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? _______________________

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

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.
Airship
1. What makes the airship float and why?

Bikes
2. What powers bikes?
3. List two advantages of using bicycles as transport.
4. List two disadvantages of using bicycles as transport.

Land yachts
5. What makes the yachts move?
6. What limitations does that have?

Hoverdisk
7. What is making the disk hover?
8. What is the other exhibit that uses this method?

Vehicle jigsaw
9. Which frames are more aerodynamic?

Rock the boat:
10. 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.

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.
**UPPER PRIMARY SCHOOL WORKSHEET**

**Airship**

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

**Bikes**

2. What powers bikes? *Your legs. Bonus: The rider uses chemical energy from food they have eaten.*

3. List two advantages of using bicycles as transport. *Possible answers: cheap, clean, fun, good exercise…*

4. 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**

5. What makes the yachts move? *Wind pushing on the sails.*

6. What limitations does that have? *No wind equals no movement.*

**Hoverdisk**

7. What is making the disk hover? *It is blowing air out underneath so it floats on a cushion of air.*

8. What is the other exhibit that uses this method? *Shifting steel.*
**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.

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**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?

<table>
<thead>
<tr>
<th>Amount of air</th>
<th>Estimate distance travelled (cm)</th>
<th>Actual distance travelled (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 puff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 puffs</td>
<td>`</td>
<td></td>
</tr>
<tr>
<td>3 puffs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 puffs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Why did this happen?

________________________________________________________________________________________
**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.

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**HOW FAR WILL THE CAR TRAVEL?**

**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?

<table>
<thead>
<tr>
<th>Height of ramp</th>
<th>Estimate distance travelled (cm)</th>
<th>Actual distance travelled (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 book</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 books</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 books</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 books</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Why did this happen?

________________________________________________________________________

________________________________________________________________________
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.

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?

Materials

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

**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.

**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
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)
**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).