SCIENCE INVESTIGATION

CHALLENGE CARDS

Are you a top Detective?

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KS2 Science Investigation Challenge Cards

Make your own reactive volcano! Make sure you've got towels at the ready - it could get messy...

What you'll need:

• baking soda • vinegar • a plastic bottle • paper towels

Instructions:

- Place some of the baking soda into the bottle.
- Pour in some of the vinegar.
- Watch as the reaction takes place.
- Have a go at turning your bottle into a realistic looking volcano.

• What happens? • What can you see? • Why do you think this is happening?

KS2

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KS2 Science Investigation Challenge Cards

Put your hand-eye co-ordination skills to the test whilst learning about the important role that forces play.

What you'll need:

- a few table tennis balls
- a hair dryer (with a nossle)

Instructions:

- Plug in the hair dryer and turn it on.
- Place it on the highest setting and point it upwards.
- Place your table tennis ball above the dryer and watch what happens.
- Who can keep their ball in the air the longest?

- **What happens?**
- **What can you see?**
- **Why do you think this is happening?**

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KS2 Science Investigation Challenge Cards

How does silly putty get to be so silly? Find out in this simple experiment by making your own - it even bounces!

What you'll need:

- 2 containers (1 smaller than the other)
- water
- food colouring
- PVA glue
- Borax (or Borax substitute)

Instructions:

- Fill the bottom of the larger contain with PVA glue.
- Add a few squirts of water and stir then add food colouring and stir.
- Add a squirt of Borax, stir the mixture up and put into the container. Use your fingers to work the 2 together.

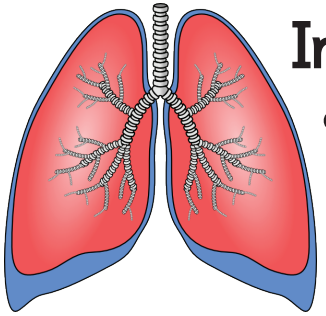
- **What happens?**
- **What can you see?**
- **Why do you think this is happening?**

KS2 Science Investigation Challenge Cards

Do you think you're fit and healthy? Let's test your lung volume to find out.

What you'll need:

- Clean plastic tubing
- a large plastic bottle
- water
- a sink or bowl



Instructions:

- Put about 10cm of water into the sink or bowl.
- Fill the plastic bottle right to the top with water.
- Put your hand over the top of the bottle to stop water escaping when you turn it upside down. Turn the bottle upside down and place under the water in the sink or bowl before removing your hand.
- Push one end of the tube into the bottle.
- Take a big breath in and then breathe out as much air as you can through the tube.
- Measure the volume of air your lungs had in them.

KS2 • What happens? • What can you see? • Why do you think this is happening?

SCIENCE INVESTIGATION

KS2 Science Investigation Challenge Cards

Ever wanted to make your own lava lamp? You don't even need electricity...

What you'll need:

- water
- a clear plastic bottle
- vegetable oil
- food colouring
- alka-seltzer (or other tablets that fizz).

Instructions:

- Pour water into the bottle until it is 1/4 full.
- Pour in vegetable oil until the bottle is nearly full and wait for the oil and water to separate.
- Add 6 or more drops of food colouring (choose any colour you like).
- Watch as the food colouring falls through the oil and mixes with the water.
- Cut the fizzing tablet into small pieces and drop one of them into the bottle.
- What can you see happening?
- When the bubbling stops, add another piece and enjoy the show.

KS2 • What happens? • What can you see? • Why do you think this is happening?

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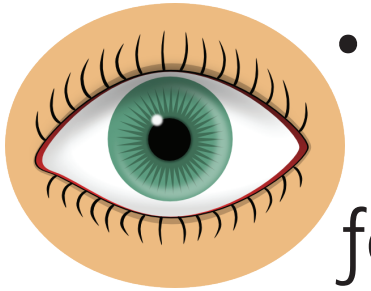
KS2 Science Investigation Challenge Cards

Learn more about how your body and brain work together with this series of challenges.

What you'll need:

- pencil
- challenge sheet
- empty tube
- cup of water
- small ball

Instructions:



- Using the challenge sheet, write 'left' or 'right' next to each task depending on what side you have favoured.
- When you've finished all the challenges, review your results and make your own conclusions about which is your dominant eye, hand and foot.
- Are all three the same? Do you have a dominant side?
- What happens?
- What can you see?
- Why do you think this is happening?

Test your dominant side with this series of challenges.

L or R

Eye:

1) Which eye do you use to wink with?
2) Which eye do you use to look through the empty tube?
3) Stretch out your arm infront of you and hold up your index finger. Close your left eye first then swap and close your right eye.
Did your finger seem to move when you closed one of your eyes? Which one?

Hand/arm:

1) Which hand do you write with?
2) Pick up the cup of water. Which hand did you use?
3) Throw the ball, which hand/arm did you use?

Foot/leg:

1) Run forwards and jump off one leg, which did you jump off?
2) Drop the ball on the ground and kick it, which foot did you use?

My dominant side is my left side / right side

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KS2 Science Investigation Challenge Cards

Learn about air resistance whilst making a parachute. Can you bring the soldier slowly to the ground?

What you'll need:

- various materials to test
- scissors
- string
- object or figurine

Instructions:

- Cut out a large square from your chosen material.
- Trim the edges so it looks like an octagon.
- Cut a small hole near the edge of each side.
- Attach eight pieces of string (all the same length) to each of the holes and tie the object or figure to the string.
- Use a chair or find a high spot to drop your parachute.
- How slowly did it drop? Can you modify it to make it drop even slower? Test various materials. Which worked the best?

KS2 • What happens? • What can you see? • Why do you think this is happening?

SCIENCE INVESTIGATION

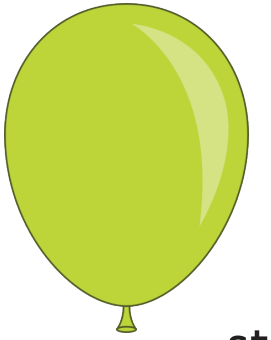
KS2 Science Investigation Challenge Cards

I bet you can blow up a balloon without it touching your lips with this cool chemical reaction.

What you'll need:

- balloon
- 40ml of water
- soft drink bottle
- drinking straw
- juice from a lemon
- 1 teaspoon of baking soda

Instructions:



- Before you begin, make sure that you stretch out the balloon to make it as easy as possible to inflate.
- Pour the 40ml of water into the drinks bottle.
- Add the teaspoon of baking soda and stir it around with the straw until it has disolved.
- Pour the lemon juice in and quickly put the stretched balloon over the mouth of the bottle.
- Watch what happens.

KS2 •What happens? •What can you see? •Why do you think this is happening?

SCIENCE INVESTIGATION

KS2 Science Investigation Challenge Cards

Somewhere over the rainbow... Don't wait to catch a glimpse of a rainbow when you can make your own.

What you'll need:

- a glass of water (3/4 full)
- white paper
- a sunny day
- a window

Instructions:

- Take the glass of water and paper to a part of the room with sunlight (near a window works best).
- Hold the glass of water above the paper and watch as a rainbow of colours forms on your sheet of paper.
- Try holding the glass at different heights and angles to see if it has a different effect.
- What do you think is causing this to happen?

KS2

- What happens?
- What can you see?
- Why do you think this is happening?

SCIENCE INVESTIGATION

KS2 Science Investigation Challenge Cards

I know how you can bend water without even touching it. You'd be amazed at what static electricity can do.

What you'll need:

- a plastic comb or an inflated balloon
- a tap
- dry hair

Instructions:

- Turn on the water so it is falling from the tap in a narrow stream.
- Run the comb through your hair just as you would when you brush it (around 10 times). If you are using a balloon then run it back and forth against your hair for a few seconds.
- Slowly move the comb or ballon towards the stream of water (without touching it) while watching closely to see what happens.
- What can you see? Why do you think this is happening?

- What happens?
- What can you see?
- Why do you think this is happening?

KS2

SCIENCE INVESTIGATION

Teacher's Notes

A huge part of carrying out any science investigation is not just the observing and enjoyment, it's also the understanding that is gained from participating - that's where you come in.

So we've also included some simple explanation notes for each of the 10 experiments that you will hopefully find useful.

Vinegar volcano

What's happening?

The baking soda (sodium bicarbonate) is a base while the vinegar (acetic acid) is an acid. When they react together they form carbonic acid which is very unstable, it instantly breaks apart into water and carbon dioxide, which creates all the fizzing as it escapes the solution.

Floating table tennis ball

What's happening?

Your ping pong ball floats gently above the hair dryer without shifting sideways or flying across the other side of the room. The airflow from the hair dryer pushes the ball upwards until its upward force equals the force of gravity pushing down on it. When it reaches this point it gently bounces around, floating where the upward and downward forces are equal.

Teacher's Notes

Floating table tennis ball

What's happening?

The reason the ball stays nicely inside the column of air produced by the hair dryer without shifting sideways is due to air pressure. The fast moving air from the hair dryer creates a column of lower air pressure, the surrounding higher air pressure forces the ball to stay inside this column, making it easy to move the hair dryer around without losing control of the ball.

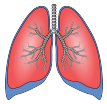
Silly putty

What's happening?

The PVA glue you use is a type of polymer called polyvinyl acetate (PVA for short), while the borax is made of a chemical called sodium borate. When you combine the two in a water solution, the borax reacts with the glue molecules, joining them together into one giant molecule. This new compound is able to absorb large amounts of water, producing a putty like substance which you can squish in your hands or even bounce.

SCIENCE INVESTIGATION

Teacher's Notes



Lung volume

What's happening?

As you breathe out through the tube, the air from your lungs takes the place of the water in the bottle. If you made sure you took a big breath in and breathed out fully then the resulting volume of water you pushed out is equivalent to how much air your lungs can hold. Having a big air capacity in your lungs means you can distribute oxygen around your body at a faster rate.

Lava lamp

What's happening?

The oil and water you added to the bottle separate from each other, with oil on top because it has a lower density than water. The food colouring falls through the oil and mixes with the water at the bottom. The piece of Alka-Seltzer tablet you drop in after releases small bubbles of carbon dioxide gas that rise to the top and take some of the coloured water along for the ride. The gas escapes when it reaches the top and the coloured water falls back down. The reason Alka-Seltzer fizzes in such a way is because it contains citric acid and baking soda (sodium bicarbonate), the two react with water to form sodium citrate and carbon dioxide gas.

SCIENCE INVESTIGATION

Teacher's Notes

Lava lamp

What's happening?

Adding more Alka-Seltzer to the bottle keeps the reaction going so you can enjoy your funky lava lamp for longer. If you want to show someone later you can simply screw on a bottle cap and add more Alka-Seltzer when you need to. When you've finished all your Alka-Seltzer, you can take the experiment a step further by tightly screwing on a bottle cap and tipping the bottle back and forth, what happens then?

Dominant side

What's happening?

Around 90% of the world's population is right handed. Why most people favour the right side is not completely understood by scientists. Some think that the reason is related to which side of your brain you use for language. The right side of your body is controlled by the left side of your brain, and in around 90% of people the left side of the brain also controls language. Others think the reason might have more to do with culture. The word 'right' is associated being correct and doing the right thing while the word 'left' originally meant 'weak'.

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Teacher's Notes

Dominant side

What's happening?

Favouring the right hand may have become a social development as more children were taught important skills by right handed people and various tools were designed to be used with the right hand.

Around 80% of people are right footed and 70% favour their right eye. These percentages are lower than those who are right handed and this could be because your body has more freedom of choice in choosing its favoured foot and eye than that of its favoured hand. In other words you are more likely to be trained to use your right hand than your right foot and even more so than your right eye.

Try testing others and coming to your on conclusions about what side the human body favors and why.

Extra: Are you more likely to be left handed if one of your parents is left handed? What are some of the possible disadvantages for left handed people? (Tools, writing materials etc) Do left handed people have an advantage in sports?

SCIENCE INVESTIGATION

Teacher's Notes

Parachutes

What's happening?

Hopefully your parachute will descend slowly to the ground, giving your weight a comfortable landing. When you release the parachute the weight pulls down on the strings and opens up a large surface area of material that uses air resistance to slow it down. The larger the surface area the more air resistance and the slower the parachute will drop.

Cutting a small hole in the middle of the parachute will allow air to slowly pass through it rather than spilling out over one side, this should help the parachute fall straighter.

Blowing up balloons

What's happening?

If all goes well then your balloon should inflate! Adding the lemon juice to the baking soda creates a chemical reaction. The baking soda is a base, while the lemon juice is an acid, when the two combine they create carbon dioxide (CO2). The gas rises up and escapes through the soft drink bottle, it doesn't however escape the balloon, pushing it outwards and blowing it up. If you don't have any lemons then you can use vinegar.

SCIENCE INVESTIGATION

Teacher's Notes

Rainbow making

What's happening?

While you normally see a rainbow as an arc of color in the sky, they can also form in other situations. You may have seen a rainbow in a water fountain or in the mist of a waterfall and you can even make your own such as you did in this experiment.

Rainbows form in the sky when sunlight refracts (bends) as it passes through raindrops, it acts in the same way when it passes through your glass of water. The sunlight refracts, separating it into the colors red, orange, yellow, green, blue, indigo and violet.

Bending water

What's happening?

The static electricity you built up by combing your hair or rubbing it against the balloon attracts the stream of water, bending it towards the comb or balloon.

Negatively charged particles called electrons jump from your hair to the comb as they rub together, the comb now has extra electrons and is negatively charged. The water features both positive and negatively charged particles and is neutral. Don't forget that positive and negative charges are attracted to each other.