Raft Building

How to make one

1. Cut your straws to 8cm long.
2. Make a frame with the straws for your raft Consider what would make a strong structure.
3. Wrap your foil square around the straw structure to create the bottom of the raft.
4. See how many 10g weights or pennies you can put in your raft until it sinks.
5. Use a combination of straws and foil to make and test out different structures.

How it works

An aluminium foil raft floats because it is more dense than water, therefore the surface tension of the water is able to hold the raft up.

What you'll need

Straws
Aluminium foil 10cm squares
Scissors
Trays
Water
Pennies

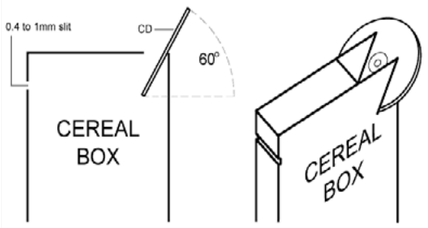
Spectrometers

How to make one

1. On the top of the box, measure in 4cm and make a mark.
2. Using the 90 degree edge of the set square, draw a guideline across the width of the box.
3. Cut along the guideline, then unfold the flaps you just made. Cut off the flaps.
4. Place the short edge of the triangle along the top edge of the box and draw a 7.5cm line towards the centre of the box. Using those lines as guides, cut two 7.5cm slits on both sides of the cereal box.
5. Flip the box over and do the same thing on the other side.
6. Slide the CD into the slits as shown
7. Now you're going to cut a rectangle out on the opposite long side of the box as shown. The rectangle should be the width of the box and 2.5cm high. The top of the rectangle should be about half an inch from the top of the box.
8. Take enough aluminium foil to cover the hole and fold it in half. place the creased side towards the middle of the hole and tape it in place.
9. Take a second piece of foil and cover the bottom half of the hole. You want to leave a gap between the two pieces of foil. This gap should be between 0.4 and 1mm. Too wide and the spectra gets blurry. Too narrow then not enough light gets in.
10. Tape the top of the box closed.

What you'll need

An old CD
Cereal Box (any size)
Scissors
Aluminum Foil
Sellotape
Set Square



Light sources to look at

If you want to look at the sun point your spectrometer to a white wall in sunshine or at some clouds instead. DO NOT LOOK DIRECTLY AT THE SUN.

- **Mercury Vapour Lamps**
- **Sodium Lamps**
- **Candles**
- **Fluorescent Light Bulbs**

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stem clubs activity sheet

STEM Clubs are a fun and rewarding way to boost enjoyment and enhance learning of Science, Technology, Engineering and Mathematics (STEM) . Why not try one of these fun activities at your STEM Club?

Fossil Rubbing & Identification

Fossil Rubbing

To get your very own fossil image you can make a rubbing.

1. Take your fossil and lay a sheet of paper over the top of it
2. With a side of the crayon rub over the fossil so that you can see the detailed image.
3. Then try using different colours, pressures and different textures such as chalk and black paper

What you'll need

Pictures of Fossils
Fossils
Paper
Crayons

Fossil Identification

Using your rubbing why not see if you can identify your fossil

- What kind is it?
- How old do you think it is?
- How was it formed and what kind of rock would it be found in?
- Where might you find it?

Squeeze Rockets

How to make one

Take a 500ml sports drinks bottle, remove the insert from the lid and press in a length of straw. Construct a rocket made from a closed cylinder of paper and slide it over the end of the straw. Squeeze the bottle sharply and see how far you can fire the rocket.

Suggestion

Try out different designs of rocket to see which goes the furthest; measure the trajectory and have a leader board.

What you'll need

500ml plastic drinks bottles
Sheets of paper
Straws

How it works

While you're having fun launching rockets, you're actually learning about Newton's Third Law of Motion. According to Newton, for every action there is an equal and opposite reaction. As you squeeze the bottle, air is forced out of the tube and pushes against the rocket. The resulting force causes the rocket to "launch" through the air.

Engineering Hand

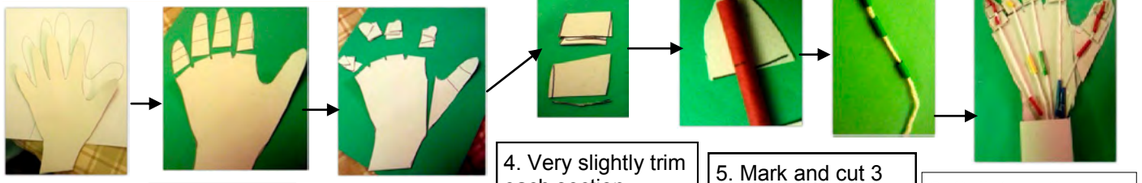
How it works

The engineering hand shows you how pulling on the straws replicates the movement of our own hands. Why not investigate how this works? Try pulling different strings and find out what this means for your own hands.

What you'll need

- Sheets of card
- Straws
- String
- Scissors
- Sellotape
- Pencils
- Paper

How to make one



1. Draw around your hand on a piece of card. Cut out 2 copies of the hand shape.
2. Cut the fingers and thumb off one of the card hands. Then mark sections for the knuckles on the fingers.
3. Cut the sections of the fingers and thumbs, making sure you keep the parts of each finger and thumb together.
4. Very slightly trim each section (approx. 1mm). Stick the 3 sections in the correct place on your second hand. There should be a small gap between each section.
5. Mark and cut 3 pieces of straw that measure slightly less than the 3 card sections (these will be your bones). Cut a 4th piece of straw about 2cm long.
6. Sellotape the end of 1 length of string onto the back of the thumb and loop the string over the tip of the thumb.
7. Thread the straw cuttings through the length of string attached to the thumb. First the top bone, then 2nd bone, the 3rd bone and then the 2cm cut straw.
8. Sellotape each straw cutting onto the appropriate section. The 2cm straw should be positioned on the back of the hand, close to the wrist (the carpal bone section)

To add a wrist...
Cut a strip of card, 5cm wide and 12cm long. Stick the short ends together to make a tube. Stick this to the hand and push the string through the tube.

Plasma Ball Powered Light

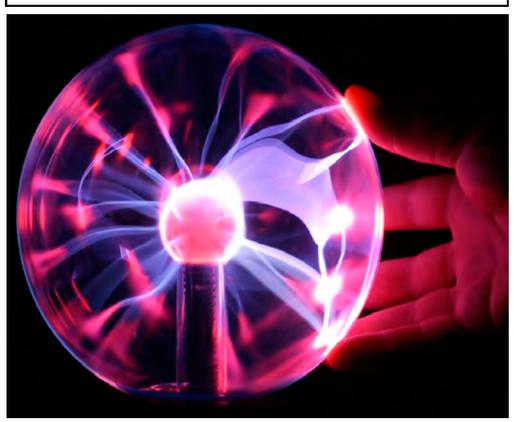
How it works

Hold the light bulb next to the plasma ball, it should glow! Try making a circuit by having the first person put their hand on the plasma ball, with the other hand hold the light bulb out so that a friend can grab the other end of the bulb.
Important: Be sure that the only thing your friend is touching is the light bulb

Be very careful with the light bulb and make sure you have insulated rubber soled shoes.

What you'll need

- Plasma Ball
- Florescent Light Bulb



What is going on?

The Plasma Ball is powered by a Tesla Coil. The Tesla Coil emits a high frequency / high voltage electromagnetic field. This energy causes nearby gasses to glow. The plasma ball is filled with special gasses which allow you to see purple streamers. The florescent light bulb has gas in it as well. So, when the light bulb is close enough to the Tesla Coil, the gas inside the bulb will begin to glow.

Tornadoes in Bottles

What you'll need

- 2 x1 litre plastic drinks bottles
- Water
- Bowl or other container
- Stopwatch to record times
- Duct tape
- Metal washer
- Pitcher

How it works

If you've ever watched the water drain from the bath, you've seen a vortex. A vortex is a type of motion that causes liquids and gases to travel in spirals around a centre line. A vortex is created when a rotating liquid falls through an opening. Gravity is the force that pulls the liquid into the hole and a continuous vortex develops.

Tip...
Try adding washing up liquid, glitter, food colouring or paraffin to see the different effects of the vortex

How to make one

1. Fill a one-litre bottle to the top with water.
2. Find a metal washer that fits flush (or as close as possible) onto the mouth of the one-litre bottle.
3. Place another empty one-litre bottle on the water-filled one-litre bottle so that the washer sits in place between the two.
4. Use duct tape to tape the two bottles and washer in place. Make sure that the connection is as sturdy as possible and that the duct tape does not allow any bending.
5. Turn the bottle over so that the filled bottle is on top and swirl the water. The water will form a vortex and drain into the other bottle. You can do this as much as you want without refilling it!

Stretchy Snakes

Stretching Jelly Snakes

1. Measure your jelly snake by placing it on the graph paper and drawing a line along its length.
2. Gently stretch the snake as far as possible until it breaks
3. Measure the length of the stretched snake, including the broken piece.
4. Think about other possible variables and predict how this might affect the stretchiness of the jelly snakes.

Why not try different variables

Test each variable in the same way, try different types of jelly snake, snakes trimmed to the same length, snakes heated for a period of time, snakes cooled and snakes soaked in water.

What you'll need

- Jelly Snakes
- A3 size graph paper