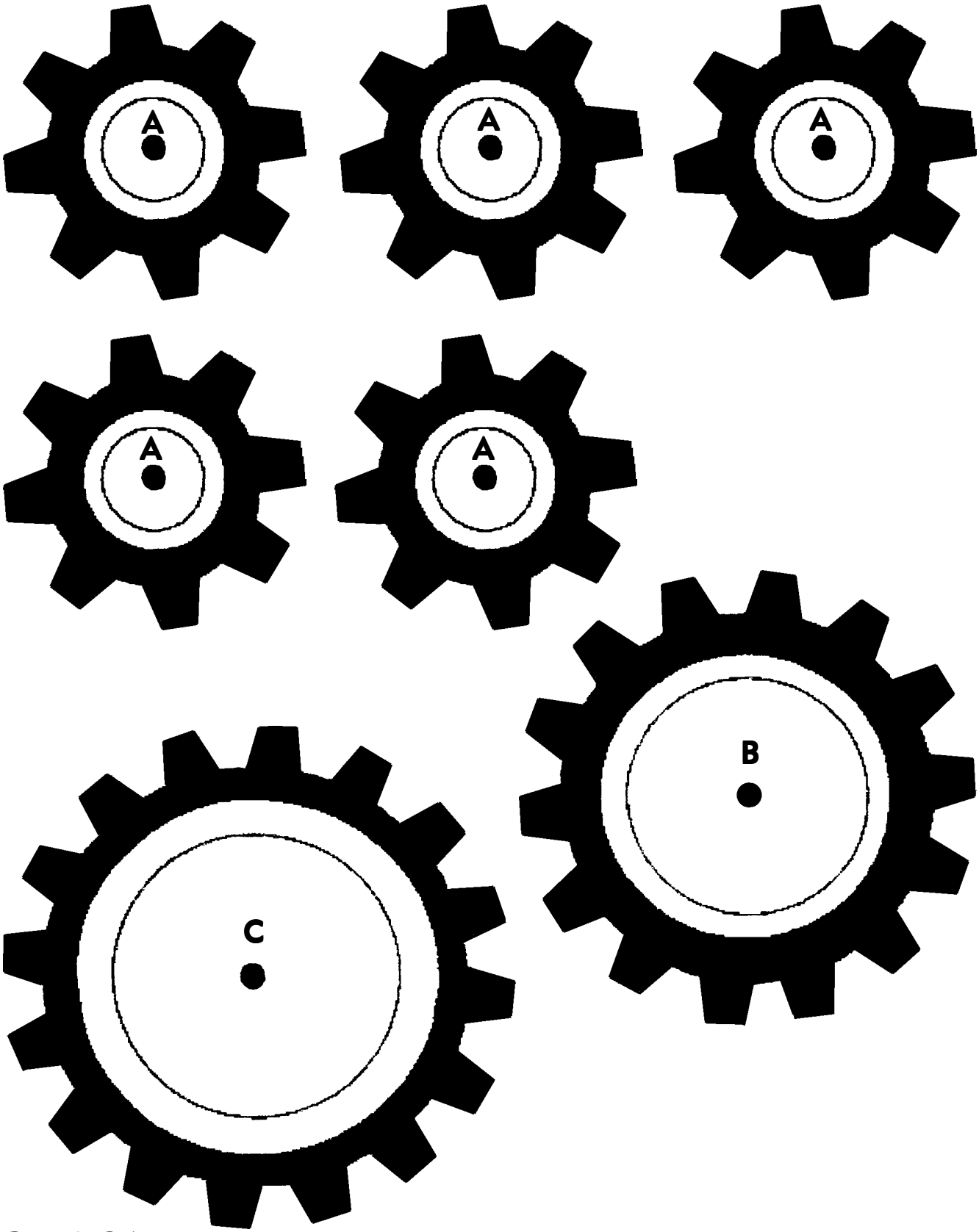
_____

_____

Cog Templates

❑ Use the templates below to complete the activities on pages 27-29.

1. Glue this sheet onto a piece of cardboard.
2. Carefully cut around the cogs.
3. Push a drawing pin through their centre.



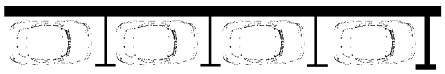
Car Park (1)

Have you ever been stuck in the back of a car while the driver goes around and around the car park looking for a vacant parking space?

Designing car parks is a skilled job. The aim of the designer is to make the greatest number of parking spaces available, but also leave enough room so that cars can easily get into and out of them. Cars also need to be able to move around, and enter and leave the park without slowing other traffic down too much.

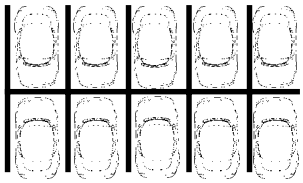
There are basically three different types of parking that you may have seen.

Parallel



Angle

Perpendicular



Angle and perpendicular car parks are easy to get into but cars parked in this way sometimes end up with their fronts overhanging the footpath, making things more difficult for pedestrians. Parallel parks tend to be easier to get out of but other traffic slows down when drivers try to reverse into them.

❑ Look at your school car park. Complete the following table and answer the questions.

Total number of car spaces:	Number of exit points:
Number of vacant spaces:	Number of entry points:
Type of parking:	

Are there any special spaces for motor bikes or disabled drivers? _____

How do these spaces differ from normal parking spaces? _____

_____

How does the traffic move around the carpark, e.g. one way or in both directions?

_____

Are there signs in the carpark? If so, what do they say? _____

_____

Does it look like an easy place to park in? Why or why not?

(Hint: Check to see if the cars are in the middle of their spaces or if some are parked over the lines.)

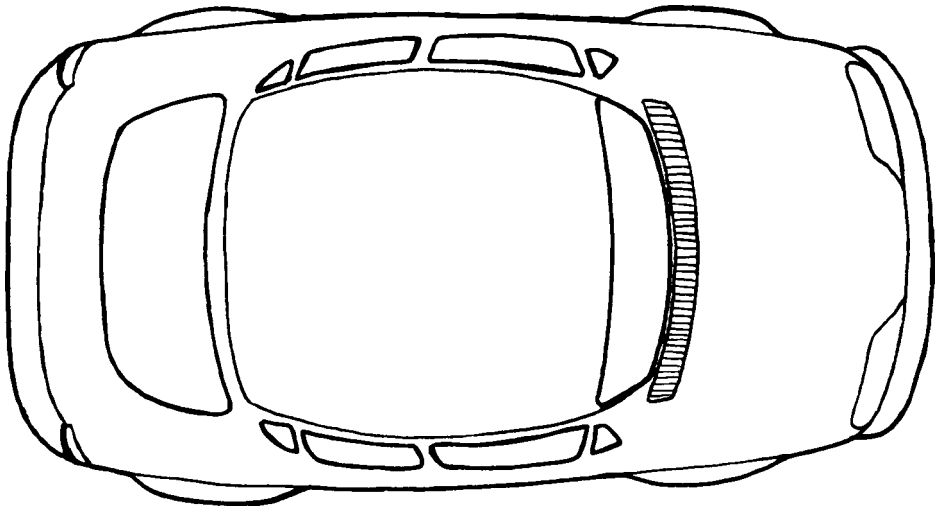
_____

_____

Car Park (2)

❑ Experiment to discover which type of parking is the most efficient.

Use the template below, a pencil, an eraser and some sheets of A3 paper to design your own car park. A small toy car (about the size of the car template) can also be used to help.



Try to create the greatest number of spaces but also allow enough room for cars to move around the carpark.

Place exits and entries where you like. Single entry/exit points must be at least **one car width** wide. Combined exit and entry point must be **two car widths wide**. One-way aisles between parks must be at least $1\frac{1}{2}$ car lengths to allow cars to move around and turn. Two-way aisles must be **two car widths wide.**

❑ How many cars can you park using:

- ✻ only parallel parking? _____
- ✻ only angle? _____
- ✻ only perpendicular? _____
- ✻ any combination? _____

❑ Colour in your most efficient design. Include signs and show entry and exit points and the direction of traffic. Experiment with the measurements below and compare the amount of cars that can be parked in the same amount of space (i.e. the entire sheet of A3 paper).

Parking angle	stall width (m)	aisle width (m)
45°	2.4	3.60
90°	2.4	6.00

What did you find? _____

_____

Late For School

Buses are a common form of transport – many students use buses as their main transport to school. If you do take a bus you will have to make sure you can read the timetable, otherwise you could be waiting for a long time. Most timetables are written in digital form. Some use a 24 hour clock and some just write a.m. and p.m. after the number.

❑ Draw a line to match the words with the correct time.

five minutes past twelve (p.m.) half past eight (a.m.) midnight

a quarter to three (p.m.) a quarter past six (a.m.)

Timetable Trouble

George left his bus timetable in his shirt pocket and his mother washed it. Parts of the timetable have completely disappeared. The bus takes five minutes to travel between each stop.

❑ Fill in the missing bits on George's timetable and then use it to answer the following questions.

School Bus Timetable

	To School	From School
Alexander St.	8.00 a.m.	
Belinda Ave.	8.05 a.m.	
Christopher Pl.		
David Cres.		
Ellen Rd.	8.20 a.m.	
Frances Dr.		
Gina St.		
Harry Rd.		
School	8.40 a.m.	3.15 p.m.

Abbreviations

What do these abbreviations stand for?

Ave: _____

Pl: _____

Cres: _____

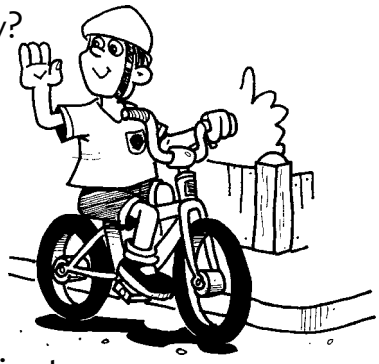
Rd: _____

Dr: _____

1. George lives in Ellen Rd. How long does it take him to travel to school? _____
2. Rose lives in Christopher Pl. How long is she on the bus before George gets on?

   _____
3. Kirsten is on the bus for ten minutes before she gets to school. Where does she catch the bus? _____
4. At 3.15 p.m. the bus takes the children home. Complete the return timetable in the table above, (5 minutes between stops). What times do George, Rose and Kirsten get off the bus at their stops? _____

Travelling to School (1)



❑ How do you and other students arrive at school each day? Complete the following.

My Travel

I travelled to school this morning by: *(Circle correct answer.)*

A) walking B) bike C) car D) bus E) other

The trip took me:

A) 0 - 5 B) 6 - 10 C) 11-15 D) more than 15 minutes

I will travel home today by:

A) the same method I came to school B) a different method

❑ What are some of the **advantages** of travelling this way? *(E.g. I like listening to the car radio.)*

_____

_____

❑ What are some of the **disadvantages** of travelling this way? *(E.g. I get wet in the rain.)*

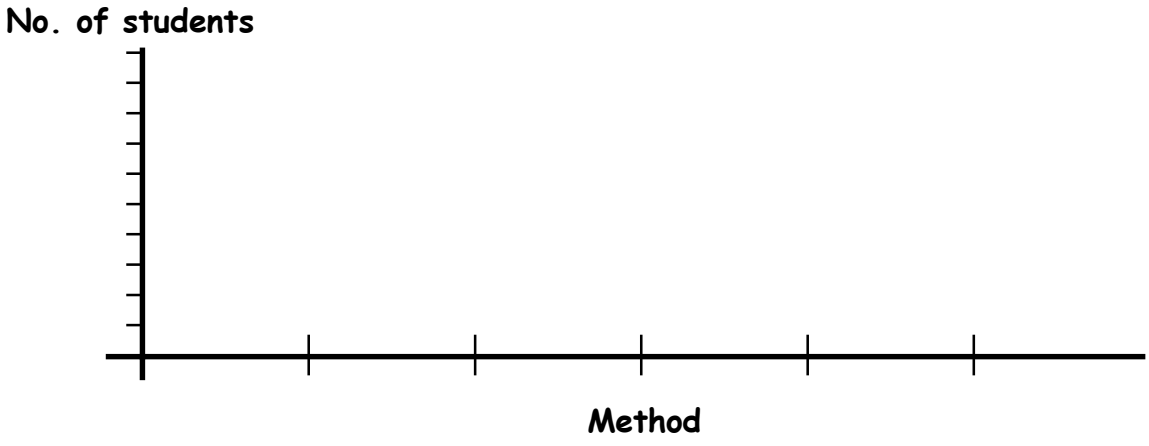
_____

_____

Class Results

❑ **How do people travel to school?** Survey the students in your class about their methods of transport. Complete the table and then draw a bar graph of your results.

Method	walked	bike	car	bus	other
Number					



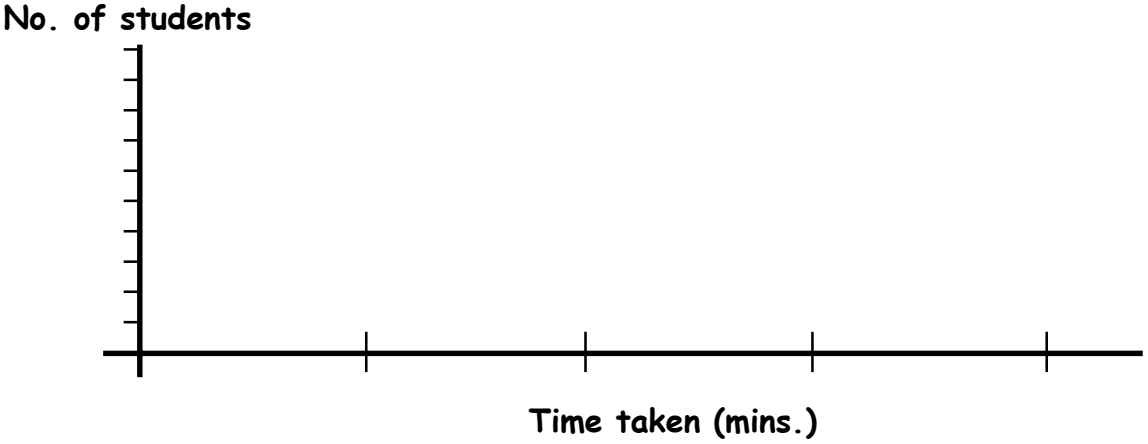
Most children came to school by _____. The least popular method was _____.

Travelling to School (2)

Class Results

❑ **How long does the trip take?** Survey the students in your class about how long it takes them to travel to school each day. Complete the table and then draw a bar graph of your results.

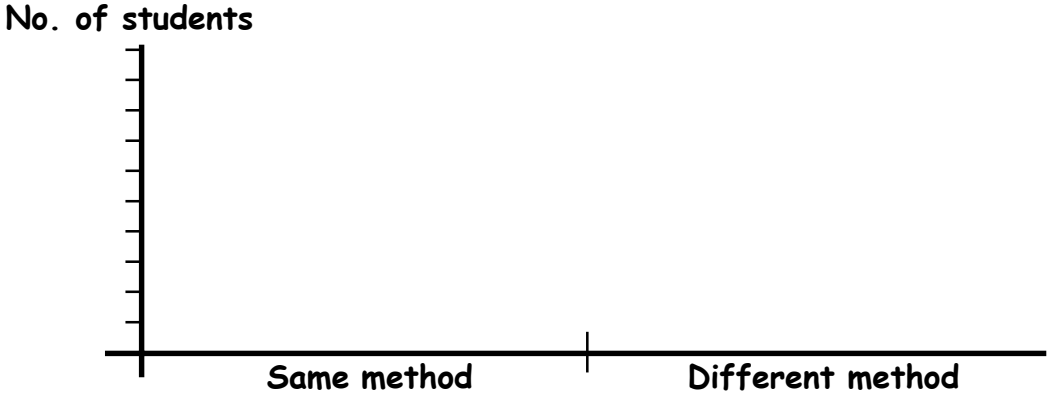
Time	0-5 mins.	6-11 mins.	11-15 mins.	> 15 mins.
Minutes				



It takes most children _____ to travel to school.

❑ **Do they travel home by the same method of transport?** Survey the students in your class about how travel from school to home each day. Make a tally and then draw a bar graph of your results.

Same Method: _____ Different Method: _____



Most children travel to and from school _____ way.

❑ Think of a reason some children might travel home in a different way.

_____

_____

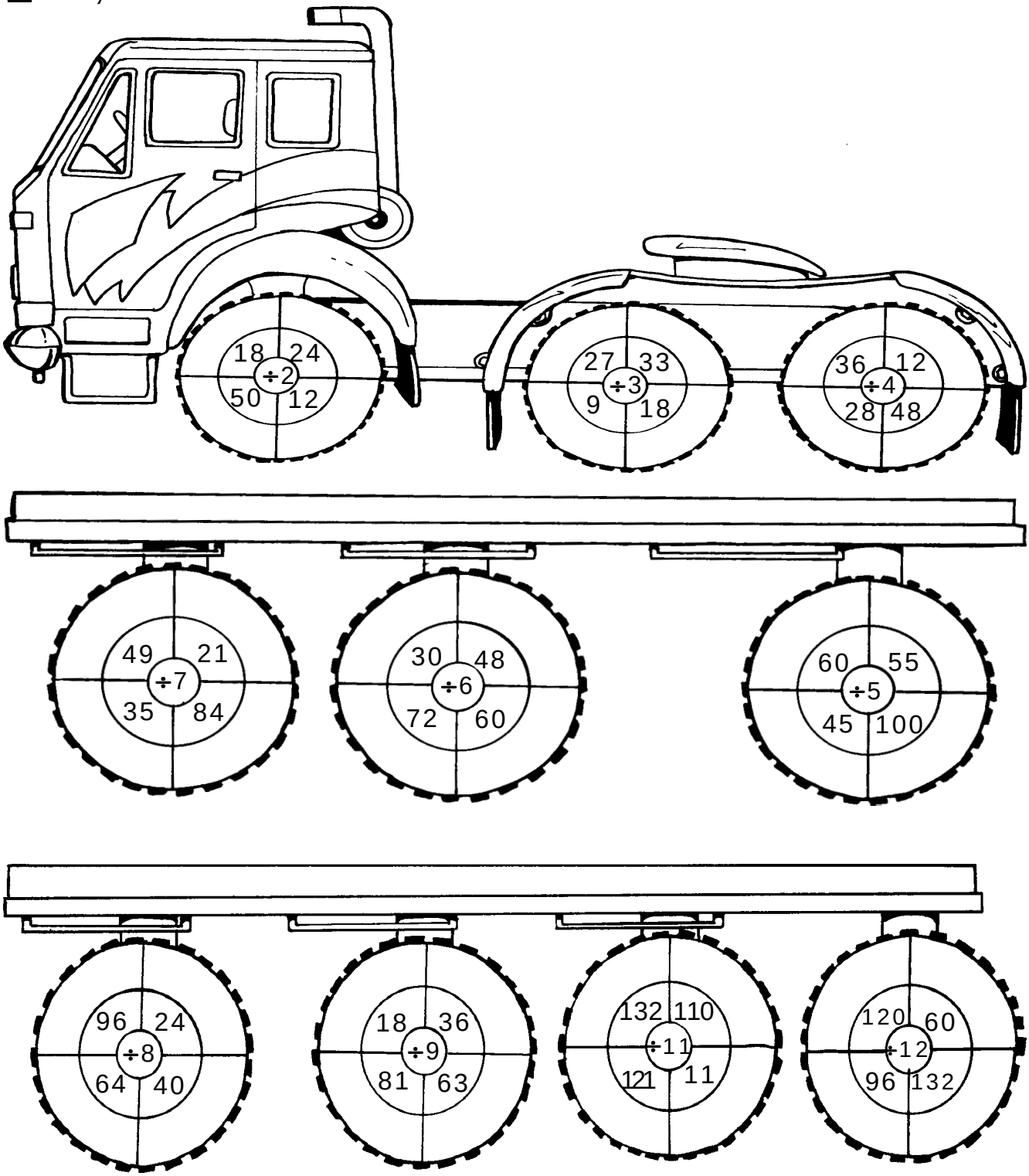
How do bees travel? They take the buzz ...!

Road Trains

Road trains are super long trucks that are used to transport goods over vast distances all over the country. They are made up of a prime-mover or tractor connected to a number of trailers. On sealed highways they normally have between three and four trailers (that's about as long as 10 cars in a row!) but some may pull even more.

The trailers are connected in a special way, using "dollies". These help the long vehicle to turn easily.

❑ Use your mathematical skills to fill in the road train's "wheels".



Sign Language (1)

Did you know there is an International Convention (agreement) on road signs? This means that in most countries similar signs mean similar things.

This is what a "Give Way" sign looks like in three countries.

United States

New Zealand

Korea

Why do you think it is important to have this agreement? _____

_____

_____

❑ How many signs can you recognise? Write down what you think each means. If you are not sure make a guess.

_____
_____
_____

_____
_____
_____

_____
_____
_____

_____
_____
_____

_____
_____
_____

_____
_____
_____

_____
_____
_____

_____
_____
_____

Sign Language (2)

❑ Here are some signs from other countries. Have a guess at what they mean, then check them on the Internet. Your teacher will tell you the site to look up.

_____ _____
_____ _____
_____ _____

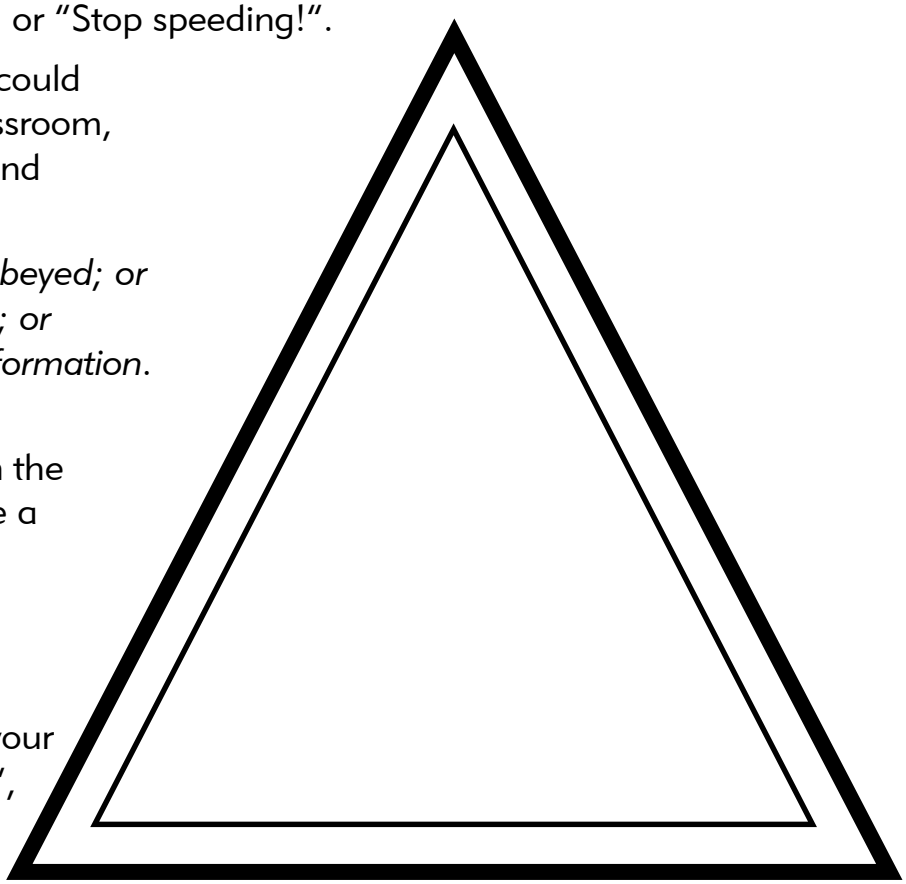
_____ _____
_____ _____
_____ _____

Vehicle-activated signs are now being designed which automatically turn on in certain conditions. For example, a speeding motorist might trigger a sign to light up reading "Slow down now!" or "Stop speeding!".

❑ Design a sign that you could put up around your classroom, school or home to remind people ...

A) of a rule that must be obeyed; or
B) to warn them of danger; or
C) to provide them with information.

Draw a plan of your sign in the triangle and then complete a large sign on card.



❑ If you decide to make your sign "person-activated", write below what will cause it to go on.

_____

_____

What's That Sign?

There are hundreds of different types of road signs around – you probably pass many on your way to school each day.

Road signs are used for a number of different reasons. Most are for the protection of ourselves and others. Look at these signs and what they mean.

Some signs warn of *possible dangers.*

Some signs *display road rules.* **You may be fined if you don't obey these signs.**

Some *provide information,* **e.g. Handicapped Parking**

❑ In the blank boxes, add examples of your own for each category listed above.

Signs must be easily seen so they come in a variety of colours. Similar types of signs tend to use the same colour combinations, for example, warning signs are usually yellow and black. Many signs are made with a reflective layer so that they can clearly be seen at night. They also come in a range of shapes, e.g. rectangular, circular, octagonal. Their message must be simple to understand. Reading long complicated instructions when travelling is too difficult. Overseas visitors may not be able to read English but will still need to understand the signs.

You have probably noticed that some signs only have writing on them, e.g. 

others have only pictures, e.g.  and some have both. Pictures are often easier to understand than words.

❑ Look at three road signs near your school and complete the following table.

Simple drawing	Shape of sign	Pictures, words, or both	Colours used	Advice or information	What the sign means

Skateboarding

No one knows exactly when skateboards were invented. It may have been about 50 years ago when someone had the clever idea of attaching an old roller-skate to a spare piece of wood. Did you know that a number of the moves used in skateboarding today were thought up by surfers who used skateboards to practise on when the sea was calm?

Over time the board's design and the materials they are made of have changed. Most boards are now made of laminated wood and their wheels are made from a plastic called *urethane*. Different shaped boards are used for different styles of ride, e.g. freestyle, slalom and speed.

Like all sports there are certain rules you should follow if you want to have fun but also stay safe. These include not skateboarding on the streets, only having one rider on the board at a time and never hitching lifts from other vehicles. It's sensible not to ride in the dark. Always check the areas you're going to ride in beforehand for holes, bumps and rocks. Make sure your board is not damaged and the bolts holding the trucks to the deck are tight.

Wear protective gear such as a helmet, elbow and knee pads, wrist guards and non-slip shoes. These may not stop you getting hurt but they will reduce how often injuries happen and how serious they are.

Knowing the correct way to fall is important. If you're losing your balance, crouch down low – that way you'll have less distance to fall if you do come off! Even experienced riders have accidents and complicated tricks need plenty of practice in specially designed areas.

If you are interested in learning more about skateboarding, your library may have some useful books or magazines about it. This web site is a great place to start:

www.exploratorium.edu/skateboarding/

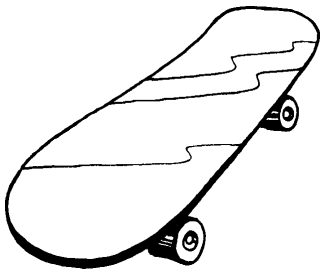
Of course there's nothing quite like just watching an experienced skateboarder in action to see how it's done.

❑ Find the antonyms (opposites) for these words. All the answers are included above.

rough _____ afterwards _____ loose _____

inexperienced _____ increase _____ simple _____

❑ Write your answers to these on the back of this sheet.



1. Use a dictionary to find out what laminated means.
2. Why do you think skateboarders shouldn't ride in the dark ?
3. Explain why non-slip shoes should be worn ?
4. Give a reason why experienced riders may have accidents.
5. Write down three ways you could discover more about the art of skateboarding.

The Language of Skateboarding

Skateboarders use different words for their sport – some of them you will know and some of them you might not.

❑ Draw a line to connect these common skateboarding words to their best meanings.

Words	Meanings
carve	rear of skateboard
fakie	front of the skateboard
tail	jumping into the air without holding onto the board
grind	SK8
gloves	you won't move without four of these
ollie	skating in a long curving arc
helmet	where you stand
air	protection for your hands
wheels	falling off
nose	connect the wheels to the deck
skate	short for aerial
deck	standing with your right foot forwards
trucks	scraping axles on a surface
goofyfoot	head hardware
slam	skating backwards

❑ Find these words hidden in the puzzle below.

D	C	S	E	G	A	L	L	R	S	L	A	M	E	R	F	A	K	I	E	S
S	K	A	T	E	W	S	C	E	O	T	F	I	V	D	E	E	A	I	R	E
W	H	E	E	L	S	U	O	K	O	R	F	V	N	E	G	H	A	L	K	L
Y	L	G	O	O	F	Y	F	O	O	T	T	I	K	O	G	I	S	E	I	S
V	C	C	C	T	A	I	L	I	K	L	R	T	E	F	N	H	E	T	T	E
K	N	Y	A	S	E	R	S	T	C	G	O	S	E	E	E	L	V	E	R	F
R	E	K	R	A	V	I	V	I	E	I	I	D	G	L	N	I	O	D	U	L
R	T	R	V	L	E	K	F	G	D	T	C	O	M	O	I	O	L	K	C	R
N	I	R	E	A	S	F	K	N	O	B	A	E	S	M	L	C	G	I	K	I
T	E	I	L	L	O	K	I	M	A	F	T	E	Y	D	F	A	S	O	S	H
L	E	R	V	I	G	F	A	K	A	R	A	R	K	E	N	V	G	T	R	F

Language evolves (changes) all the time, so it is likely you may use different words to those listed above or you might use the same words but spell them another way, e.g. ollie or olly. Perhaps you have even invented your own words.

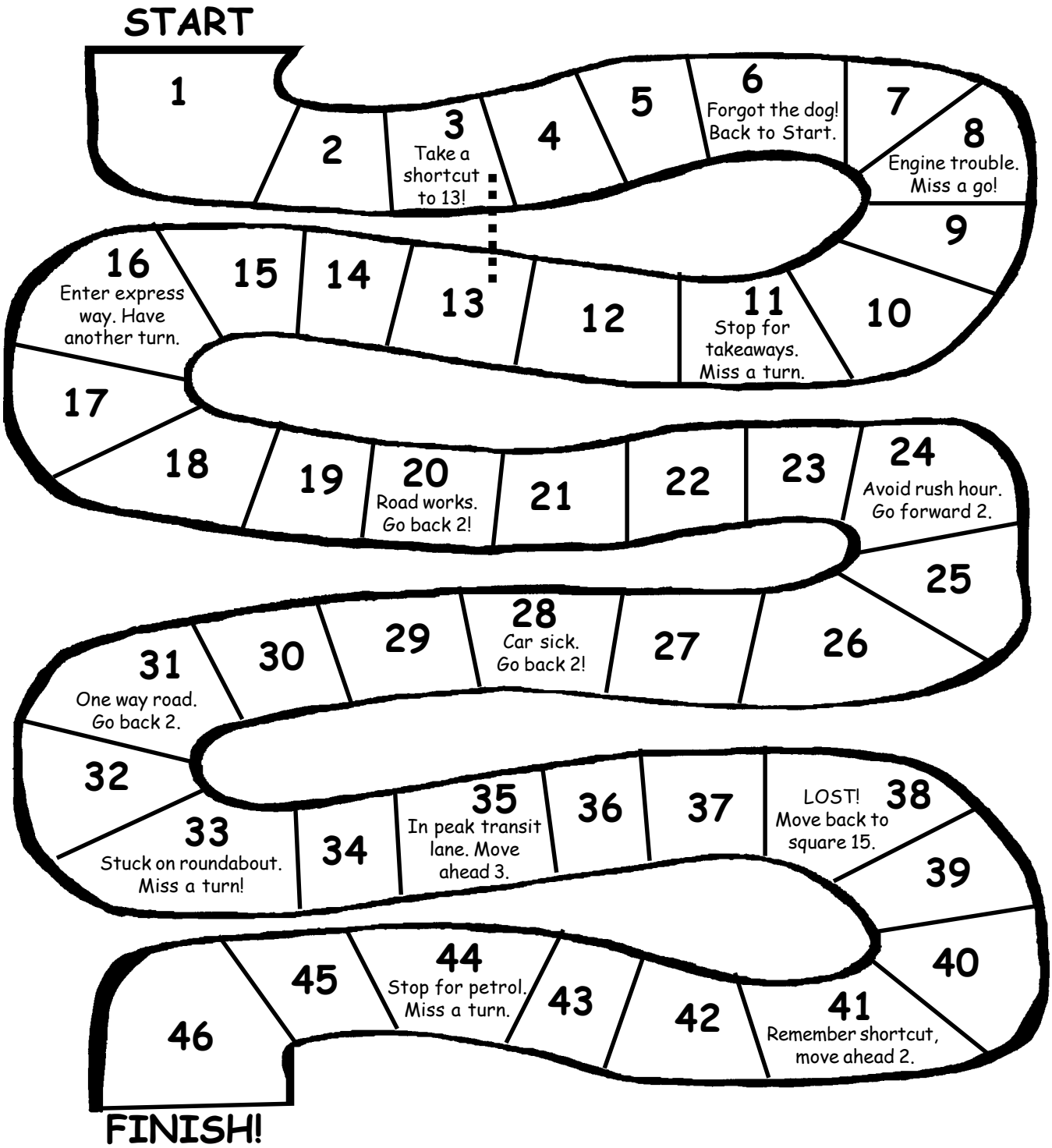
❑ List five other skateboarding words you know, e.g. kickflip and bailing.

Invent a word to describe the most complicated move an experienced skate boarder could only dream about making and explain what the move involves. You may use pictures to help. Use the back of this sheet for your work.

Are We There Yet?

School's finished and you're going on a dream holiday to _____. You've packed your suitcase, found you can't close it, taken stuff out and repacked it again. You've organised for your neighbours to feed your cat, your goldfish and your Venus flytrap. You've lent your grandma your favourite computer game (hope it still goes when you get back) because your mother says, "You won't be needing it at all where you're going!" and you're off, off and away ...

Your teacher will write the rules of the game on the board.



Yippee - You have arrived at _____ .

Answers

A Flying Timeline (Page 8)

1783 - The balloon of the Montgolfier brothers becomes the first unmanned balloon flight. The balloon was propelled by burning a pile of moist wool and old shoes.
1804 - Sir George Cayley builds and flies the world's first successful model glider.
March 31, 1903 - New Zealand aviator Richard Pearse climbed into a self-built monoplane and flew for about 140 metres before crashing into a gorse hedge on his Waitohi property.There is some doubt as to whether this met the definition of "sustained flight" and thus was the first powered flight.
December 17, 1903 - The Wright Flyer lifts into the air at 10:35 am. The flight lasted only 12 seconds and covered a distance of just 121 feet (37 m). It is the first powered, manned, heavier-than-air, controlled flight.
November 13, 1907 - First helicopter flown by Paul Cornu, a French inventor. The flight lasted only 20 seconds and hovered just 1 foot (30 cm) above the ground.
May 20-21, 1932 - Amelia Earhart becomes the first woman to fly solo across the Atlantic
January 15-18, 1957 - The first jet flight around the world occurs.

Air Pollution (Page 9)

Acrostic Puzzle: cars; illegal; converter; Pb; toxic; unleaded; lead; fumes; asthma; brain; smog; children.

Email From Space (Page 13)

1. Endeavor; 2. five; 3. seven; 4. arachnids; 5. sandwiches; 6. ninety; 7. fatter, thinner; 8. urine; 9. hang; 10. space sickness; 11. Wednesday, October 2.

Somewhere in a Galaxy ... (1) (Page 14)

Aeroplane - aviation gas; Older car - leaded petrol; Modern car - unleaded petrol; Bus - diesel; Solar powered car - sun; Hybrid car - petrol and electricity; Space shuttle - solid rocket fuel.
Fuel: 1. $450; 2. $60; 3. $133; 4. $234; 5. $360; 6. $266; 7. $387; 8. $540; 9. $161.

Somewhere in a Galaxy ... (2) (Page 15)

1. 3; 2. 9; 3. 6; 4. Zlubjuice; 5. Xyblipanol; 6. Wibblegas; 7. 15; 8. 35.

Car Ferry (Page 17)

a. 37; b. 24; c. 13; d. 29; e. 11; f. 18. 1. $1316; 2. $588; 3. $798; 4. $546.

As Easy as Pi (2) (Page 25)

a. piano; b. pipe; c. pit; d. picnic; e. pig; f. pillow; g. pineapple; h. pirate; i. pingpong; j. pink.

More Crazy Cogs and Groovy Gears (2) (Page 30)

E	L	E	C	T	R	I	C	S	C	R	E	W	D	R	I	V	E	R	$	W
T	J	A	M	O	T	O	R	N	E	W	I	L	R	L	F	I	N	E	P	R
U	H	A	P	Y	P	I	N	H	A	N	D	W	I	N	C	H	E	V	U	I
R	S	S	T	$	H	I	S	N	E	W	Y	E	L	A	R	A	N	E	R	$
N	A	S	P	R	O	C	K	E	T	L	L	E	L	E	E	H	W	R	H	T
C	A	N	O	P	E	N	E	R	S	H	A	F	T	E	R	D	R	S	E	W
O	S	C	I	L	L	A	T	I	N	G	S	P	R	I	N	K	L	E	R	A
G	A	E	M	R	R	H	T	W	T	U	R	U	P	Y	S	O	J	Y	X	T
W	I	N	D	U	P	A	L	A	R	M	C	L	O	C	K	S	X	F	A	C
M	L	L	M	E	U	R	O	T	A	T	E	V	E	R	N	O	B	X	L	H
S	E	N	I	H	C	A	M	G	N	I	H	S	A	W	E	I	N	I	T	E
S	W	C	O	T	R	I	G	I	L	L	N	F	O	R	W	A	R	D	D	F

The Language of Skateboarding (Page 42)

carve - skating in an arc; fakie - skating backwards; tail - rear of skateboard; grind - scraping axles; gloves - protection for hands; ollie - jumping into air ...; helmet - head hardware; air - short for aerial; wheels - you won't move without four of these; nose - front of skateboard; skate - SK8; deck - where you stand; trucks - connect wheels to deck; goofyfoot - right foot forwards; slam - falling off

D	C	S	E	G	A	L	L	R	S	L	A	M	E	R	F	A	K	I	E	S
S	K	A	T	E	W	S	C	E	O	T	F	I	V	D	E	E	A	I	R	E
W	H	E	E	L	S	U	O	K	O	R	F	V	N	E	G	H	A	L	K	L
Y	L	G	O	O	F	Y	F	O	O	T	T	I	K	O	G	I	S	E	I	S
V	C	C	C	T	A	I	L	I	K	L	R	T	E	F	N	H	E	T	T	E
K	N	Y	A	S	E	R	S	T	C	G	O	S	E	E	E	L	V	E	R	F
R	E	K	R	A	V	I	V	I	E	I	I	D	G	L	N	I	O	D	U	L
R	T	R	V	L	E	K	F	G	D	T	C	O	M	O	I	O	L	K	C	R
N	I	R	E	A	S	F	K	N	O	B	A	E	S	M	L	C	G	I	K	I
T	E	I	L	L	O	K	I	M	A	F	T	E	Y	D	F	A	S	O	S	H
L	E	R	V	I	G	F	A	K	A	R	A	R	K	E	N	V	G	T	R	F