Scientific Discovery

A few months ago, my monthly programme concentrated on some of the Cubs favourite activities, Cooking & Campfires. Therefore, for this month, I thought I would look at some more of their favourites – Science Experiments & Discovery.

These are simple experiments that can be completed in about 10-15 minutes each. For my own pack, we usually do these over two pack nights on a point to point rotation, and do about 4 experiments on each night. You might like to do the same, or you may want to turn an afternoon at your next Pack Holiday into one of Science (Cue the song “She Blinded me with Science” by Thomas Dolby and lets get going).

Making a Volcano

What you'll need:
- Baking Soda (make sure it's not baking powder)
- Food Colouring
- Vinegar
- A container to hold everything and avoid a big mess!
- Paper towels or a cloth (just in case)

Instructions:
1. Place some of the baking soda into your container.
2. Add some food colour
3. Pour in some of the vinegar
4. Watch as the reaction takes place!

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.

For extra effect you can make a realistic looking volcano. It takes some craft skills but it will make your vinegar and baking soda eruptions will look even more impressive!

Making Quicksand

What you'll need:
- 1 cup of cornflour
- Half a cup of water
- A large plastic container
- A spoon

Instructions:
1. This one is simple, just mix the cornflour and water thoroughly in the container to make your own instant quick sand.
2. When showing other people how it works, stir slowly and drip the quick sand to show it is a liquid.
3. Stirring it quickly will make it hard and allow you to punch or poke it quickly (this works better if you do it fast rather than hard).
4. Remember that quick sand is messy, try to play with it outside and don’t forget to stir just before you use it.
5. Always stir instant quicksand just before you use it!

What's happening?

If you add just the right amount of water to cornflour it becomes very thick when you stir it quickly. This happens because the cornflour grains are mixed up and can’t slide over each other due to the lack of water between them. Stirring slowly allows more water between the cornflour grains, letting them slide over each other much easier.

Poking it quickly has the same effect, making the substance very hard. If you poke it slowly it doesn’t mix up the mixture in the same way, leaving it runny. It works in much the same way as real quick sand.

Creating Static Electricity

What you'll need:
- 2 inflated balloons with string attached

- Your hair
- Aluminium can
- Woollen fabric

Instructions:
1. Rub the 2 balloons one by one against the woollen fabric, then try moving the balloons together, do they want to or are they unattracted to each other?
2. Rub 1 of the balloons back and forth on your hair then slowly it pull it away, ask someone nearby what they can see or if there's nobody else around try looking in a mirror.
3. Put the aluminium can on its side on a table, after rubbing the balloon on your hair again hold the balloon close to the can and watch as it rolls towards it, slowly move the balloon away from the can and it will follow.

What's happening?

Rubbing the balloons against the woollen fabric or your hair creates static electricity. This involves negatively charged particles (electrons) jumping to positively charged objects. When you rub the balloons against your hair or the fabric they become negatively charged, they have taken some of the electrons from the hair/fabric and left them positively charged.

They say opposites attract and that is certainly the case in these experiments, your positively charged hair is attracted to the negatively charged balloon and starts to rise up to meet it.

This is similar to the aluminium can which is drawn to the negatively charged balloon as the area near it becomes positively charged, once again opposites attract.

In the first experiment both the balloons were negatively charged after rubbing them against the woollen fabric, because of this they were unattracted to each other

Taste Testing without Smell

What you'll need:
- A small piece of peeled potato
- A small piece of peeled apple (same shape as the potato so you can't tell the difference)

Instructions:
1. Close your eyes and mix up the piece of potato and the piece of apple so you don't know which is which.
2. Hold your nose and eat each piece, can you tell the difference?

What's happening?

Holding your nose while tasting the potato and apple makes it hard to tell the difference between the two. Your nose and mouth are connected through the same airway which means that you taste and smell foods at the same time. Your sense of taste can recognize salty, sweet, bitter and sour but when you combine this with your sense of smell you can recognize many other individual 'tastes'. Take away your smell (and sight) and you limit your brains ability to tell the difference between certain foods.

Gravity Free Water

What you'll need:
- A glass filled right to the top with water
- A piece of cardboard

Instructions:
1. Put the cardboard over the mouth of the glass, making sure that no air bubbles enter the glass as you hold onto the cardboard.
2. Turn the glass upside down (over a sink or outside until you get good).
3. Take away your hand holding the cardboard.

What's happening?

If all goes to plan then the cardboard and water should stay put. Even though the cup of water is upside down the water stays in place, defying gravity! So why is this happening? With no air inside the glass, the air pressure from outside the glass is greater than the pressure of the water inside the glass. The extra air pressure manages to hold the cardboard in place, keeping you dry and your water where it should be, inside the glass.

Making a Ping Pong Ball Float

What you'll need:
- At least 1 ping pong ball (2 or 3 would be great)
- A hair dryer

Instructions:
1. Plug in the hair dryer and turn it on.
2. Put it on the highest setting and point it straight up.
3. Place your ping pong ball above the hair dryer and watch what happens.

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 ping pong 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.

The reason the ping pong 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 ping pong ball to stay inside this column, making it easy to move the hair dryer around without losing control of the ping pong ball.

See if you can float 2 or even 3 ping pong balls as an extra challenge.

Make your Own Fake Snot

What you'll need:
- Boiling water (be careful with this)
- A cup
- Green Food Colour
- Gelatin
- Corn syrup
- A teaspoon
- A fork

Instructions:
1. Fill half a cup with boiling water.
2. Add some Green Food Colour
3. Add three teaspoons of gelatin to the boiling water.
4. Let it soften before stirring with a fork.
5. Add a quarter of a cup of corn syrup.
6. Stir the mixture again with your fork and look at the long strands of gunk that have formed.
7. As the mixture cools slowly add more water, small amounts at a time.

What's happening?

Mucus is made mostly of sugars and protein. Although different than the ones found in the real thing, this is exactly what you used to make your fake snot. The long, fine strings you could see inside your fake snot when you moved it around are protein strands. These protein strands make snot sticky and capable of stretching.

Warm Air Needs More Room

What you'll need:
- Empty bottle
- Balloon
- Pot of hot water (not boiling)

Instructions:
1. Stretch the balloon over the mouth of the empty bottle.
2. Put the bottle in the pot of hot water, let it stand for a few minutes and watch what happens.

What's happening?

As the air inside the balloon heats up it starts to expand. The molecules begin to move faster and further apart from each other. This is what makes the balloon stretch. There is still the same amount of air inside the balloon and bottle, it has just expanded as it heats up.

Warm air therefore takes up more space than the same amount of cold air, it also weighs less than cold air occupying the same space. You might have seen this principle in action if you've flown in or watched a hot air balloon.

Testing your Dominant Side

What you'll need:
- A pen or pencil
- Paper or a notepad to write your findings on
- An empty tube (an old paper towel tube is good)
- A cup of water
- A small ball (or something soft you can throw)

Instructions:
1. Write ‘left’ or ‘right’ next to each task depending on what side you used/favoured.
2. When you’ve finished all the challenges review your results and make your own conclusions about which is your dominant eye, hand and foot.

Eye tests:
- Which eye do you use to wink?
- Which eye do you use to look through the empty tube?

- Extend your arms in front of your body. Make a triangle shape using your fore fingers and thumbs. Bring your hands together, making the triangle smaller (about the size of a coin is good). Find a small object in the room and focus on it through the hole in your hands (using both eyes). Try closing just your left eye and then just your right, if your view of the object changed when you closed your left eye mark down 'left', if it changed when you closed your right eye mark down 'right'.

Hand/Arm tests:
- Which hand do you use to write?
- Pick up the cup of water, which hand did you use?
- Throw the ball, which arm did you use?

Foot/Leg tests:
- Run forward and jump off one leg, which did you jump off?
- Drop the ball on the ground and kick it, which foot did you use?

What's happening?

So what side do you favour? Are you left handed or right handed? Left footed or right footed? Is your right eye dominant or is it your left?

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'. 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.

It's not strange to find people who favour the opposite hand and foot (e.g. left hand and right foot), and some people are lucky enough to be ambidextrous, meaning they can use their left and right sides with equal skill.
Try testing others and coming to your on conclusions about what side the human body favours 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?

Is it better to be left handed in some sports than others?

What do you think?