THE BLANDFORD SCHOOL

Year 7 & 8 Science Club

6 C 12.0107 CARBON

$E=mc^2$

AT HOME!

Equipment list:

- ✓ Small plastic cups or glasses
- ✓ Absorbent paper towels (single sheets cut in half)
- ✓ Food colouring in primary colours
- ✓ Water

Method:

1. Place 7 cups in a row and pour water in the 1st, 3rd, 5th, and 7th cup. Around ¾ or more full.

2. Add 5 drops of red food colouring to the 1st cup and the 7th cup.

3. Add 5 drops of yellow food colouring to the 3rd cup.

4. Add 5 drops of blue food colouring to the 5th cup.

5. Take a half sheet of paper towel and fold it in half lengthwise and in half again lengthwise.

6. Trim off some of the length so that there isn't too much excess paper towel that will stick up in the air between each cup. This will make the water walk more quickly.

7. Place one half of a rolled paper towel in the 1st cup and place the other half in the cup next to it. Then another paper towel from 2nd cup and into the 3rd cup. This continues until you have placed the last paper towel that drapes over from the 6th cup to the 7th cup.

8. Stare at the cups and watch what starts happening. You should quickly be able to see the coloured water begin to crawl up the paper towel.

Keep checking back every couple of minutes. Soon you will be able to see that the water has crawled all the way up the paper towel and is beginning to walk back down into the empty cup next to it.
Since the cup on either side of an empty cup has coloured water in it, the two colours begin to mix in the empty cup. So cool! Keep coming back and observe what is happening.

https://funlearningforkids.com/rainbow-walking-water-science-experiment-kids/

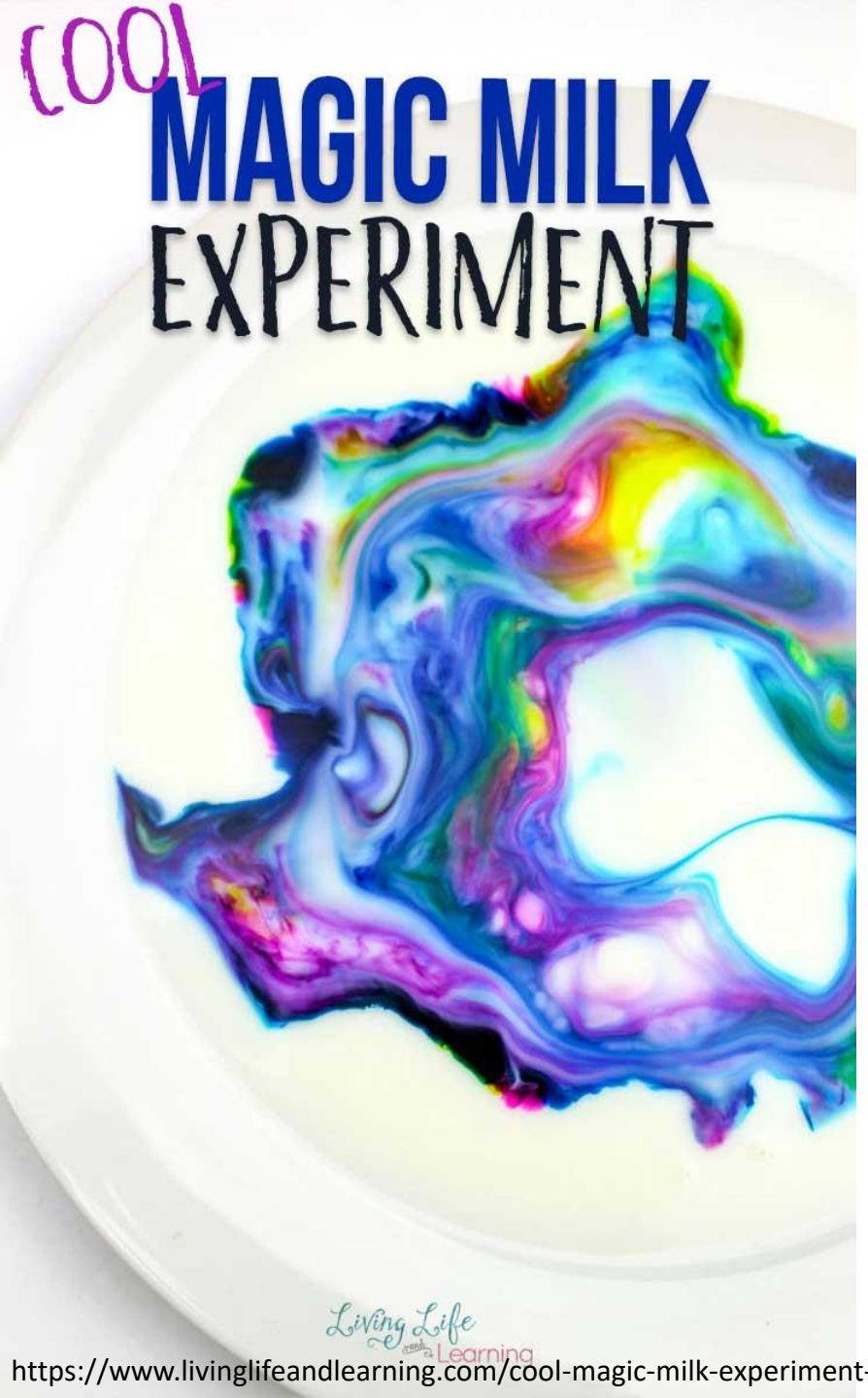
How this Science Experiment Works

The water moves up the paper towels through a process called capillary action. The paper towel is made from fibres and the water is able to travel through the gaps in the fibres.

The gaps in the paper towel act like capillary tubes and pull the water upward. This is what helps water climb from a plant's roots to the leaves at the top of the plant or tree.

The water is able to move upward against gravity because of the attractive forces between the water and the fibres in the paper towel.

https://funlearningforkids.com/rainbow-walking-water-science-experiment-kids/



Equipment list:

- ✓ milk (preferably room temperature),
- ✓ some food colouring,
- ✓ cotton swabs
- ✓ dish soap
- ✓ a shallow bowl or plate with a lip to hold the milk.

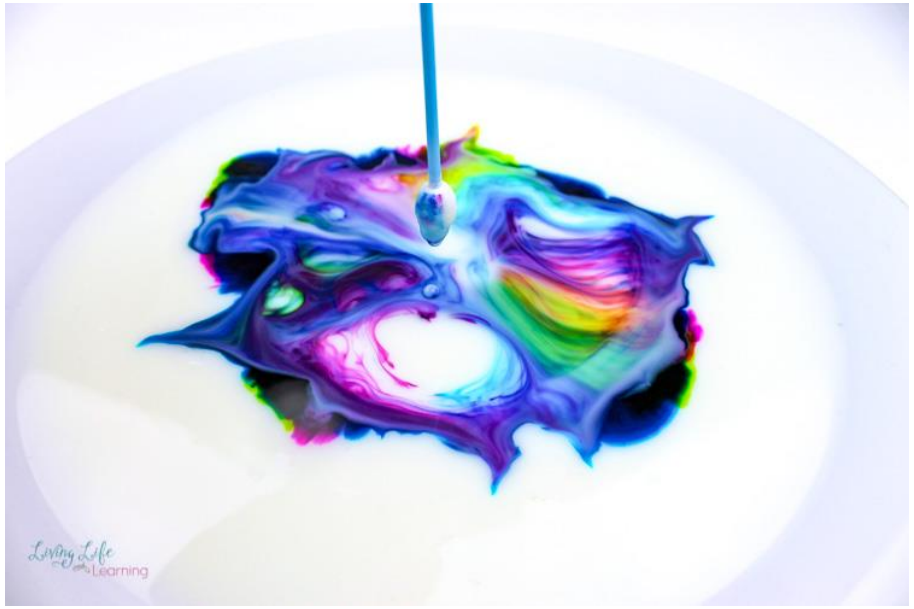
Method:

- Add the colours to the milk, they kind of "sit" on top of the milk. They might slowly spread through it, similar to paint spreading on paper. They are held by the water tension in the milk, on the surface. So at first, it looks like not much happens.

- Adding the dish soap to the milk in the magic milk experiment causes the colours to swirl. When you add the dish soap, that's when things start moving — literally! The soap causes a chemical reaction that makes the colours mix together and moves around in the milk. In fact, it's not really the colours moving, but the food colouring that allows us to see the chemical reaction between the soap and the milk fat.

https://www.livinglifeandlearning.com/cool-magic-milk-experiment-you-have-to-try.html

What happens in the Magic Milk Experiment?



The soap lowers the surface tension of the milk, allowing the colours to mix and move about more freely. So for a bit, you'll see everything move around and swirl, before finally settling. It's a lot of fun to watch!

At the end of the magic milk experiment, the colours are all mixed together and settling to the bottom.

The soap reacts with both the proteins in the milk and the milk fats themselves. When the soap and proteins interact, the soap makes the proteins change shape, sending them swirling, which in turn makes the colours swirl about.

And the soap and fat want to join together in pockets called "micelles" (similar to how soap lifts the grease off your dirty pans!), so that also causes movement.

https://www.livinglifeandlearning.com/cool-magic-milk-experiment-you-have-to-try.html

Method:

- Fill the bag full of water and make certain that there are no holes or leaks anywhere to be found.
- Once you have the bags inspected and filled with water, it's time to start sticking in the sharpened pencils and not letting any of the water out.
- The key is to have the water bag held tightly at the top with two hands by the first person while the second person inserts the sharpened pencils straight through, no crazy angles allowed.
- Repeat the same pattern over and over again with more and more pencils. How many can they actually get in the bag before it pops?
- Once they're done adding in all the pencils and they find out that it didn't burst, have them start to pull out the pencils one by one to see the water start to instantly gush out! (This is where the water tray comes into play!)

Equipment list:

- Ziploc/Storage Bags
- Sharp Pencils
- Water
- Water Tray (just in case) or perhaps do this outside!

https://www.funwithmama.com/water-in-a-bag-pencil-experiment-water-experiment-for-kids/

Mouldy bread experiment

Equipment list:

- Plastic sandwich/ freezer bags
- Bread
- Water
- Various Additives (eg sugar, vinegar, oil, and salt.)
- Warm location

https://www.lifewithmoorebabies.com/2017/07/growing-and-preventing-mold-science.html

***Please Do NOT open the bags of mouldy bread! Once the experiment has finished just throw them out without opening!

1. Start by preparing your supplies. You need one bag per piece of bread, so perhaps a plain piece of bread, a bread with water added, one with vinegar, one with salt, one with sugar, and one with oil. That would be 6 bags, all labelled. For the salt and sugar dissolve 2 teaspoons in 2 tablespoons of water and add that to the bread.

3. Then take each slice of bread and place it in the appropriate bag.

4. Location is key for this experiment to work. It has to be warm or your mould will grow very slowly if it grows. Try near a large window where the afternoon sun shines in. Or a warm, interior cupboard.

5. Tape bags of bread in your selected location, so they will all have a similar exposure to the heat.

6. Watch daily and document any growth.

Instant ice!

Equipment list:

- Bottled water
- Glass or ceramic bowl
- Plastic tray or shallow metal cookie sheet
- Ice cubes
- Freezer

Method:

- Put water bottles in the freezer for two hours. (You might want to set a timer to remind you to get them out!) Lay them on their sides for the best results, but try not to dent them.
- Remove the water bottles from the freezer before they freeze. (You'll know they're ready when crystals form when you jostle the bottles.)
- Place a ceramic bowl upside down on a flat surface (like a tray) to catch the water overage.
- Place an ice cube on top of the pouring surface.
- Then SLOWLY pour while instant ice forms!

How It Works

This simple but amazing experiment is more than just a cool one. The science behind it lies in the freezing temperature of water and how ice crystals form. This is also referred to as Supercooled Water or Flash Freezing. When the freezing temperature is reached, the water molecules freeze by forming ice crystals.

Why did we put an ice cube on top of the bowl? Because it's easier for the water molecules to turn to ice on top of already-formed crystals. As the ice crystals build on existing ice crystals, they eventually freeze the entire bottle of water.

The process of starting the ice crystals is called "nucleation." This starts from an impurity or scratch or piece of dust on the container holding the water. In this case, the water bottle. One ice crystal attaches to the imperfection, and the others grow on top. Isn't science cool?!

https://onlypassionatecuriosity.com/instant-ice-science-experiment-for-kids/

Lava lamps

Method:

- Fill the glass with 1 to 2 inches of water.
- Add your favourite food colouring.
- Fill the rest of the glass with oil but stop at about 1 inch from the top so that it won't bubble over.
- Drop an antacid tablet into the mixture and watch!

Ideas:

- *Try using different sizes of alka-seltzer tablet.*
- *Try using different types of oil.*
- *Try mixing the different types of oil to get your favourite "lava" flow.*

Equipment list:

- water
- oil (eg vegetable oil or baby oil)
- food colouring
- Alka-seltzer or similar effervescent tablets
- Tall glass or bottle

How does it work?

Alka Seltzer tablets contain 3 ingredients: aspirin (pain killer), sodium bicarbonate and citric acid.

When dropped into water, sodium bicarbonate and citric acid combine to form sodium citrate, carbon dioxide, and water.

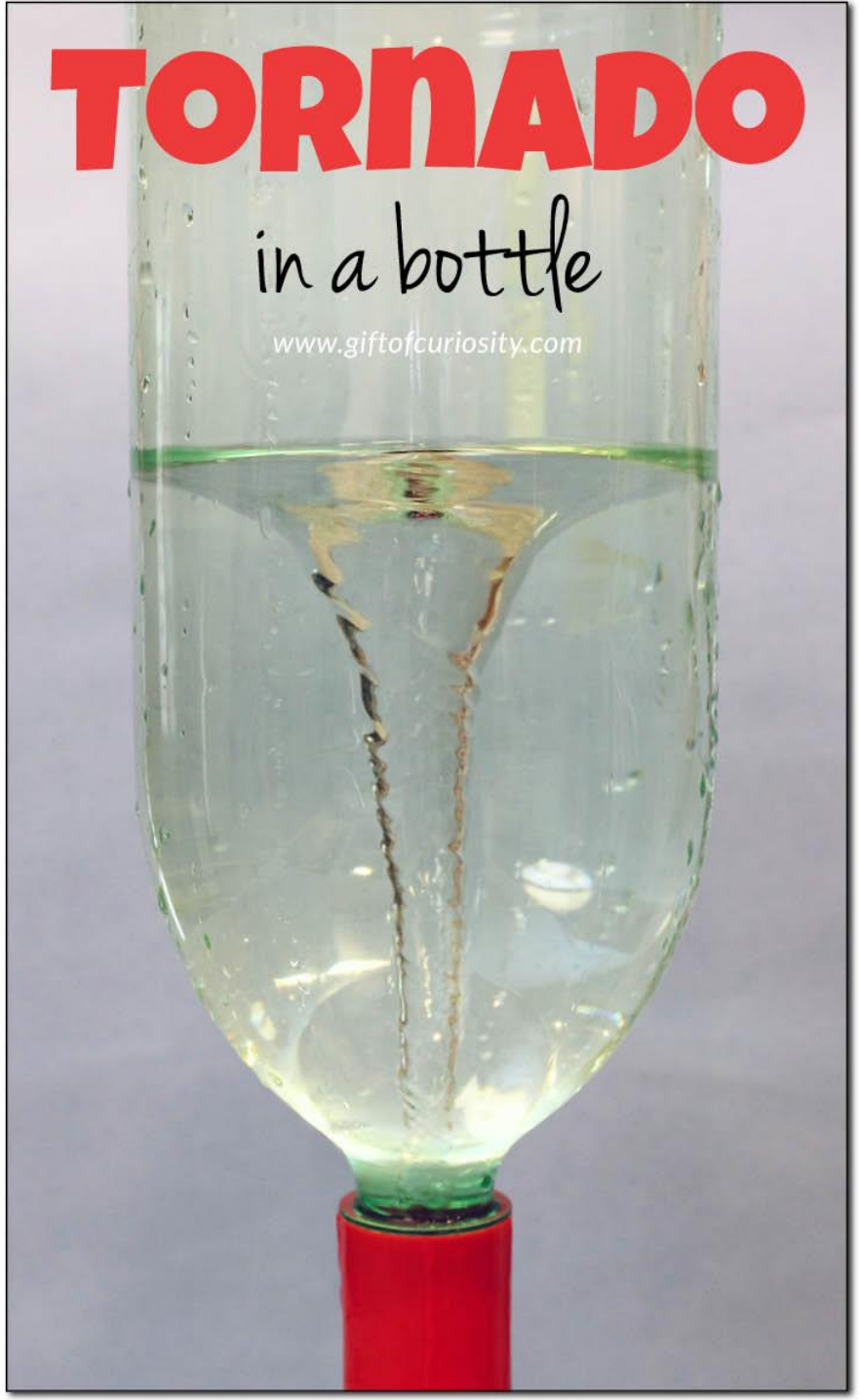
This sodium citrate can neutralize stomach acid and this is why alka-seltzer is an antacid medicine.

During this process, carbon dioxide is created. Because carbon dioxide has a lower density than water, it forms bubbles and flows to the top taking some dyed water along with it.

When the bubbles burst, the blobs of coloured water sinks back to the bottom because it has a higher density than oil.

This goes on until all the ingredients in the tablet are used up.

https://www.rookieparenting.com/the-best-homemade-lava-lamp-density-experiment/



Equipment list:

- 2 empty 2-litre bottles
- A short tube that will fit the neck of both bottles

Method:

Fill one 2-litre bottle about 3/4 full with water.
Next, attach the tube to the top.
Then attach an empty 2-litre bottle to the other end of the tube

To make a tornado, you then simply need to turn the bottles over and give them a little circular shake.

https://www.giftofcuriosity.com/make-a-tornado-in-a-bottle-extreme-weather-science/

Skittle diffusion

https://www.coffeecupsandcrayons.com/skittles-candy-science-experiment/

Equipment list:

- Skittle sweets
- water
- Shallow dish/plate with a lip that can hold the water

Method:

- Pour a little bit of water into a dish and add a couple of Skittles. Immediately you can start to see something happen.
- Skittles are pure sugar so they dissolve in water. The Ss on the top start to dissolve and float to the top first, but it happens quickly so if you walk away you may miss it.
- As the colour coating starts to dissolve the colours begin to mix together.
- Try and make different patterns!
- *You can also do this experiment with M&Ms- what happens to the letter M on them?*

https://www.aliceandlois.com/kids-cloud-science-project/

Equipment list:

- Glass Vase
- Shaving cream
- Blue food colouring
- Dropper

Cloud model

Method:

Step one: Fill the vase ¾ full of water.

Step two: Fill the top of water with white foamy shaving cream.

Step three: Mix a separate bowl of water and food colouring. Using a dropper, start adding the coloured water to the shaving cream.

Step four: Watch the cloud hold the coloured water until it becomes too heavy and the coloured water starts to rain!

Water movement in plants

Equipment list:

- 1 Cabbage (or Celery)
- At least two clear containers
- Food colouring in several shades
- Water

Method:

- Slice the cabbage from the stalk. Place at least one large piece of cabbage (stalk included) into each container.
- Pour water into each container.
- Add a few drops of food colouring to each container. Use a different colour in each.
- Wait!

https://itsysparks.com/cabbage-water-movement-experiment/

What is happening?

Plants like cabbage and celery have tubes in them called xylem that allow them to pull water from the ground and move it up through their leaves. So, when you put cabbage in water with food colouring in it, you'll get to actually see the water's movement from the stalk up through the leaves.

This has the added bonus of colouring the xylem within the plant so you can see the path water takes through it.

https://sciencing.com/osmosis-experiments-gummy-bears-10042742.html

Gummy bear osmosis

Equipment list:

- Gummy bears or similar (Haribo tangfastics work well!)
- Glass/ beakers
- Water
- Salt

Gummy Bear Experiment: Tap Water

The first experiment involves soaking your gummy bears overnight in plain water. Prior to soaking, have your student measure the height, width, and depth of the gummy bear, and record this information. Place the gummy bears in cups of water – one per student – and set aside. Then discuss hypotheses – what do the students think will happen to the bears? The next day, the bears will have swollen, as water moved by diffusion through the bear's semi-permeable membrane to reach an isotonic state where the concentration of water molecules inside and outside the bear were the same. The students should measure the bears again and use their before-and-after data to calculate the percentage of growth.

Gummy Bear Experiment: Salt Water I

Conduct the same experiment, this time soaking new gummy bears in salt water. Again ask your students to predict the outcome: Will the addition of salt change the outcome of the experiment in any way? Your students may be surprised at the results. New gummy bears soaked in salt water will shrink, but imperceptibly so. The bears' gelatin construction will cause it to hold its shape and size, for the most part, even when water leaves the bear.

Gummy Bear Experiment: Salt Water II

Soak the original, water-expanded gummy bears from your first experiment in salt water, and ask your students to predict the outcome. The bears will shrink as osmosis causes water to leave the gummy bear.

Equipment list:

- Glass
- Fizzy water or lemonade
- Raisin

Find out why…?

Method:

Place a raisin in a glass of fizzy water or lemonade and watch what happens!

Equipment list:

- Bottle of coke
- Mentos sweets

DO THIS EXPERIMENT OUTSIDE AND BE CAREFUL!

Find out why…?

Method:

Place some mentos sweets in a bottle of coke-

Equipment list:

- Cherry tomatoes
- Glass of water
- Glass of heavily salted water

Find out why…?

Method:

Place one cherry tomato in the glass of water, and the other in the salted water. Leave for a while- what happens?

Equipment list:

- Bowl of water
- Pepper
- Washing up liquid

Find out why…?

Method:

Sprinkle pepper onto the surface of the bowl of water. Add a drop of washing up liquid carefully to the middle- what happens?

Red cabbage indicator

Equipment list:

- Red cabbage – chopped
- Water
- A saucepan
- A sieve
- Cups or small containers
- Different substances to test – baking soda, vinegar, lemon juice and lime juice all work well.

Method:

1. Place the chopped cabbage into the pan and cover with water.
2. Simmer for 10 minutes.
3. Sieve the water and cabbage into a jug – you will notice that the cabbage liquid is very purple in colour.
4. Leave to cool for about 30 minutes.
5. Add a small amount of each test substance to a separate cup or container, try to keep the amount of test substance the same. Add some of your red cabbage indicator and see what happens! What happens when it is added to vinegar (an acid)? What about adding it to water (neutral)? What about washing powder (alkali)?
6. What else can you test? How about: • orange juice • cream cleaner • soap • lemon juice • cream cleaner

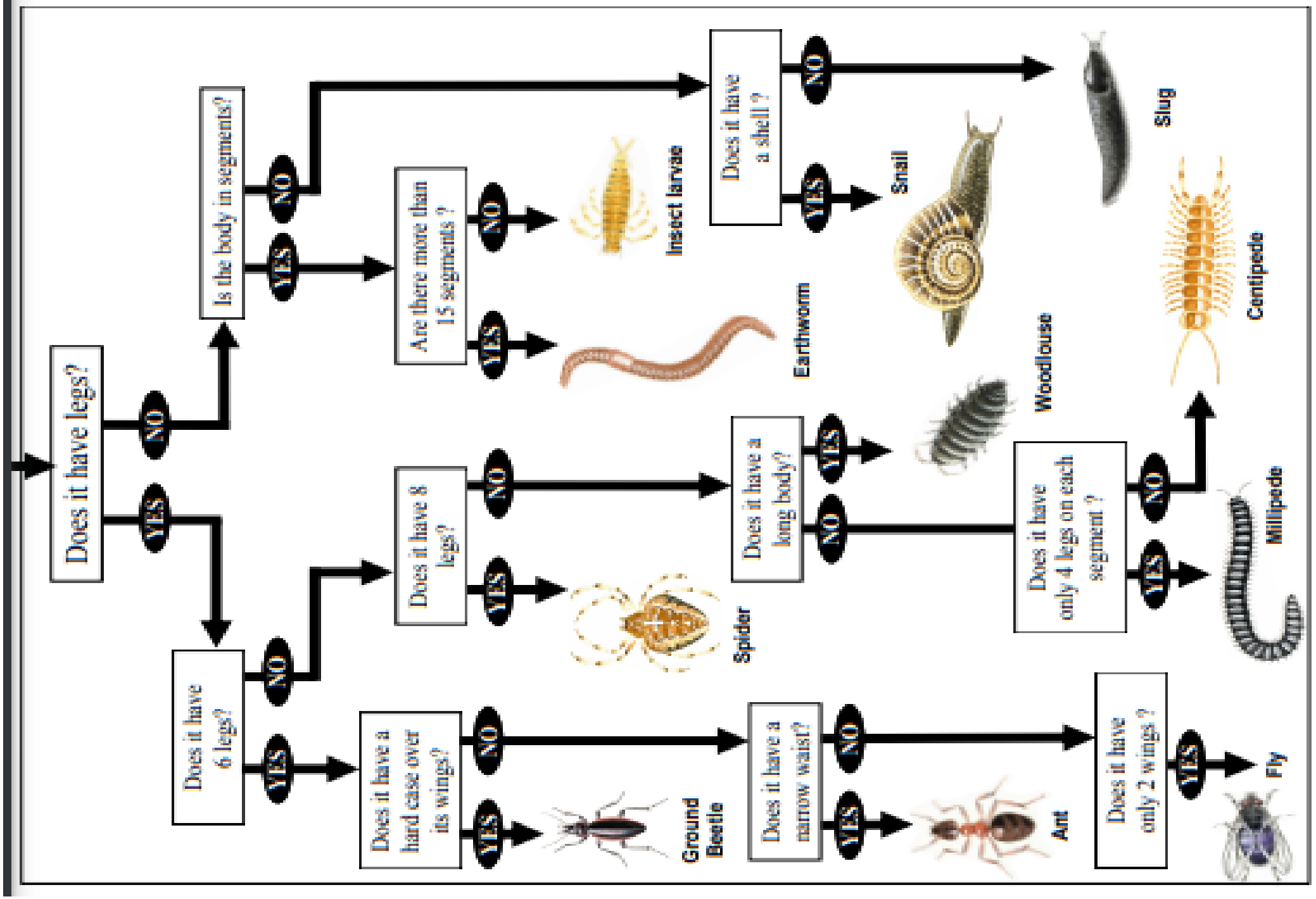
Blind spot test

- Set up your page with the following two symbols, roughly 10cm apart:

- Cover your right eye and stare at the cross. Move your page slowly towards your eye; at a certain distance, the dot will vanish!
- This is your “blind spot”; where your retina joins with the **optic nerve**. You can’t see anything here: your brain just fills in the gap!

Bug hunt!

Use the key to identify as many bugs as you can!



PRACTICAL NAME: ALKA SELTZER ROCKETS

Equipment

- Film canister with a snap-on lid.
- Soda
- Alka-Seltzer® tablets
- Empty paper towel roll (the cardboard tube) or a similar-sized plastic tube
- Duct tape
- Paper towels for clean up (you already know that this one is going to be good!)
- Water
- Watch or timer
- Safety glasses!

Method

The Amazing Alka-Seltzer Rocket

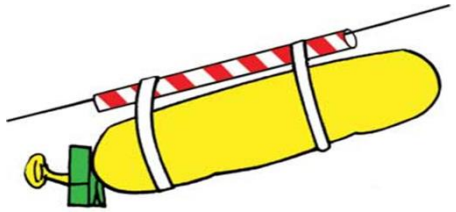
- Put on your safety glasses.
- Divide an Alka-Seltzer tablet into four equal pieces.
- Fill the film canister one-half full with water.
- Get ready to time the reaction of Alka-Seltzer and water. Place one of the pieces of Alka-Seltzer tablet in the film canister. What happens?
- Time the reaction and write down the time. How long does the chemical reaction last? In other words, how long does the liquid keep bubbling? Why do you think the liquid stops bubbling? Empty the liquid in the film canister into the trash can.
- Repeat the experiment OUTSIDE, but this time place the lid on the container right after you drop in the piece of Alka-Seltzer. Remember to start timing the reaction as soon as you drop the tablet into the water. Stand back! If you're lucky, the lid will pop off and fly into the air at warp speed! Write down your observations.

Scientific explanation

Carbon dioxide gas builds up so much pressure the lid is forcibly launched. With an Alka-Seltzer tablet, the CO_2 is produced as a result of a chemical reaction.

The fizzing you see when you drop an Alka-Seltzer tablet in water is the same sort of fizzing that you see when you mix baking soda and vinegar. The acid mixes with the sodium bicarbonate (baking soda) to produce bubbles of carbon dioxide gas. If you look at the ingredients of Alka-Seltzer, you will find that it contains citric acid and sodium bicarbonate (baking soda). When you drop the tablet in water, the acid and the baking soda react to produce carbon dioxide gas. The gas keeps building up until finally the top pops off. The lid of the canister is the path of least resistance for the gas pressure building up inside, so it pops off instead of the stronger sides or bottom of the canister bursting open.

We can thank Sir Isaac Newton for what happens next. When the build up of carbon dioxide gas is too great and the lid pops off, Newton's Third Law explains why the film canister flies across the room: for every action there is an equal and opposite reaction. The lid goes one way and the film canister shoots out of the tube in the opposite direction.



PRACTICAL NAME: BALLOON ROCKETS

Equipment

- Balloons
- Sellotape
- Straws
- Paper clips
- Cloth pegs
- Card
- String/Fishing Line
- Scissors

Method

1. **Blow up the balloon and use a peg to secure the end of the balloon.**
2. **Sellotape the balloon to the straw and sellotape paper clips to the ends of the straw.**
3. **You might like to give your balloon some funky wings made from cardboard or add colour using marker pens.**
4. **Make a tight string line across the room.**
5. **Attach the balloon to the string using the paper clips.**
6. **Hold the balloon and do a count down (5..4..3..2..1..Blastoff!).**
7. **Let the balloon go (remove the peg).**
8. **The winner is the person with the balloon that has flown furthest!**

Scientific explanation

For every action there is an equal and opposite reaction - it's the rule that explains how this rocket works. The blast of air rushing out of the balloon in one direction pushes it in the opposite direction. Isaac Newton discovered this scientific rule hundreds of years ago. Real rockets have enormous tanks for fuel and oxygen that ignite and push the rocket up into the air.

PRACTICAL NAME: MAKING SOAP BOMBS

Equipment

15g of:
- Citric acid
- Sodium bicarbonate
- Cornflour
- Plastic beaker
- Sunflower oil
- Measuring cyclinder
- Spatula
- Fragrance oil
- Food colouring
- Plastic bags.
- Newspaper

Method

1. Weigh out 15g of each of these : Citric acid, bicarbonate of soda and cornflour.
2. Mix these dry ingredients well. Get out any lumps. Put the mixture into a plastic tub.
3. Measure out 9ml of sunflower oil in a measuring cylinder using a funnel to avoid spillage.
4. To the oil add 5 small drops of food colouring and enough fragranced oil to bring the total volume up to 10ml.
5. Mix the wet ingredients well to disperse the food colouring.
6. Add the wet to the dry ingredients a bit at a time, stirring well all the time.
7. When it has all been incorporated mould the mixture with your hands into a ball. You will have to squeeze pretty hard and it will make a mess! Do it over newspaper please. If the mixture does not hold together then return to the plastic beaker and stir in a little more sunflower oil and try again.

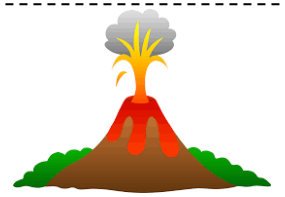
Scientific explanation

The main ingredients in a bath bomb are citric acid and bicarbonate of soda.

When these are added together in the presence of water, a chemical reaction takes place and a gas is made (that's where the fizzing comes from)

Colouring, fragrance and oil is also added.

Acid + Metal carbonate → Metal salt + Water + Carbon dioxide



PRACTICAL NAME: VOLCANOES

Equipment

- **Baking powder / Bicarbonate of Soda**
- **Red food colouring**
- **Vinegar (preferably white)**
- **Washing up liquid**
- **Water**
- **Empty plastic bottle**

Method

Step 1 – Making the cone - Cut the top off the bottle approximately 2cm below the lid. Turn this up-side-down to represent the magma chamber and place inside the remaining top half of the bottle, cut to size. Secure the upturned top of the bottle with some clay or plasticine to seal the edge.

Step 2 – Making the volcano sides - Roll your volcano picture into a cone and put it inside the plastic volcano cone

Step 3 – Making the activation fluid - To make your activation fluid, pour the following ingredients into your empty plastic bottle: 100ml (¼ Pint) vinegar, 100ml very hot water, 3 tablespoons of washing up liquid, A few drops of red / orange food colouring

Step 4 – Loading the volcano - Carefully spoon the baking powder into the crater making sure that it is no more than half-full (this will use about 2 teaspoons of baking powder)

Step 5 – Erupting the volcano - Slowly pour some activation fluid into the crater and watch the lava as it flows out of your volcano!

Scientific explanation

How do volcanoes work?

The lava that erupts from a volcano is in fact really hot rock. It is rock that has been heated so much that it has become runny. When this runny rock is underground, it is called magma. Volcanoes form where the surface crust of the earth is weak. This means that the magma can creep up through cracks in the weak crust. When it gets to the surface: BOOM!

A volcanic eruption happens when the magma forces through the surface (like the way that a fizzy drink will spray everywhere if you shake it up before you open it!). The way that a volcano erupts depends on how runny the magma is and much pressure has built up before the magma breaks through the surface. When a volcano erupts, we call the magma a new name: Lava.

Lava quickly cools down in the open air or sometimes, in water. When it cools down, the lava becomes hard again and turns back into rock.

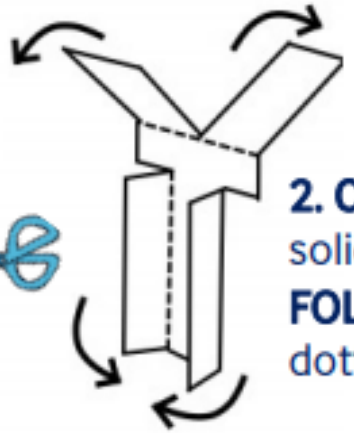
SPINNING SCIENCE

You will need

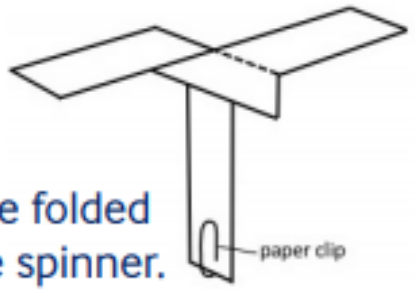
- paper
- paper clips
- Scissors
- different types of paper or card

1 TRY THIS INDOORS .... MAKE A SPINNER

1. Cut out the spinner



2. CUT along the solid lines and **FOLD** along the dotted lines.



3. PAPER CLIP the three folded pieces of the tail of the spinner.

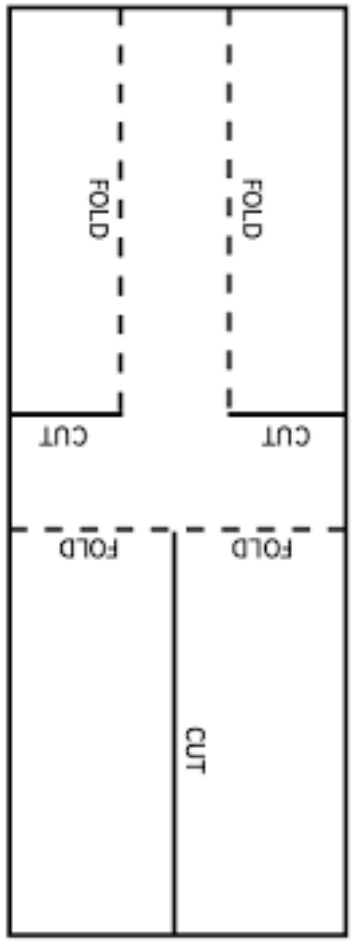
4. FOLD the two 'wings' of the spinner in opposite directions. Hold the spinner high up, let go and watch what happens!

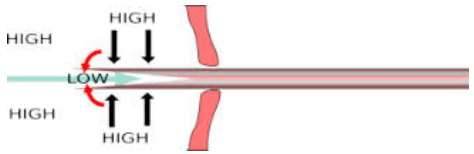
5. MAKE more spinners .... you could make different sizes, use different types of paper, use more paper clips or change the length of the wings.

WHAT DO YOU NOTICE?
Things to talk about ...

What happens when you let the spinner go? Can you slow the spinner down? How? What happens if you use different sorts of paper? Does tissue paper fall fast or slower than cardboard? What happens when you make the wings longer or shorter? What if you make a giant one? A tiny one?

TEMPLATE:





PRACTICAL NAME: STRAW OBOES

Equipment

- STRAWS (NEED TO BE STRAIGHT – CUT OFF THE BENDY BITS IF THERE ARE ANY)
- SCISSORS

The tip of the straw oboe

Method

1. Flatten one end of the straw ~2cm from the end to the tip.
2. Make two cuts in the now flattened end of the straw, to form a triangular tip.
3. Insert the triangular tip of the straw into your mouth and blow hard. You should hear a loud 'buzzing' sound.
4. While blowing on the straw oboe, get a volunteer to cut the straw shorter, ~1cm at a time. With each cut you will hear the pitch of the oboe sound go up.

Scientific explanation

The flattened triangular tip acts like the reed found in most wind instruments. Blowing on the reed causes the straw to vibrate. A standing wave pattern is created along the length of the straw, which we hear as sound. As you shorten the straw you shorten the wavelength of the standing wave pattern and therefore increase the pitch of the note.

PRACTICAL NAME: KETCHUP DIVER

Equipment

- 2 LITRE PLASTIC BOTTLE
- A SACHET OF KETCHUP
- SACHETS OF OTHER SAUCES TO EXPERIMENT WITH (OPTIONAL)

Method

Fill the bottle full of water. Put the sachet in the top and secure the lid on. When you squeeze the bottle the sachet dives down into the bottle – let go and it'll float back up.

Scientific explanation

An object will only sink if it is denser that the fluid around it, otherwise it floats. The ketchup is denser than water, so should sink. But your sachet of ketchup is actually ketchup plus packaging plus an air bubble, so overall it is less dense than ketchup on its own, and floats somewhere around the middle of your bottle.

Press the sides of the bottle and you'll make the volume of the bottle smaller. Everything inside the bottle is compressed (squashed). Gases compress easily compared to liquids, so it is the air bubble inside your sachet that gets squashed the most. Now the air bubble is denser, so your ketchup plus packaging plus an air bubble is also denser than before therefore isn't as buoyant (floatable) and so sinks.