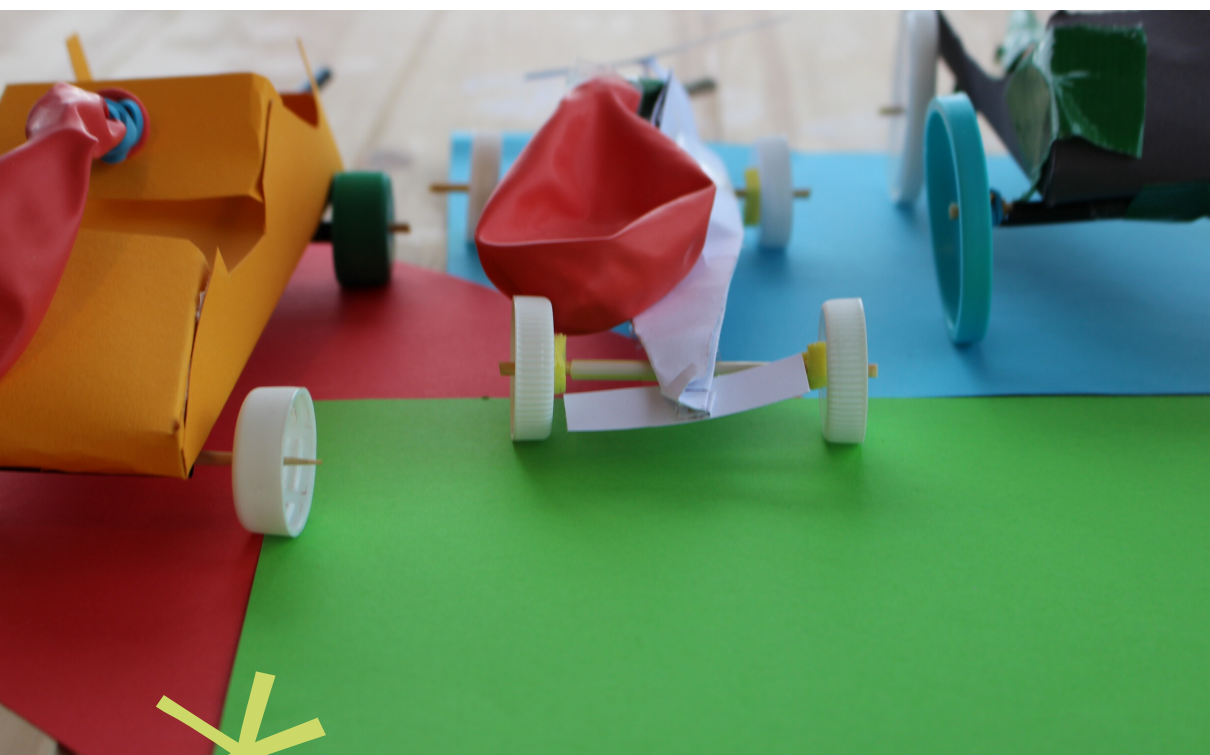




BALLOON POWERED CAR



BALLOON CAR

Lesson Design and make a balloon powered car

Subject: Social, environmental and scientific education

Strand: Energy and forces

Stand Unit: Forces

Working Scientifically:

- Questioning
- Observing
- Predicting
- Investigating and experimenting
- Estimating and measuring

Analysing:


- Sorting and classifying
- Recognising patterns
- Interpreting
- Recording and communicating
- results.

Lesson Objectives:

- o Design and build a moving car that's powered by air pressure.
- o Investigate forces and simple machines in particular wheel and axles.
- o Investigate Newton's Three laws of motion
- o Become aware of the relationship between force, mass and acceleration. Less mass greater the acceleration.
- o Describe what causes the balloon car to start moving. Action and reaction, as trapped air pushes car forward
- o Become aware of friction, resistance and air resistance to keep the car moving forward.



Introduction/Trigger Question


- Blow up a balloon but don't tie it, ask children what will happen if you let go of the balloon. Does the balloon move as the air is released? Point out to children that the balloon moves off in the opposite direction to which the air is being released.
 - Using a toy car to demonstrate that a force (push) is needed to get the car to move, point out that the car won't just take off on its own.
 - As students if they were designing a race car would they make it really big and bulky or small light and low to the ground? Explain reasoning behind choices.
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Background information

This activity allows students to develop their ideas about forces and motion, and simple machines. Newton's third law

$$\mathbf{F = m \ a}$$

For every action, there is an equal but opposite reaction. This means that, for every force pushing on an object, there is an equal but opposite force pushing back. The balloon pushes the air in one direction, and the air pushes back on the balloon to make it go in the other direction. If the gases are pushed out faster, this will produce more force to push the car.



- Mass
A lighter mass will speed up more quickly than a heavier mass if the same force is applied. A lighter car will speed up more quickly although too light and the car will tip forward with the force of the balloon.
 - Force
A larger force will cause an object to speed up more. For a balloon car it is good not to over stretch the balloon..
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INSTRUCTION GUIDE



1. Materials Needed

Wheels - bottle tops, plastic lids,
Straw - act as axle
Tape - duct tape is good
Scissors
Skewers
Ballon
Craft material - card, old bottles or car template
Nail - adult helper needed!



2. Getting Started

Wheel and Axle mechanism:
Decide roughly how wide the base of your machine will be. You don't need to make car yet but an idea of design is good!

Cut out two pieces of straw approximate width of base of design

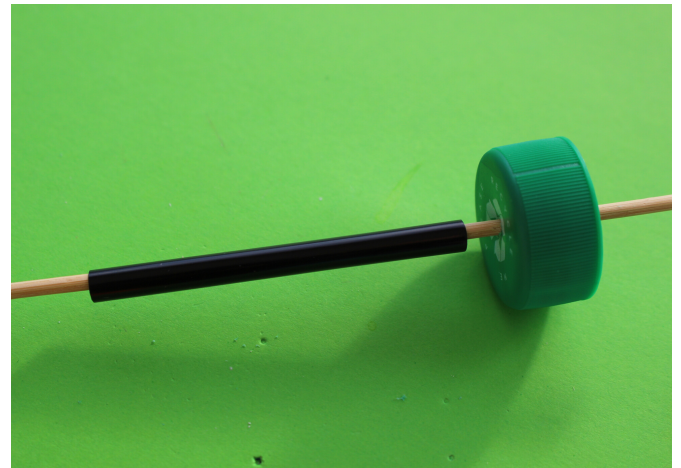


3. Gather Wheels

Decide what will be used to make wheels, Milk tops or bottle tops we find handy or card wheels.

ADULT HELP NEEDED:

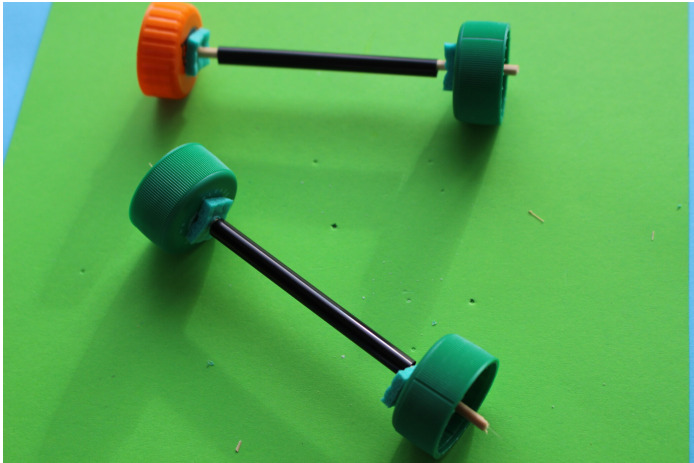
carefully make a hole in the centre using a nail or small knife.



4. Wheel and Axle

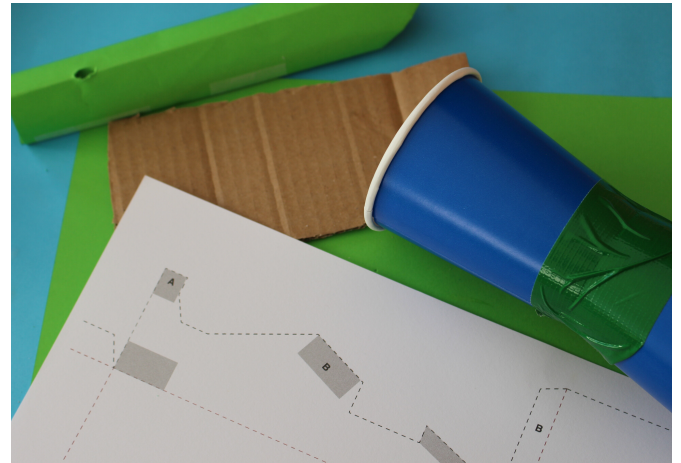
Push a wheel though pointy end of wooden skewer and then slip of a piece of straw. Add second wheel to the other end.

Repeat for second wheel and axle



5. Check Wheels

When you have completed two axles, check that the wheels are secure. Add glue or tape if wobbly!! Check that they can freely spin.



6. Car Design

Unleash your creativity and design a machine of your choice, tall, long, small like a rocket - it is up to you!



7. Attach Wheels

Add wheels and axle to your completed design. We normally just stick the axles underneath our machine...but you might try a different way! to your



8. Add an engine

How will you power this machine:

Secure a balloon to a straw using some tape - duct tape is strong. Add engine to car and make sure the ball the straw sticks out the back for escaping air.

Tip: we find shortening the straw a little makes for a more powerful engine

Troubleshooting Guide

Think Like an Engineer:

Science and engineering can involve a lot of problem solving and trial and error. It is really ok if the car doesn't work perfect on the first go. The most important bit is trying to figure out why and fix it.

Here are some tips:

- The wheels need to be able to freely rotate around the paper axle. Ensure that they are not too tight and pushed against the side of the car or cardboard. If the car doesn't function as a moving car with a push do not add the balloon until you have solved this.
- The car won't travel in a straight line or move at all if the wheels are wobbly. If this happens secure with a little tape or glue.
- If the air comes out of the balloon too quickly the car will just jump forward and not travel in a straight line. Experiment with how much to expand the balloon. The biggest inflated balloon does not always give the best results.
- If your car does move think how would you improve the design or what would you change to get it to travel further.

