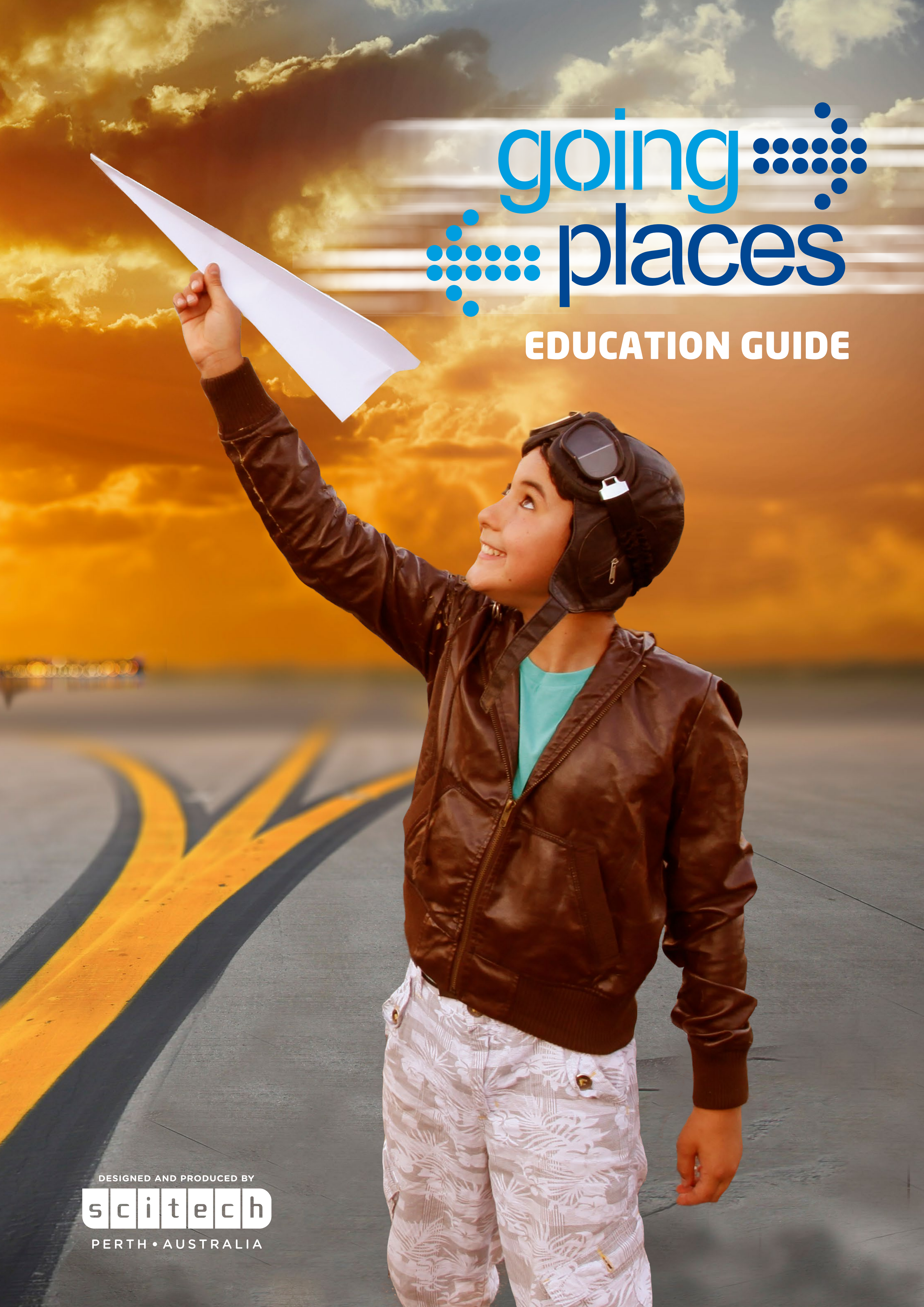


going places
EDUCATION GUIDE
DESIGNED AND PRODUCED BY
scitech
PERTH • AUSTRALIA

CONTENTS

EXHIBITION BACKGROUND

Where did you go today? How did you get there? Did you walk or cycle? Did you take a plane, train or boat? What about a parachute, airship or rocket?

Humans have developed many modes of transport to get around much faster than our legs could ever take us, opening up our world so that travel is possible like never before.

Going Places is interactive science exhibition that explores the technology humans have developed for travel. If you have ever wanted to pilot an airship, ride on a hovercraft, or control traffic in a city, now is your big chance!

As well as exploring the technology that gets us around everyday, visitors will explore the way that travel has shaped the social fabric of our time. Visitors will also see new technology and get a glimpse of where our future is headed.

With over 17 exhibits detailing the incredible technology pioneered by humans to make the farthest reaches of our planet accessible, Going Places will be a wild ride!

VISITOR APPEAL

Going Places has been developed to engage children between the ages of 5 and 12, although the exhibition provides wonderful learning opportunities for all ages.

The exhibition covers many different aspects of transport, including the movement of people and goods, land, sea and air options and technological solutions that make transport possible and efficient. Going Places explores the physics and technology of transport, as well as looking at the choices people make when choosing their own personal mode of transport.

Significant opportunities exist for media exposure and sponsorship, due to the ubiquitous nature of transport solutions. Strong links to the school curriculum through science, technology and design enhance the relevance of Going Places for schools and other educational organisations.

going places

THE EXHIBITION

Going Places consists of 17 interactive science exhibits, eight supporting information kiosks and supporting set walls and equipment. The exhibition is modular in design and will fit into a space between 400 and 500 square metres depending upon available floor area. This exhibition is also bilingual in English and Spanish.

All the exhibits have been constructed with accompanying inbuilt, durable graphic panels that outline what the visitor needs to do and supporting science information.

Accompanying eight exhibits are interactive video kiosks, providing more information, interesting videos and other materials related to the exhibit. This gives inquisitive visitors both the answers to their questions and quirky facts relating to the exhibit or science concept.

KEY MESSAGES

1. The range and scope of inventions and technology that humans have developed to travel across the planet's lands, oceans and atmosphere is truly amazing. Visitors will observe, understand and use an incredible range of travel technology to see how it makes our lives easier and better.
2. Planet Earth presents many challenges for us to overcome in our travels. Visitors learn how its awesome size and natural processes, like gravity, wind, currents, waves, friction and changing landscapes are overcome by the ingenious designs, researched and developed over time. Visitors will appreciate the need for the continuing development of sustainable technologies for travel and living.

EXHIBIT DESCRIPTIONS

Entrance and virtual earth

Visitors walk into the exhibition through a real metal detector. Can you find your city on the three-dimensional Planet Earth? Rotate it and explore the world in miniature, and consider the amazing technology that enables us to explore the globe.

SCIENCE LINKS: Earth and space science, technology.

Flight simulator

Climb aboard the flight simulator and pilot a plane through the skies. There's more to it than simply turning left and right.

SCIENCE LINKS: Physics, technology.

Hoverdisk

Hop on board a hoverdisk and float across the floor. Learn about how the cushion of air allows hovercraft to travel across roads, sand, water and more.

SCIENCE LINKS: Physics, technology.

Rock the boat

Packing a cargo ship is not easy. Visitors will attempt to prevent capsizing while loading blocks onto a ship. Factor in centre of gravity, buoyancy and packing arrangements and get ready for some hilarious results!

SCIENCE LINKS: Physics, mathematics.

EXHIBIT DESCRIPTIONS

Luggage loader

Connecting the right luggage to the right people is a major challenge at airports. Test your own sorting and packing skills in this high-tech game and find out how using mathematics makes life easier.

SCIENCE LINKS: Mathematics.

Sit down

Take a seat in a whole range of scientifically designed seats. From the racing car that protects and supports drivers at high speeds, to functional and durable public transport options.

SCIENCE LINKS: Technology, biology.

Vehicle jigsaw

It's time to find out just how much fuel your V8 engine with 31 inch rims is using. Choose from aerodynamic profiles, engine and wheel types, then pit your car against the raceway to find out just how far you can go on a tank of fuel.

SCIENCE LINKS: Physics, engineering.

Recumbent racer

Which is best: recumbent or racer? Race a friend to find out which type of bicycle travels fastest up and down hills and how professional cyclists reduce their aerodynamic profile to get the fastest times.

SCIENCE LINKS: Physics, biology, exercise science.

EXHIBIT DESCRIPTIONS

Transport footprint

Just how much carbon do you produce in your everyday travels? Take the carbon challenge to find out what impact your travel is having on the planet and how some simple changes in your lifestyle can reduce your carbon footprint.

SCIENCE LINKS: Ecology, earth and space science.

Airship

Got that sinking feeling you'll never get a chance to see or fly an airship? Don't despair, as this fleet of airships are awaiting your instructions. Find out just how difficult they are to fly accurately, and why you might be seeing more of them in the future.

SCIENCE LINKS: Physics, technology.

Big engine

Bang! Rrrrrroar! That's the sound of a giant engine roaring to life. See how air and fuel are used to create thrust and why the modern engine is one of the cheapest and most efficient energy providers on the planet….for now.

SCIENCE LINKS: Physics, engineering.

Aeroplane mobile

Use your powers of discovery to get the giant aeroplane mobile to spin. Want a clue?
Solar technology is involved.

SCIENCE LINKS: Physics, green technology.

EXHIBIT DESCRIPTIONS

Land yacht

Sailing is not just for the seas. Try your luck at sailing a land yacht against perilous winds. Travelling downwind is easy – but can you sail into the wind? You will need to use angles, and of course, ingenuity.

SCIENCE LINKS: Physics, engineering, mathematics.

Virtual train controller

Can you get the most train passengers to the central station? By controlling the track intersections you must pick up the passengers and direct the train to the central station, before your opponent. But be careful not to crash into each other. The more passengers are dropped off the faster it goes so you must use quick reflexes to keep the trains running.

SCIENCE LINKS: Mathematics, engineering.

Design your city

How will future vehicles help us travel across our planet? Do you have an idea for the next big transport invention? What would your dream car look like? What about our future cities? How will they operate? We want your ideas!

SCIENCE LINKS: Technology and innovation.

Load the car

There always seams to be one bag that never quite fits in the car. Can you pack all the holiday gear into the boot? Find out who has the best spatial ability in your family.

SCIENCE LINKS: Mathematics, engineering.

EXHIBIT DESCRIPTIONS

Shifting steel

Did you know the same principles of moving people can also be used to move heavy objects? See if you can shift our heavy weight on nothing but air.

SCIENCE LINKS: Physics, engineering.

In addition to the 17 exhibits, the exhibition comes with eight information kiosks presenting videos, photographs and in depth information for visitors who want to know more about particular exhibits. Kiosks are provided for the following exhibits:

- Flight Simulator
- Land Yacht
- Aeroplane Mobile
- Big Engine
- Hoverdisk
- Rock the Boat
- Airship
- Recumbent Racer

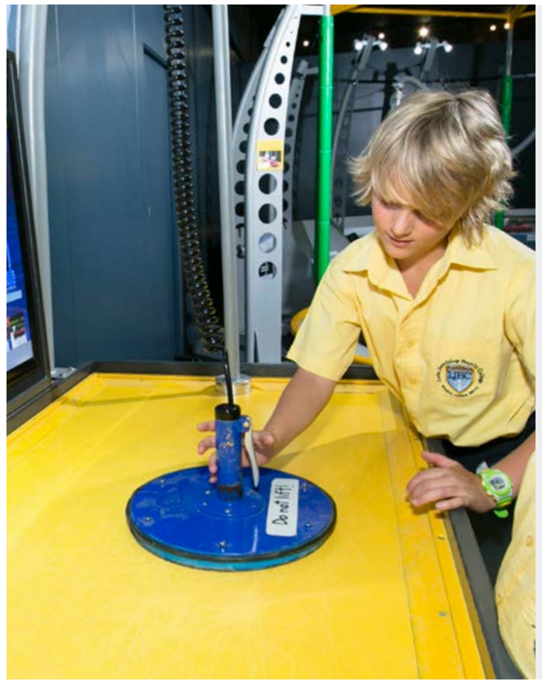


Image: Scribex

EDUCATIONAL RESOURCES

Going Places is accompanied by a School and Visitor guide to assist teachers and family groups visiting the exhibition.

The exhibition covers the following areas of science:

- Transport
- Technology
- Physics
- Innovation

Scitech will provide each venue with a sample program to run with visiting schools. Venues are free to use and modify this material to suit the curriculum in their area or the target audience, providing due acknowledgement is made to Scitech.

MARKETING

Going Places has been designed specifically for children aged between 5 and 12 years old although the subject material and exhibit content will have broad appeal for both younger and older audiences.

Scitech will provide the following marketing materials to help each venue promote the exhibition:

- Exhibition photos and videos (where available)
- Exhibition logos
- Example of media release
- Examples of advertising and promotional artwork

Going Places will tour to other venues free of any specific sponsorship agreements, enabling host venues to link with a wide range of sponsors for the local market.

LOWER PRIMARY SCHOOL WORKSHEET

How did you get here today? Did you catch a bus, travel by train or ride a bike?

Have a look around the exhibition to see technologies humans have used for travel, as well as what we might be seeing more of in the future. To complete the worksheet, find each pictured exhibit and have a play. Then answer the related questions. You may need to have a look at the graphic panels or use your problem solving skills.

Whole exhibition

1. Write down which exhibit:

- is powered by your legs? ______________________
- is full of helium? ______________________
- floats on a cushion of air? ______________________
- uses light to power it? ______________________

Big engine

2. Where would you find this type of engine? ____________
3. What makes this type of engine work? ____________

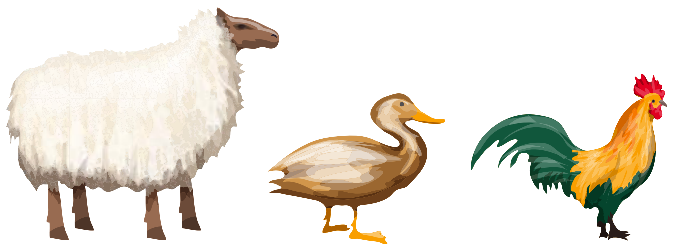
Bikes

4. Name one good thing about using bicycles as transport

____

5. Name one bad thing about using bicycles as transport

____



Did you know?

An ancient mode of desert transport is the camel! Their large hooves are useful for walking over soft sand without sinking.

Rock the boat

6. What force makes the loading blocks fall down?

____

Land yacht

7. When wouldn't the land yacht work very well?

____

Did you know?

The first known hot air balloon passengers were a sheep, a duck and a rooster.

LOWER PRIMARY SCHOOL WORKSHEET ANSWERS

Whole exhibition

1. Write down which exhibit:

- is powered by your legs? *Bicycles*
- is full of helium? *Airship*
- floats on a cushion of air? *Hoverdisk and/or Shifting Steel*
- uses light to power it? *Aeroplane Mobile*

Big engine

2. Where would you find this type of engine? *In a car, bus, motorbike etc.*
3. What makes this type of engine work? *Petrol, diesel, gas etc. (fuel).*

Bikes

4. Name one good thing about using bicycles as transport. *Possible answers: cheap, clean, fun, good exercise…*
5. Name one bad thing about using bicycles as transport. *Possible answers: slower, more difficult, can't go on some surfaces e.g. water or soft sand…*

Rock the boat

6. What force makes the loading blocks fall down? *Gravity*

Land yacht

7. When wouldn't the land yacht work very well? *When there is no wind, or when the terrain is unsuitable e.g. soft sand.*

UPPER PRIMARY SCHOOL WORKSHEET

Airship

1. What makes the airship float and why?

Aeroplane mobile

2. What makes the mobile spin?

3. Name four other ways you could use this energy resource.

Did you know?

The Spruce Goose was the biggest plane ever built, with a wingspan of nearly 100m. Its maiden and only flight took place in 1947, when it managed to fly at about 100km per hour for one minute.

Bikes

4. What powers bikes?

5. List two advantages of using bicycles as transport.

6. List two disadvantages of using bicycles as transport.

Land yachts

7. What makes the yachts move?

8. What limitations does that have?

Hoverdisk

9. What is making the disk hover?

10. What is the other exhibit that uses this method?

Vehicle jigsaw

11. Which frames are more aerodynamic?

Rock the boat:

12. Name two forces that affect the loading of a boat.

Did you know?

When Britain first started producing armoured combat vehicles around 1915, the name "tank" was chosen to so that people would think they were water tanks instead.

UPPER PRIMARY SCHOOL WORKSHEET

Airship

1. What makes the airship float and why? *Helium gas, because it is lighter than air.*

Aeroplane mobile

2. What makes the mobile spin? *Light shining on solar panels.*
3. Name four other ways you could use this energy resource. *Possible answers: solar panels to provide electricity for home or business, heating water, running a car, cooking, lighting a fire by magnifying the light, running a pump, running street lights etc…*

Bikes

4. What powers bikes? *Your legs. Bonus: The rider uses chemical energy from food they have eaten.*
5. List two advantages of using bicycles as transport. *Possible answers: cheap, clean, fun, good exercise…*
6. List two disadvantages of using bicycles as transport. *Possible answers: slower, more difficult, can't go on some surfaces e.g. water or soft sand…*

Land yachts

7. What makes the yachts move? *Wind pushing on the sails.*
8. What limitations does that have? *No wind equals no movement.*

Hoverdisk

9. What is making the disk hover? *It is blowing air out underneath so it floats on a cushion of air.*
10. What is the other exhibit that uses this method? *Shifting steel.*

HOW FAR WILL THE BALLOON TRAVEL?

EXPERIMENT 1

What to do

Introduction

The teacher explains that they will be building balloon racers.

The teacher...

1. builds two balloon race tracks.
   (lengths of string between two chairs)
2. builds one balloon racer – a balloon attached to a straw with masking tape.
3. puts the racer on the track start point, puts one puff into the balloon and ready, set, let's go!
4. measures the distance the balloon travelled.

What do you think would happen if you increased the amount of air in the balloon, the number of puffs? How much further do you think it would travel?

How do you think you could find out? – test it.

What things will you use? – balloons, twine, masking tape etc.

Task

The students will divide into groups and build 4 balloon racers. They will then race their balloons with different amounts of air in them and record the distance travelled. They will record estimates and actual distances.

Conclusion

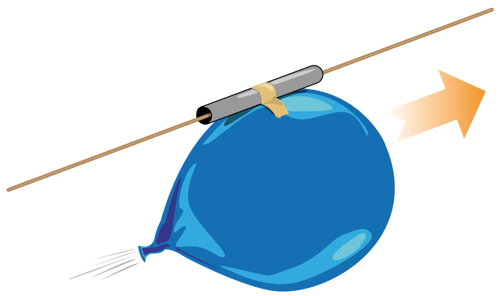
It goes further because there is more air in the balloon – more air pressure pushing it along. When the air is kept inside the balloon, the pressure on the balloon from inside is constant. When the air is released at the bottom the pressure on the inside of the balloon is greater at the top and the sides than the bottom and it is therefore pushed forward by the air inside.

Materials (per group)

- 4 straws
- 4 balloons
- 4 recording sheets

Materials (teacher)

- string / scissors
- 2 large tape measures
- 4 chairs
- masking tape



WORKSHEET

Name ______________________ Date __________

How far will the balloon travel?

____

____

How will I find out?

____

____

What things will I use?

____

____

What happened?

Amount of air	Estimate distance travelled (cm)	Actual distance travelled (cm)
1 puff		
2 puffs	`	
3 puffs		
4 puffs		

Why did this happen?

____

____

HOW FAR WILL THE CAR TRAVEL?

EXPERIMENT

2

What to do

Introduction

The teacher explains that they will be testing how far a car can travel.

The teacher...

1. puts a toy car on the table. How far do the children think it can travel? It will depend on how hard you push it. Teacher pushes car. You need to use a force to make it move.
2. holds the car up in the air and drops it. Gravity is the force which pulls it to the ground.
3. uses gravity to see how far the car can travel.

- Uses a book and a piece of cardboard to make a ramp.
- Places the car at the top of the ramp and lets it go.
- Measures how far the car travels.

What do you think would happen if you increased the number of books? Would the car travel further?

How do you think you could find out? - Test it, using more books,one more, then two, then three, then four...

What things will you use? - Books, cardboard, recording sheet, toy car, ruler.

Task

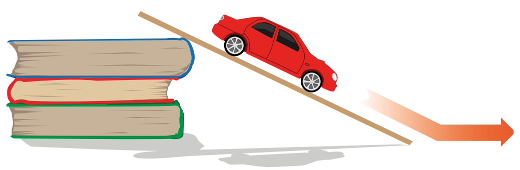
The students will divide into groups and measure how far their car travels when starting at the top of ramps of different height. They will record estimates and actual distances.

Conclusion

The higher the ramp, the further the car travels. Earth's gravity pulls objects to the ground. The higher the starting point of the car the greater the potential energy (stored energy) and the car travels further.

Materials (per group)

- 1 toy car
- 1 piece stiff cardboard
- (30 cm by 30 cm)
- 1 ruler
- 1 recording sheet
- 4 books the same size



WORKSHEET

Name ______________________ Date ____________

How will I find out?

____

____

____

What things will I use?

____

____

____

What happened?

Height of ramp	Estimate distance travelled (cm)	Actual distance travelled (cm)
1 book		
2 books		
3 books		
4 books		

Why did this happen?

____

____

ACTIVITY 1

HOVERCRAFT

Background Information

When substances rub together they seem to stick because of the friction between them. Friction between two solid materials is greater than friction between a solid and a gas.

The gas (air) from the balloon acts as a cushion between the Hovercraft and the table. This reduces the friction so the Hovercraft glides across the table.

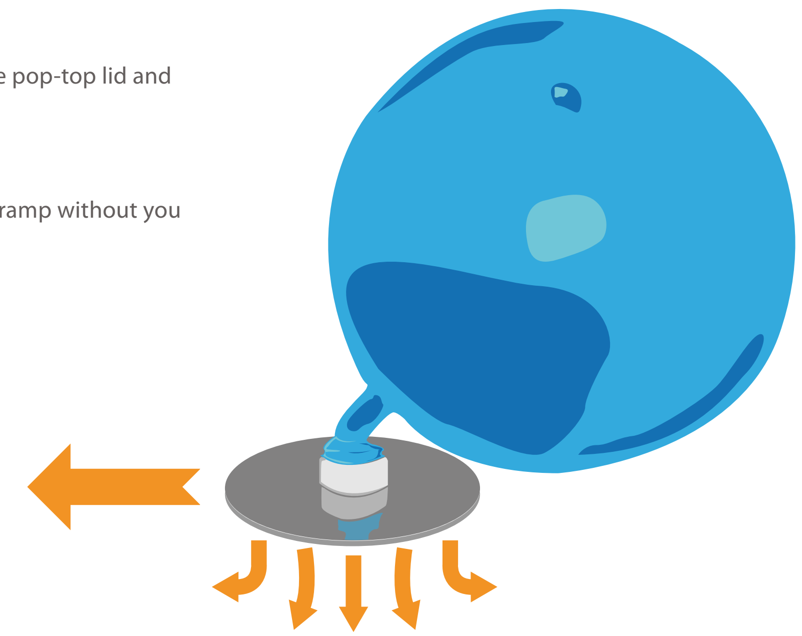
The escaping stream of air from the balloon provides the force needed to lift the Hovercraft and provides a cushion of air on which the Hovercraft floats.

Materials

- 1 CD
- 1 pop-top lid
- (available in bulk from
- Silverlock packaging)
- 1 balloon
- blutak

What to do

1. Place the CD on the table.
2. Place the pop-top lid over the hole in the CD and make an air tight seal between the pop-top lid and the CD.
3. Push the CD. What happens?
4. Blow up the balloon, attach it to the top of the pop-top lid and open the lid.
5. Again push the CD. what happens?
6. Can you design your hovercraft to move up a ramp without you touching it?



ACTIVITY 2

DESIGNING A MARBLE MAZE

Background Information

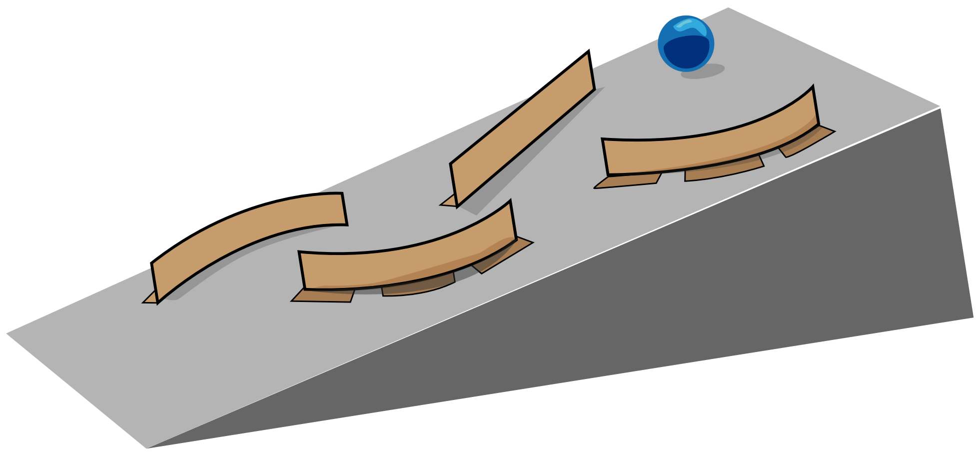
When substances rub together they seem to stick because of the friction between them. Gravity will pull the marble to the ground but the maze will slow its fall because of the friction between the cardboard and the marble and the angle of the chutes.

Materials (per group)

- 1 large sheet of thick
- cardboard (all groups must
- have the same size)
- Scissors
- Glue
- 1 marble
- Strips of thin cardboard
- Stop watch

What to do

1. Cut some strips into particular lengths.
2. Have the students hold the strips in various positions on a sloping board and roll a marble down the sloping board to see if the strips keep the marble on the board but also make a long and interesting path.
3. The strips should be placed in position by cutting and gluing them as shown below.
4. Encourage the students to make as many interesting pathways as they can to keep the marble from racing too quickly to the bottom.
5. Encourage the student to find an interesting place or way for the marble to finish.



ACTIVITY 3

ROLL-A-CAN RACING

Background Information

Rubbing one thing on another transfers electrons to the rubbing object - static electricity. This build up of electrons on the balloon means the balloon is negatively charged. The positively charged protons in the can are attracted to the balloon. The electrostatic force will pull the can along behind it.

Unlike charges attract, like charges repel. If you try placing two rubbed balloons next to each other, they will push each other away.

What to do

(The teacher may choose to demonstrate or let students explore.)

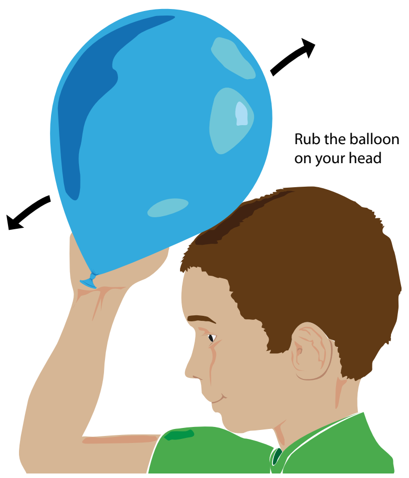
1. Place masking tape on the floor as a start and finish line.
2. Blow up a balloon.
3. Rub the balloon on hair/jumper.
4. Use the charged balloon to coax the can towards the finishing line, without the balloon touching the can.
5. Students race the cans without touching the cans at all.

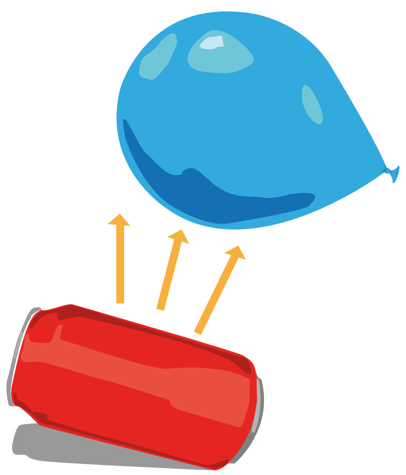
Materials (per student)

- empty soft drink can
- balloon
- your head with clean hair on it (or even a jumper or synthetic top)

Materials (for teachers)

- masking tape and flat floor (to mark start/finish line)
- empty soft drink can
- balloon
- your head with clean hair on it (or even a jumper or synthetic top)





ACTIVITY 4

CLIMBING MONKEY

Background Information

When substances rub together they seem to stick because of the friction between them. Gravity is pulling the monkey down to the ground but friction keeps the monkey climbing up the string.

What to do

1. Glue monkey onto a piece of card.

2. Colour and cut out the monkey.

3. Cut two 5cm pieces from the straw; attach them to the back of monkey as shown in diagram. Tie the weights onto the ends of the string.

4. Put a thumbtack into a pin board or some other vertical surface.

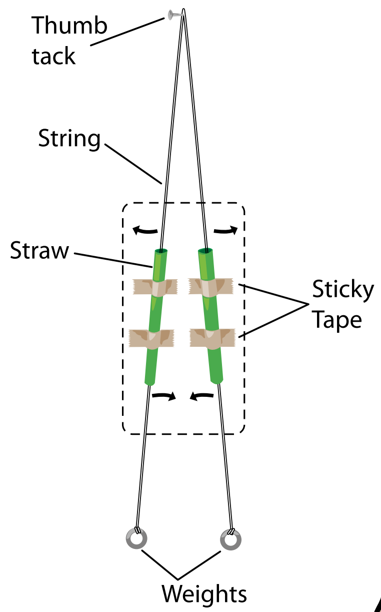
5. Thread the string through the straws and attach weights to the ends as shown in diagram.

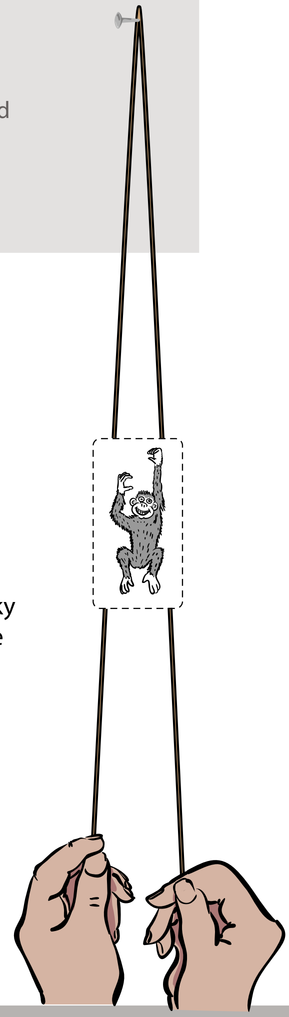
6. Make your monkey climb by pulling on the weights (first left and then right).

7. Bring the monkey back to the bottom by pulling on both weights at the same time.

Materials (per group)

- stiff card
- a drinking straw
- string
- sticky tape
- scissors
- two weights (modelling clay or washers)
- a thumbtack
- access to a pin board
- monkey template (see page 29)





INTERESTING FACTS

Parachutes: Leonardo Da Vinci designed one of the first parachutes in 1480- it was designed for people to be able to jump from burning buildings.

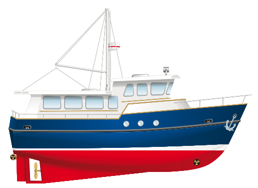
Hot air balloon: The oldest successful method of human flight. A sheep, a duck and a rooster were the first known passengers.

Zip wires / flying fox: Originally used to transport people and food across rivers and valleys in the Himalayas.

Hovercraft: One of the only forms of transport that can travel just as well over land, ice and water as it doesn't touch the ground - there is a cushion of air.

Boat: Boats have been used for thousands of years, the earliest ones being made from logs. Most modern boats have a streamlined shape to help them travel faster. Most owners name their boats Obsession is the most popular name.

Tank: Tracks help to spread out the weight on soft surfaces and increase the grip on rough and bumpy ground. The name 'tank' was used to make people think the army was transporting water tanks, rather than vehicles.



Glider: these are aircraft which fly or glide without using engines. A paper aeroplane is a simple example of a glider.

Plane: The biggest plane ever built has a wingspan of nearly 100m (It only flew once in 1947 and was nicknamed the 'Spruce Goose' as it was made from wood due to a shortage of aluminium). The Wright brothers built and flew the first plane in 1903.

Camel: Useful in the desert as they have large feet that don't sink into the sand and stores of fat in their humps. They can lose up to 25% of their body weight through sweating, which would kill most other animals. Australia has the largest wild population of one humped camels.

Snowmobile: Usually have tracks and skis to drive on snow and ice and are driven by a petrol engine - can be a pollution problem in the areas they're used.

Sledge/sled: Can just be pulled down a hill by gravity or can be pulled by animals like dogs or reindeer (red noses optional).

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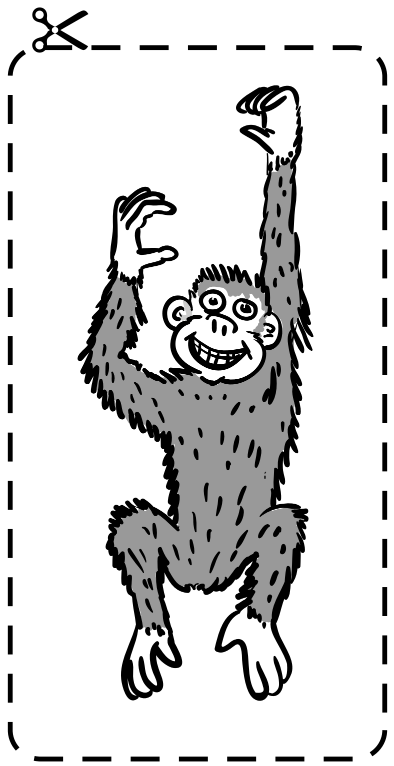

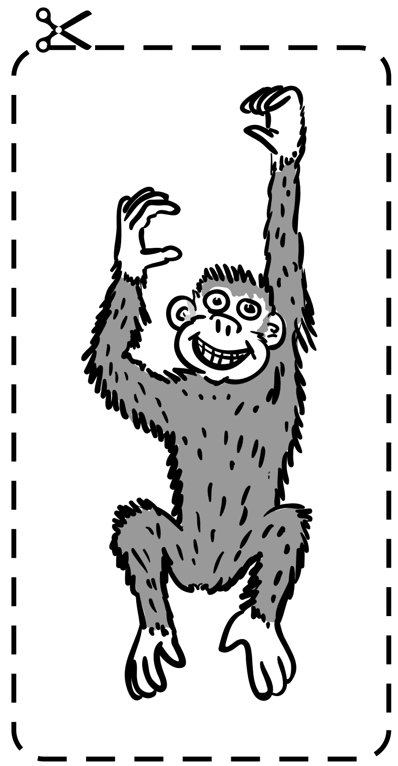

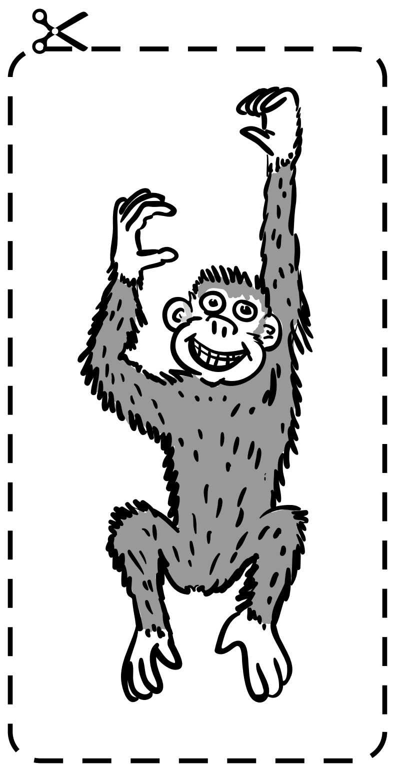

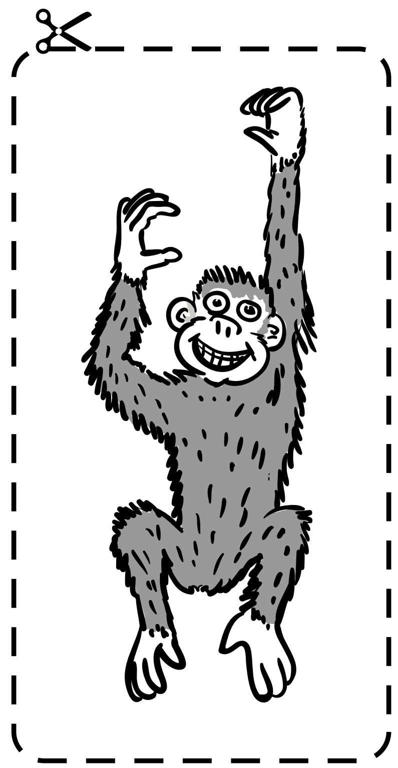


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