Science home learning 2

Here are some more suggestions for simple science experiments using items you should find in the home. They are fun to do and a great way to learn. There are some to be done inside and some outside, now that the weather is improving.

It would be great if your parents/carers could take some photographs of you doing any of these science activities you decide to try and email them to your teacher so they can see what you have been doing.

Health and Safety Reminders and Cautions

- All of these experiments should be carried out with an adult.
- Bicarbonate of soda and vinegar are safe to touch. However, contact with the eyes should be avoided. Rinse eyes with water if your child happens to stick their hands in their eyes after touching vinegar.
- Many of the experiments involve edible things – none of these should be eaten as they are being used for Science.
- Do not choose investigations if you are allergic to any of the ingredients involved.
- Wash hands thoroughly when you are finished doing the activities.

Nature Session videos with Iver Environment Centre

Iver Environment Centre are doing a Nature Sessions video each Tuesday and Thursday to keep children connected to nature and the outdoors. These videos cover topics in the primary science curriculum and Iver Environment Centre have received support from Heritage Lottery Fund to do this. You can find the first few videos on their new YouTube Channel:

https://www.youtube.com/channel/UCyndutPaaxUyUEhQVbNxRaQ

Topics covered so far are:

- Parts of a plant
- Water Nymphs and Larvae
- Signs of Spring
- Seeds
- Tree Tour at Braywick
- Trees Part 2
- Sorting minibeasts

Investigating how well materials absorb water

Why do this?

Kitchen roll, paper towels and disposable cloths are everyday items in most kitchens. They have a number of uses, but they are especially good at mopping up spills. This practical investigation provides a simple method to explore how absorbent different materials are. It can support learning about the suitability of different materials for different uses.

You will need:

- Shallow container
- Strips of material (suggested materials: kitchen roll; J cloth or equivalent; different types of paper – printer, tissue, etc; plastic – eg. from a plastic bag; aluminium foil; sponge; cotton material – old towel, t-shirt; greaseproof paper)
- Water
- Food colouring
- Paper towels (in case of spillages)
- You may wish to use a larger container to place the shallow container in to avoid any splashes/spillages going onto surface of table).

Activity:

- Add food colouring to water and pour into shallow container.
- Cut the paper/material into strips (2cm x 10-12cm).
- Choose first strip of material to test.
- Place one end of a strip of material in water and watch what happens – which material absorbs the fastest/slowest? What happens if you leave the materials for a longer time, eg. 1 hour?
- Using a stopwatch, if you have one, you could time how quickly the absorbed coloured water travels to the end of each piece of material.

Expected observations and results:

The coloured water will be absorbed at different rates by the different materials. Any non-absorbent (waterproof) materials used will not soak up the coloured water.

Possible further activities:

Once you have explored the samples, there is a variety of enquiries you could undertake, including:

- Which kitchen towel product is the best for mopping up spills?
- Which material absorbs the largest volume of water?

- Using a stopwatch and ruler to find out which material absorbs the quickest.
- Do different coloured J cloths absorb different amounts of water?

Background information

Absorbency is the ability of a material to soak up a liquid. Materials that are resistant to or repel liquids are called waterproof.

Make a liquid that is also a solid (cornflour slime)

You will need:

- Large mixing bowl
- Measuring jug
- Cornflour (450g / 16 oz)
- Water (475ml / 16 fl oz)
- Spoon
- Clear re-sealable storage bag
- Uncooked egg
- Food colouring (optional)
- Plastic disposable gloves (optional)

Making cornflour slime can get a bit messy, so make sure you wear an apron to protect your clothes.

IMPORTANT: Don't pour your slime down the sink as this could clog the pipes. Instead spoon the mixture into a zip-lock bag, fasten it tightly and dispose of it in a bin.

Activity:

- Place 450g / 16 oz of cornflour into a large mixing bowl.
- Add 475ml / 16 fl oz of water and use your hands to mix it into the cornflour. If you want to make coloured slime, add a couple of drops of food colouring to the water first. You can wear disposable plastic gloves to avoid staining your hands.
- Keep mixing until the cornflour and water have blended together and the slime is the consistency of honey. You can add more cornflour to make the slime thicker, or more water to make the slime thinner.

Now here are a few things you can do with it:

- Try punching the slime, making sure withdraw your fist back quickly. You would expect most fluids to splash, but you'll find this mixture instantly turns hard. This is because, under the force of your punch, the water in the slime quickly flows away from the site of impact and leaves behind a very dense patch of cornflour particles in front of your fist.

- Now try scooping some of the slime into your hand and rolling it into a ball between your palms. As long as you keep pressure on it, the solid mixture will keep the shape of the ball. Stop rubbing however and it soon trickles back into the bowl as a liquid.

- This is known as a ‘Non-Newtonian fluid’. Non-Newtonian fluids, like cornflour slime, are really good at absorbing and dissipating energy. You can test this yourself by spooning some of the slime into a re-sealable storage bag. Stop when the bag is two-thirds full, then gently push an uncooked egg into the mixture.

- Find a clear area where you can safely drop the bag from a height of around 8-12 feet, or 2.5-3.5 metres. Make sure you seal the bag tightly before you let go.

- You would expect the egg to break if it was suspended in a Newtonian liquid that has a constant viscosity (resistance to flow), like water for example. However, because of its non-Newtonian properties, as the slime hits the ground it forms a solid around the egg. This means that the force of the fall is evenly distributed around the shell's surface and it stays intact. How high can you drop it until the egg breaks?

IMPORTANT: Don't pour your slime down the sink as this could clog the pipes. Instead spoon the mixture into a zip-lock bag, fasten it tightly and dispose of it in a bin.

Why?

When you mix cornflour with water, the large cornflour particles remain 'suspended' (float around) in the liquid.

Cornflour slime is thick because the particles are packed very close together, yet they are still able to slip past each other.

When you stir the mixture slowly it acts like a liquid because the suspended particles have time to move past each other.

Yet when you put sudden stress on the mixture, by rolling it for example, the water quickly flows out of the area but the particles do not have enough time to move out of the way.

The cornflour particles temporarily stay packed up where they are, which makes the slime act like a solid.

This is known as a ‘non-Newtonian’ fluid.

Make a Bird's Nest

A bird nest is the spot in which a bird lays its eggs and raises its babies. These can be usually found in trees, bushes or a burrow dug into the ground.

You will need:

- Materials for nest building such as twigs, leaves, mud and grass.
- Modelling clay (optional)

Activity:

- Before you start building your nest, have a think about the following important questions:

    - What materials can you find to build your nest?
    - Which ones do you think will be best?
    - Do you need different materials inside and outside the nest?
    - How will you keep everything together?
    - You could start with a small bowl made from modelling clay.
    - What other ways can you think of to build a nest?

- Go outside and explore what natural materials you can find. Perhaps collect some leaves, feathers, twigs and some mud!

- Build your nest, ensuring it can comfortably fit a small bird and their eggs. Make sure it's strong and sturdy.

- Why not take it further and test your nest?
    - What would happen to your nest on a windy day?
    - What would happen to your nest in rainy weather?
    - What worked well and what could have been improved?

Note: If you see nests outside, do not disturb the birds or remove the nests or eggs.

When working outside make sure an adult knows where you are at all times. Remember to wash your hands after working outdoors. Adults should supervise all activities.

Make a Bug Hotel

In some gardens it's hard for wildlife to discover safe hideaways where they can live. So, why not help them out by building your own bug hotel?
It could help shelter all sorts of creatures, from ants to woodlice, ladybirds or even toads!

You will need:

- A flowerpot
- Stones, twigs, bark, dried leaves
- Waterproof marker
- Sugar cubes

Activity:

- Find a good spot where you'd like to put your flowerpot (perhaps near some trees or bushes) and put a few stones next to the flowerpot to stop it rolling over or blowing away.
- Fill it with twigs, bark and dried leaves that will make it cosy for your guests.
- Add a few sugar cubes to tempt them in, and maybe add a personalised welcome sign at the front!
- Peep inside every day to check on your creepy-crawly visitors.
- Why not keep a record of all the animals you see in your hotel each day? Then you can see who likes your hotel the most.
- If you want to look at them more closely, use a magnifying glass.

Note: Be careful as some bugs may bite or sting. Adults should supervise all activities. Wash hands after working outside.

Plastic Milk

Have you ever wanted to make cheese? Now's your chance! It all starts with the 'coagulation' of milk. In milk there is a protein called casein. Casein is really small and there are lots of separate pieces (or molecules) of casein in the milk. Acidic vinegar changes the casein and causes it to all start sticking together, which causes large blobs to appear.

This was also the basis for making plastic out of milk in the early 20th century; it was shaped and left to harden in a similar way.

The earliest evidence of cheese making dates back 7,500 years in what is now Poland.

You will need:

- 570ml of full fat milk
- 4 teaspoons of white vinegar
- Strainer/sieve or a muslin cloth
- Food colouring (e.g. yellow)
- Cookie cutter
- Spoon
- Pan or a bowl

Activity:

- Get an adult to heat the milk in a pan or in the microwave. It should be hot but not boiling.
- Pour the milk into a bowl and add the vinegar and food colouring.
- Stir for about a minute, then pour the milk and vinegar solution through the strainer or sieve, into the sink. If you have some muslin cloth, use it to line your strainer, as it's easier to get your plastic cheese out.
- There should be a mass of lumpy blobs left in the strainer.
- Rinse them with water and squeeze them together.
- If you find your milk doesn't turn into a solid, the vinegar may be old and has lost its acidity, so you'll need to use fresh vinegar instead.
- You can use the cookie cutter to cut out shapes, or just mould them into any shape like they did when making casein plastics. The mixture should harden in a couple of days.
- If you want to find out more about cheese making, you could research how cheese is made in factories and how bacteria can be used to make all the different varieties and flavours we find in the supermarkets, eg. cheddar, brie, stinky cheese etc.

Note:
The milk only needs to be warm. It can be heated in a bowl placed over a pan of hot water or in a microwave. Do not to eat the cheese you have made. Make sure to wash your hands!

Escape from the Ice!

A plastic adventurer got themselves stuck in ice, and it is up to you to explore how best to get them out! What methods do you think will work best?
Ice is formed when water is cooled down to 0 degrees Celsius. The molecules (little water particles) get all their energy sucked out of them as they cool down, until they stop moving altogether. This is when ice is made - we call this process freezing.

When you want to turn ice into water the reverse happens; we call this process melting.

You will need:

- Yoghurt pot or small container that can go in the freezer
- A figurine, e.g. Lego person
- Water
- A freezer
- Foil
- Small hammer or bowl of tepid (slightly warm) water

Activity:

- Fill the yoghurt pot or similar a third of the way up with water and add a figurine so they are submerged in the water (covered by the water). Put this in the freezer.
- When it is frozen, top up the water until the container is full and freeze again so that the figurine will be inside the ice, not floating on the top.
- Release the ice from its container (you might need to run the yoghurt pot under a little water to free the ice).
- Now, it's up to you to decide what is the best way to get the figurine out of the ice.
    - Putting it in a bowl of warm water perhaps?
    - Or maybe putting it on the windowsill?
    - How about tapping it with a hammer?

- If you left the ice to melt, draw a sequence of pictures showing how much the ice has melted after 5 mins, 10 minutes and so on.
- You could create a story or poster, recounting how the figurine ended up in the ice and then act out the story using sounds and movements.

Note: Be careful when using a hammer to get the person out. The ice can slip around a lot!
Be aware of slippery puddles made from the melting ice. Have a towel handy to mop up any mess.
Do not freeze containers made from glass or with lids or caps.

Balloon Rockets

You will need at least two people to do this activity.

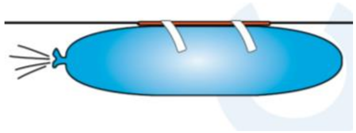
You will need:

- A drinking straw
- Different shapes and sizes of balloon
- A peg
- String
- Sticky tape
- Stopwatch
- Washing up liquid
- Two chairs
- A metre ruler /measuring tape

Activity:

- Blow up the balloon, fold over the neck and secure it with the peg to stop the air coming out.
- Thread the string through the straw.
- Tie the string to two chairs about 2 metres apart.

- Stick the balloon to the straw as per diagram:



- Remove the clip from the neck of the balloon and watch your rocket zoom away.
- One person should measure the distance the balloon travels and one person should time how long it takes the balloon to travel to a stop.
- Make a note of the time taken / distance travelled.
- Repeat the experiment after covering the string with washing up liquid. What do you notice?

- Think about why certain balloon rockets travelled further than others.
- What could you have done differently to make your rocket travel further?
You will need to think about things such as:

- The friction between the balloon rocket and the string.
- The shape / weight of your balloon rocket.
- The position of the 'mouth' of the balloon in relation to the string guideline.

Why?

A balloon provides a simple example of how a rocket engine works. The air trapped inside the balloon pushes out the open end, causing the balloon to move forward. The force of the air escaping is the "action"; the movement of the balloon forward is the "reaction".

Colourful flowers experiment

This colourful water experiment shows how flowers absorb water into their petals to keep them fresh.

You will need:

- White flowers
- Water
- Food colouring
- Small vases

Activity:

- Cut a single flower with a fairly short stem. A shorter stem will get you a quicker result as the colour has to travel all the way up the stem to get to the petals. Cut the stem on an angle to give a greater surface area for the coloured water to enter by.

- Now place the flower in a small, short vase or glass (a shot glass works well) and add a generous amount of food colouring.

- Keep an eye on it; in about 30 minutes some colour will start to show in the petals. You could ask the adult with you to take a time lapse video on their phone (in the camera field – on an iphone - you'll find a 'time lapse' button) to see the changes happening quickly (or if you are able to do this yourself then you can do it).

Why?

Flowers suck water up through their stems to feed their petals and make them grow. This process is called, 'capillary action'. Because the water is coloured, the petals end up coloured too!

If nothing else, this experiment proves that you really need to put your cut flowers in some water! They use it!