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Sociable Science

VARIOUS LOCATIONS IN ABERDEEN CITY

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Sociable Science

The aim of Sociable Science is to engage all ages in science activities that are done in conversation utilising teamwork, creativity and most of all fun while learning.

Each activity would be designed to be repeated at home with our audiences being encouraged to share what they have learnt with others.

All children must be accompanied by a responsible adult. Please wear sturdy footwear and dress for the weather.

Make Others Smile Challenge

In this activity, well, you've probably guessed it... You'll make others smile!

Suitable for primary

What will you need

Cardboard paper Elastic String Hole puncher Colouring tools Scissors

1. Take a piece of cardboard and cut out a shape of a smile.
2. Use colouring tools to make your smile as bright as possible!
3. Punch holes on each side of your cut out shape.
4. Take a piece of elastic string, thread the shape and make a knot on each of the side.
5. Wear the shape on your face.

What happens when we smile?

When we smile, more than 10 face muscles are involved to create a smile. When these muscles contract, they send a signal back to our brain and stimulates our reward system. This stimulation further increases the level of happy hormones, called endorphins. In other words, when our brain feels happy, we smile; when we smile, our brain feels happier.
In addition, smiling is contagious! When we see people who smile, it stimulates our mirror neurones to suppress our facial muscle control, and triggers a smile.

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Making Your Own Toothpaste

In this activity you will be making your own toothpaste!

Suitable for primary

What will you need

Baking soda Cornflower Salt Glycerine Peppermint Flavouring Food Colouring Teaspoons Mixing Container Dirty Teeth Laminated Picture

1. Mix together 1 teaspoon of baking soda, 1 teaspoon of cornflour and 1 teaspoon of salt in your container.
2. Add 1 teaspoon of glycerine and 1-2 drops of peppermint flavouring and mix to form a thick paste.
3. Add 1-2 drops of food colouring.
4. Test your recipe on the laminated face - please do not try this on yourself!

Why are clean teeth important?

When you get your picture taken, everyone says, "Say cheese! Smile!" So you do – you open your mouth and show your teeth. When you see the picture, you see a happy person looking back at you. The healthier those teeth are, the happier you look. But why is that? It's because your teeth are important in many ways. If you take care of them, they'll help take care of you. Strong, healthy teeth help you chew the right foods to help you grow. They help you speak clearly, and help you look your best. If you don't take care of your teeth, cavities and unhealthy gums will make your mouth very, very sore. Eating will be difficult and you won't feel like smiling so much.

Growing A Smile Activity

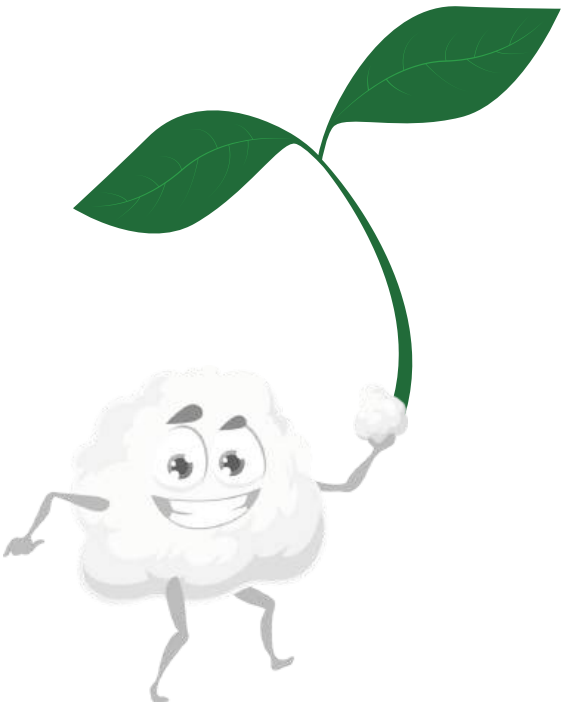
In this activity you will learn all the things that plants need to grow.

Suitable for primary

What will you need

Paper plate Cotton wool Cress seeds Water

1. Take an empty paper plate.
2. Place a cotton wool on your plate.
3. Now sprinkle some cress seeds in a shape of a SMILE on the top of the cotton wool, lightly press the seed into the cotton wool and spray with some water.
4. It will only take a few days for you to see the results. Cress seeds germinate pretty quickly.
5. Take your plate home with you, place it on your window shelf and don't forget to water it! Cress seeds only need a small amount of water every couple of days.



How do plants grow?

Like humans, plants need water to survive. Water is essential to life and so without it seeds won't even germinate (start to grow). So water triggers seeds to germinate. Humans get their energy from food, and plants get their energy from light. Chlorophyll (the green pigment found in plants) uses energy from light and turns carbon dioxide from the air and water into sugar which the plants then use as an energy source: a process is called photosynthesis.

Making a Windflower Seed Ball

In this activity we'll get creative with nature and make wildflower seed balls to scatter in the garden.

Suitable for primary

What will you need

Flour Soil Mixing bowl Water
Native British wildflower seeds

1. Mix 10 parts soil to 1 part flour.
2. Slowly add water and mix slowly until the mixture becomes sticky like dough.
3. Roll into a golf-ball size ball.
4. Fill a tray with wildflower seeds.
5. Roll your mud balls around until covered in seeds.
6. Leave to dry for a day or two and then they're ready to throw in your garden.

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Growing a Sunflower

In this activity you will learn all the things that plants need to grow.

Suitable for primary

What will you need

Multi purpose compost, plant pots, Sun flower seeds Water

1. Take your plant pot and fill with compost nearly to the top
2. Carefully drop your seed into the pot
3. Cover your seed with a little bit of compost
4. Lightly spray some water on top
5. Take your plant pot home with you, place it on your window shelf and don't forget to water it! Sunflower seeds only need a small amount of water every couple of days.

How do plants grow?

Like humans, plants need water to survive. Water is essential to life and so without it seeds won't even germinate (start to grow). So water triggers seeds to germinate. Humans get their energy from food, and plants get their energy from light. Chlorophyll (the green pigment found in plants) uses energy from light and turns carbon dioxide from the air and water into sugar which the plants then use as an energy source: a process is called photosynthesis.

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Paper Cup Challenge

In this activity you will put your civil engineering skills to the test! The challenge is to see if you can stand on paper cups without breaking them… Doesn't sound possible? Well, we will show you how it is done and you can try out different methods and test out just how much weight the cups can take!

Suitable for primary

What will you need

Paper cups **Cardboard**

1. Space several cups out evenly on a flat surface.
2. Place a sheet of cardboard on the top.
3. Try if the cups hold your weight.
4. Add a second layer of cardboard and try again.
5. Ask your parent to stand on your cup tower. Do the cups hold their weight too?

Why does this happen?

Paper Cup Challenge Experiment Explained

If we stood on a single paper cup it would break straight away. This is because our weight pushes down on the cup and compress it.

However, if we arrange the cups neatly spaced out and place a piece of cardboard on top, our weight is spread out. This means there isn't too much weight on one cup.

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Music Maker from CREST

In this activity we will learn about how sounds are made by experimenting with different objects and materials..

Suitable for primary

What will you need

Several identical glass bottles **Various glass containers of different size and shapes**
Wine or other glass bottles **Food colouring**

1. Place a mixture of identical bottles on one side.
2. Place a mixture of glass containers on the other side.
3. Place a mixture of wine or other glass bottles on the other side.
4. Gently start tapping the objects with a spoon.
5. Add water to the bottles, see if the music notes change!

Why does this happen?

Music Maker Experiment Explained

When a sounds is made, something vibrates. Sound can travel through air, through solid material or through liquid. When you tap a glass object the air inside vibrates, or when you tap a bottle of water, the water vibrates. The more water in the bottle, the lower the note becomes. This means you can create different notes (i.e. change the pitch), by regulating the amount of water in a bottle.

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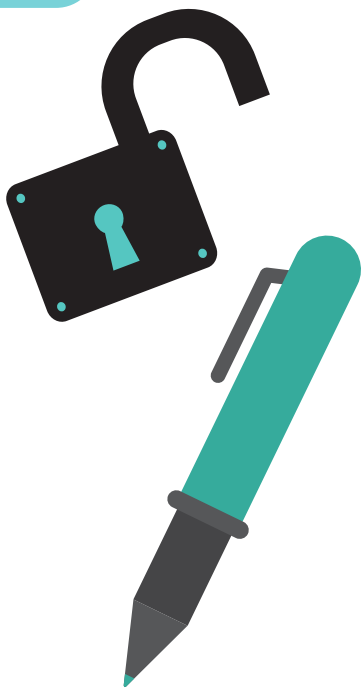
Coding and Cyphers

Become a special agent with a variety of activities where you will learn about making invisible ink and the secrets of cyphers. Why not use this method for making invisible ink to send secret messages to a friend?

Suitable for primary and secondary

What will you need

Baking soda. Water. Small Cup. Paper. Paintbrush. Sponge. Grape/Prune or Cranberry Juice



1. Mix equal amounts of baking soda and water in a small cup.
2. Write your secret message on paper using the mixture and the paintbrush.
3. Wait for the paper to dry, then pass the note to your friend.
4. To reveal the message, use a sponge or brush to paint the paper with grape/prune or cranberry juice.

Why does this happen?

The slight acidity of the juice reacts with the baking soda to reveal your message. There is an ingredient in grape juice that changes the baking soda to that very deep purple colour when they meet!

Grape juice is a ph indicator. This means that it will change the colour of different substances when it interacts with them to show us what their ph is

- **Ph tells us the acidity or basicity of items**
- **Basically, substances go through a chemical reaction when they "meet" a ph indicator and that causes them to change colour**
- **Think about a traditional baking soda and vinegar experiment - they combine and erupt! That is because baking soda is a base and vinegar is an acid. If we tested the ph of vinegar it would be a very different colour than the ph of baking soda.**

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Soda and Mentos Explosion

A classic experiment but with some variations! You might have tried adding Mentos to a bottle of fizzy juice before but this time you will experiment with different methods to see how the results vary.

Suitable for primary

What will you need

Coca- cola **Mentos** **Baking Soda** **String**
Needle **Bottle cap** **Pricker**

Coke and Baking Soda Experiment

1. Take a 2l bottle of coca- cola.
2. Take the cap off and pour in baking soda (the more the better). Step back immediately.

Coke and Mentos Experiment

1. Take a 2l bottle of coca - cola.
2. Make a hole in a middle of a used bottle cap.
3. Thread the bottle cap add 6 Mentos onto a string with a needle (start threading with the Mentos).
4. Open the coca - cola bottle, take the string with the Mentos and the cap. Place the string inside the bottle but do not let the string drop and reach cola - cola. Screw the cap (that's attached to the string) on and drop the string down. Step Back immediately.

Why does this happen?

Coke and Making Soda Experiment Explained

Coke is acid, and the acid joins together with the carbonate in baking soda to form hydrogen carbonate. Hydrogen carbonate then breaks up to become carbon dioxide and water. The carbon dioxide then bubbles off as gas.

Coke and Mentos Experiment Explained

A bottle of coke is full of bubbles (carbon dioxide). When you drop a Mentos into a bottle of coke, bubbles start to form on the surface of the Mentos, a process known as "nucleation." The surface of the Mentos is filled with tiny imperfections. These imperfections create a larger surface area and provide many more "nucleation sites." When the Mentos drops to the bottom of the bottle, it forms lots and lots of bubbles on its imperfect surface along the way. When all of this gas is released, it forces the drink up and out of the bottle.

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Rocket Balloon Experiment

This activity demonstrates Newton's Third Law of Motion and can be used to send messages to friends or even have races against them!

Suitable for primary

What will you need

Ballon **String** **Duck Tape** **Straw** **Scissors**
2 chairs

1. Using scissors cut the straw into about a 5cm long piece.
2. Cut a length of string about 2metres long. .
3. Tie one end of the string to one chair.
4. Slide the piece of straw onto the string.
5. Tie the other end the string to the other chair.
6. Blow up the balloon.
   Pinch the end of the balloon closed but do not tie it off.
7. Tape the balloon to the straw.
8. Pull the straw and balloon to one end of the string and stick your secret message onto the balloon.
9. Release the balloon and watch your Rocket Balloon send your secret message. .

Why does this happen?

Rocket Balloon Experiment Explained

This experiment demonstrates Newton's Third Law of Motion, which is: every action has an equal and opposite reaction. When the balloon is released, the pressurised air in the balloon pushes against the air around the balloon sending it and your message in the opposite direction down the string.

Milk Art

This fun science experiment also lets you use your creative side. Using milk and food colouring to we will see how chemical bonds work.

Suitable for primary

What will you need

Milk Plate Dish soap Cotton swabs (or tooth picks)
Food colouring (more than one colour)

1. Slowly pour the milk into the plate. Do not move the plate, you want the milk to stay as still as possible.
2. Put one drop of each food colouring in different places in the milk.
3. Put a tiny amount of dish soap on one end of the cotton swab, then touch it to one of the colours.
4. Continue touching the colours and make art!

Why does this happen?

Milk Art Experiment Explained

Milk has got a lot of fat in it and the food colouring floats on top of the fat. The fat is all connected with chemical bonds. It's almost like little pieces of fat happily holding hands with each other. Dish soaps are used to clean greasy dishes because it breaks the bonds in fats allowing them to separate. Adding the dish soap to the milk separates the fat and makes it move making your magical milk art!

Animal adventures with CREST

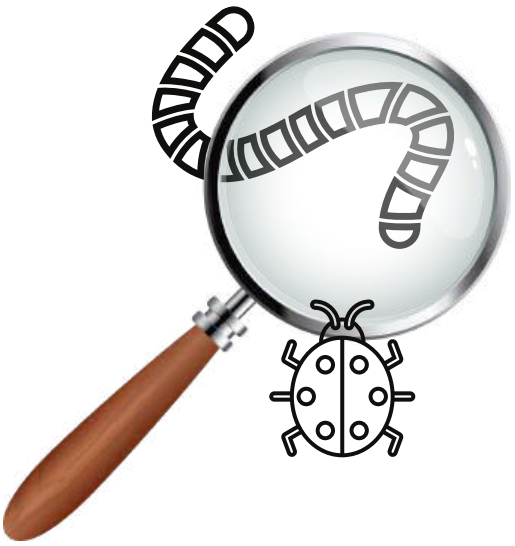
Go on an animal adventure and see how many animals you can find

Suitable for primary

What will you need

Collecting jar **Magnifying glass (optional)** **Pens** **Paper**
Identification book (below resource)

1. We're going on a mini beast hunt! Think about which areas the mini beasts will be hiding?
2. Take photographs or draw the animals that you find. Remember to be careful if collecting them, we don't want to harm the animals.
3. Now you have collected your drawings or photographs it is time to identify which mini beats you have found! Use your knowledge or use the identification book to help.



What is a mini beast?

The term 'minibeast' means a small animal. The scientific name for minibeast is invertebrates. This means an animal without a backbone. Some invertebrates have no skeleton, like worms. Others, like insects and spiders, have a skeleton on the outside (exoskeleton).

Where can I find mini beasts?

You can generally find plenty of mini beasts living in mosit, damp, dark environments which help to keep them safe and stop them 'drying out'.

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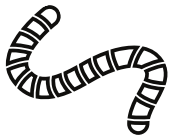
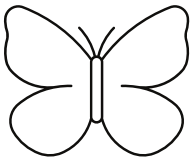
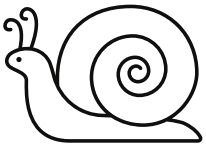
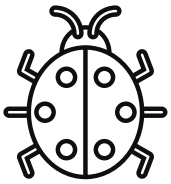
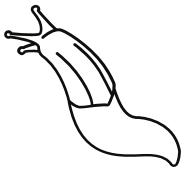
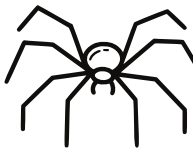
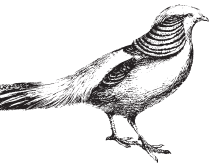
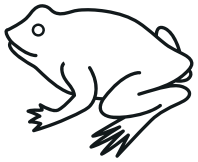
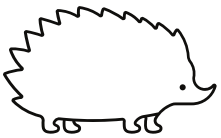
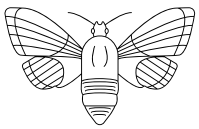
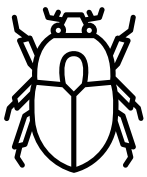
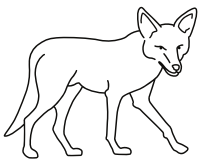
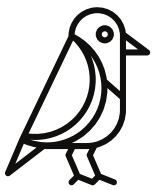
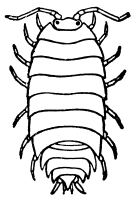
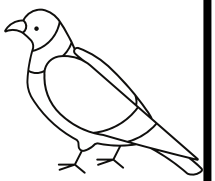
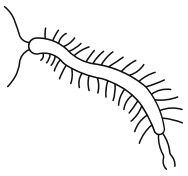
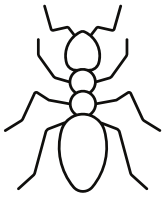
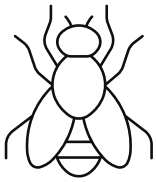
Animal adventures with CREST

Animal Identification sheet

How many did you find? Use the identification sheet and colour in the animals you found

 Wiggly Worm	 Beautiful Butterfly	 Slow Snail	**SPECIES BINGO!** HOW MANY CAN YOU FIND?	 Spotty Ladybird	 Slimy Slug	 Sneaky Spider
 Pleasant Pheasant	 Fantastic Frog	 Happy Hedgehog	 Marvellous Moth	 Brilliant Blackbird	 Bumbling Bee	 Bashful Beetle
 Fast Fox	 Red-Breast Robin	 Wonderful Woodlouse	 Pesky Pigeon	 Crawling Centipede	 Amazing Ant	 Frolicking Fly

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Leaf Veins

Work together to find out just how water travels through leaf veins!

Suitable for primary and secondary

What will you need

Jar **Magnifiying glass**
Food colouring **A cup of water** **Leaves**

1. Get outside and collect some green leafs that you can use for this experiment. Top tip: This experiment works best with leaves that are white in the center or light green, and have obvious veins.

2. Add water to your jar, then take a few drops of food colouring and add to the water. Swirl the jar around until the water has turned a solid dark colour, add some more drops if required.

3. Place your leaf into the jar with the stem inside the water.

4. Observe your experiment over a few days and watch as the leaf "drinks" the water.

Why does this happen?

You will notice that the veins in leaves have a branching pattern. Are the leaf vein patterns of different leaves the same or different? Leaf veins are made up of two types of vessels (continuous long thin tubes). Xylem vessel, which transports water from the roots of the plant to the leaves via **capillary action**. Phloem, which takes the food made in the leaves via photosynthesis, to the rest of the plant.

What is capillary action?

Capillary action is the ability of a liquid (our colored water) to flow in narrow spaces (the stem) without the help of an outside force, like gravity and even against gravity. Think about how large tall trees are able to move lots of water so far up to their leaves without a pump of any kind.
As water moves into the air (evaporates) through a plant's leaves, more water is able to move up through the plant's stem. As it does so, it attracts more water to come alongside it. This movement of water is called capillary action.

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Make your own medals

Using air drying clay, make your very own medal to show off your achievements from the day!

Suitable for primary

What will you need

Air drying clay Rolling pin Pens Paper Paint brushes Acrylic Paint Cup of water (to wash brushes) Piece of string to tie your medal onto

1. Take a chunk of air drying clay and roll into a ball to soften.
2. Use a rolling pin or a cup to roll your piece of clay flat. Create your medal using the air drying clay. Take a pencil to create a small hole at the top of your medal (this will be used to feed string through at the end)
3. Leave your medal to dry for up to 24 hours

4. It's time to decorate your medal! Use acylyric paints to create a design on the front of your medal, leave to dry before painting the back.
5. Once your medal is completely dry, take a piece of string and feed it through your medal. Tie a small knot together.
6. There you have it! You have your very own medal, wear it with pride and remember to tag TechFest in on social media so we can see your designs.

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How to make the water cycle in a bag

Learn how the water cycle works.

Suitable for primary

What will you need

Plastic zip-lock bag. Permanent marker. Water. Blue food colouring. Clear tape

1. Design your bag by using the permanent markers to draw a sky. Remember to include clouds and the sun as these are imporant elements in the water cycle

2. Pour one or two drops of your blue food colouring into a cup and mix until the water turns blue. Carefully pour into the zip-locked back and make sure it is closed so no water can escape!

3. Take your bag over to a bright sunny window for best results. Take two long pieces of tape to stick the corners of the bag up onto the window. Remember to press down tightly as we do not want the bag to fall!

4. You should see a change in your bag between two hours and 1 day this will depend on the amount of sun and the time of day you started. Eventually you will notice droplets of water sticking to the sides of the bag, some droplets will be higher up in the in the clouds others will begin to fall down like rain

So why does this happen?

The sun rays hit the window which heats up the water in the bag causing the water to transform into a gas through the process called Evaporation. Outside evaporated water vapor goes into the atmosphere, however in our bag it has no where to go and ends up sticking onto the sides. The water then turns back into a liquid as condensation, which then slides back into the pool of water below as "rain".

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How to Make a Rain Gauge

Find out how to make your very own rain gauge

Suitable for primary

What will you need

A glass jar or plastic bottle. Permanent marker. Ruler.

1. if you are using a plastic bottle cut the top off to create your gauge. Or take a jar and move onto the next step

2. Take your ruler and line the "0" up with the bottom of the jar. Make a mark on the jar for each centimetre (we went up to 8).

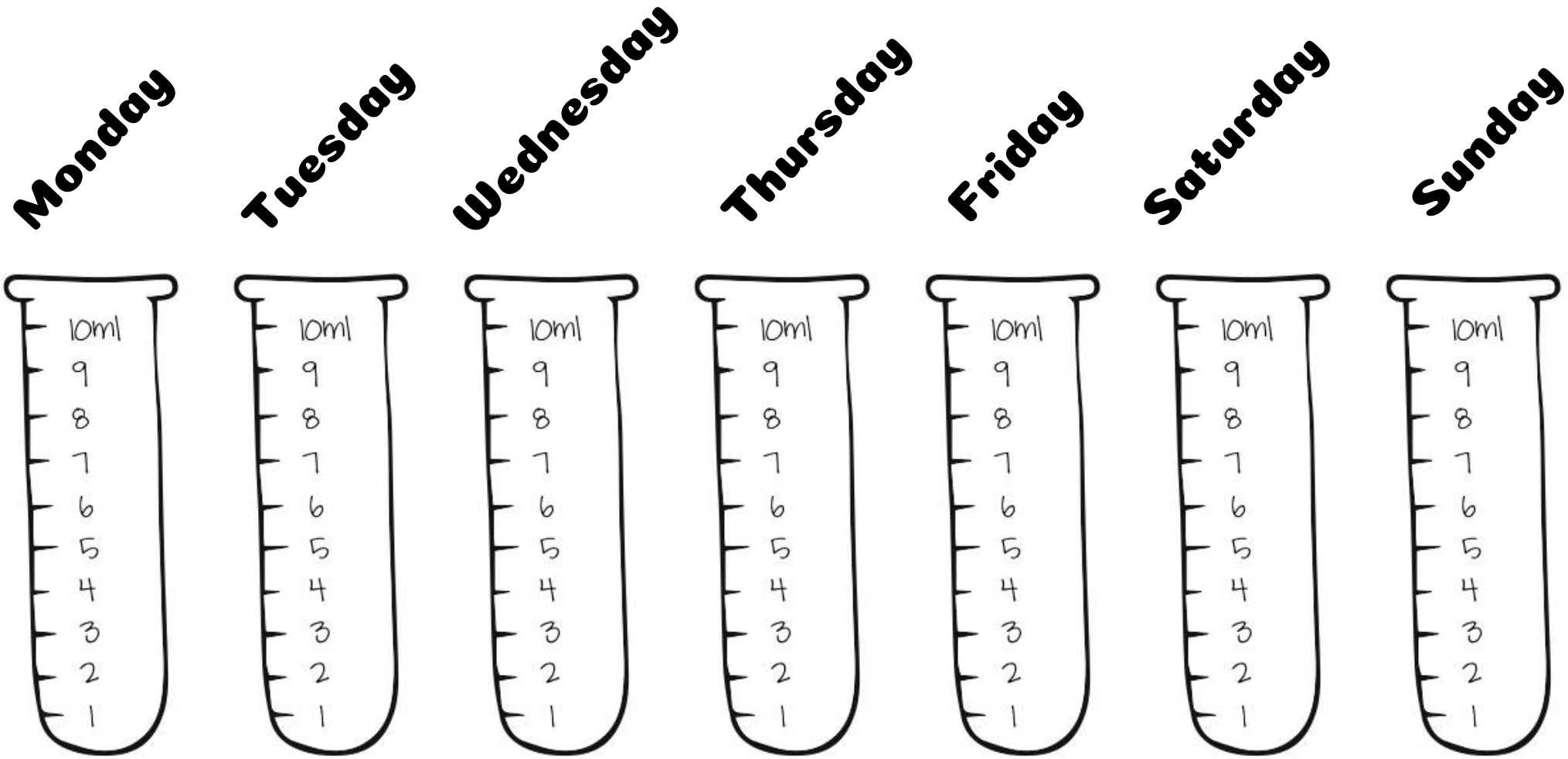
3. Fill the bottom of your rain gauge with pebbles, rocks, soil to stop it from moving outside in the wind.

4. Now that your rain gauge is in place, either in the ground or hung up somewhere secure, you can start to track the rainfall in your garden. At the same time each day take a look at how far up the jar the water has reached- you can track this using the sheet on the next page!

So why is this useful?

Now that your rain gauge is in place, either in the ground or hung up somewhere secure, you can start to track the rainfall in your garden. At the same time each day take a look at how far up the jar the water has reached- you can track this using the sheet on the next page!

Weekly Rainfall Tracker



Calculate the total rainfall for the week:

Making Rainbow Rain

Create your very own cloud and make it rain!

Suitable for primary

What will you need

A glass jar or bowls. Water. Food colouring. Shaving foam. Pipette.

1. Fill each bowl or glass with some water and a different food colouring- you can use as many colours as you like, and can even mix them together to make even more!

2. Half or three quarter fill a glass jar or vase with cold water then top with a shaving foam "cloud".

3. Use the pipette to drop the rainbow water onto the shaving foam "cloud".

4. Once the cloud is full, rainbow rain will start to fall into the jar. This could happen really quickly or take a little bit longer depending on how thick your shaving foam cloud is and how far into the cloud you stick the pipette (the farther in you go, the sooner the rain will fall).

What does this teach us about weather?

Cloud formation happens when water vapor rises into the air. When this vapor hits cold air, it turns into tiny droplets of water. These droplets start to stick together and form clouds. When the clouds get full of water that they can't hold anymore, the water falls down as rain.
In this experiment, the clouds are the shaving cream and the food colored water is the rain. As you drop the colored water into the cloud the weight of the water forces itself through the cloud to "rain" down into the jar.

Credit: https:\\www.thebestideasforkids.com\rain-cloud-in-a-jar\

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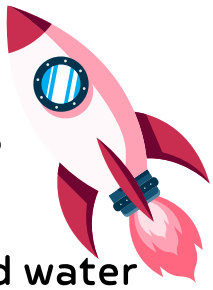
Alka-Seltzer Rockets



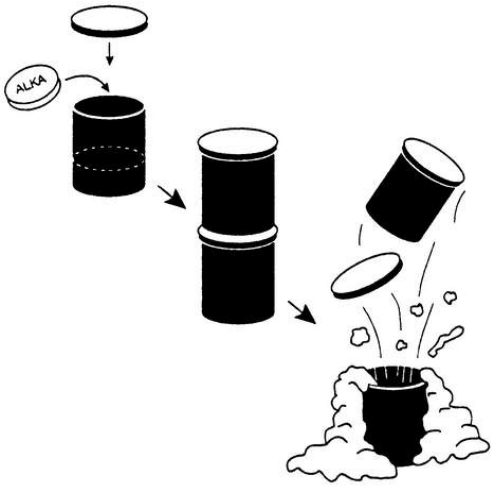
Find out how you can make a rocket powered by Alka-Seltzer and water with this fun activity.

Suitable for primary

What will you need

Photographic film pots and lids
Jug of water
Alka-Seltzer tablets or soluble vitamin tablet broken into quarters

1. Remove the lid from the film pot
2. Pour water into the pot until it is ⅓ full.
3. Break an Alka-Seltzer tablet into quarters.
4. Put 1 quarter of the tablet on to the lid of the pot
5. Carefully put the lid, with the tablet pieces, on the pot. Make sure it is on very tightly.
6. Shake the pot for 2 seconds and put it, lid down, on the table (never launch from your hand). STAND BACK



Why does this happen?

A chemical reaction occurs between the Alka-Seltzer tablet and the water.

This produces a gas called carbon dioxide - the same as the gas we breathe out.

The gas builds up inside the film pot, increasing the pressure, until the lid is forced off.

Non-Newtonian Fluid

This is a more gloopy type of science. We have a few names for this stuff oobleck, slime but my favourite is gloop. And it's a fluid that breaks all the rules. The fancy name is a non-Newtonian fluid. (Newton was a scientist who discovered many rules of physics but this is a fluid that seems to break the rules)

So sometimes it's a liquid and sometimes it's a solid depending on how much pressure you put on it. When you move it slowly, it behaves like a liquid and when you move it fast you can carve it up like a solid.

Suitable for primary

What will you need

Bowl. Cornflour. Water. Spoon. Baby wipes.

1. Start with one part water in a bowl. Slowly add 1.5 to two parts cornflour, stirring constantly.
Starch particles become suspended in water - but too much water will create liquid.

Why does this happen?

Long chain molecules slide easily over each other when moved slowly but become brittle/fragile and rip if you move them fast.

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Salt Painting

Do you know watercolour salt painting is both science and art, but what's the science? Lets find out

Suitable for primary

What will you need

PVA or craft glue. Salt. Food colouring or paint of your choice. Water. White card or watercolour paper. Pipettes or paint brushes. Template for your shapes

1. Trace your template onto card

2. Add glue to outline your shapes

3. Then add a good amount of salt onto the glue and carefully pour the excess salt off

4. Let the glue and salt dry

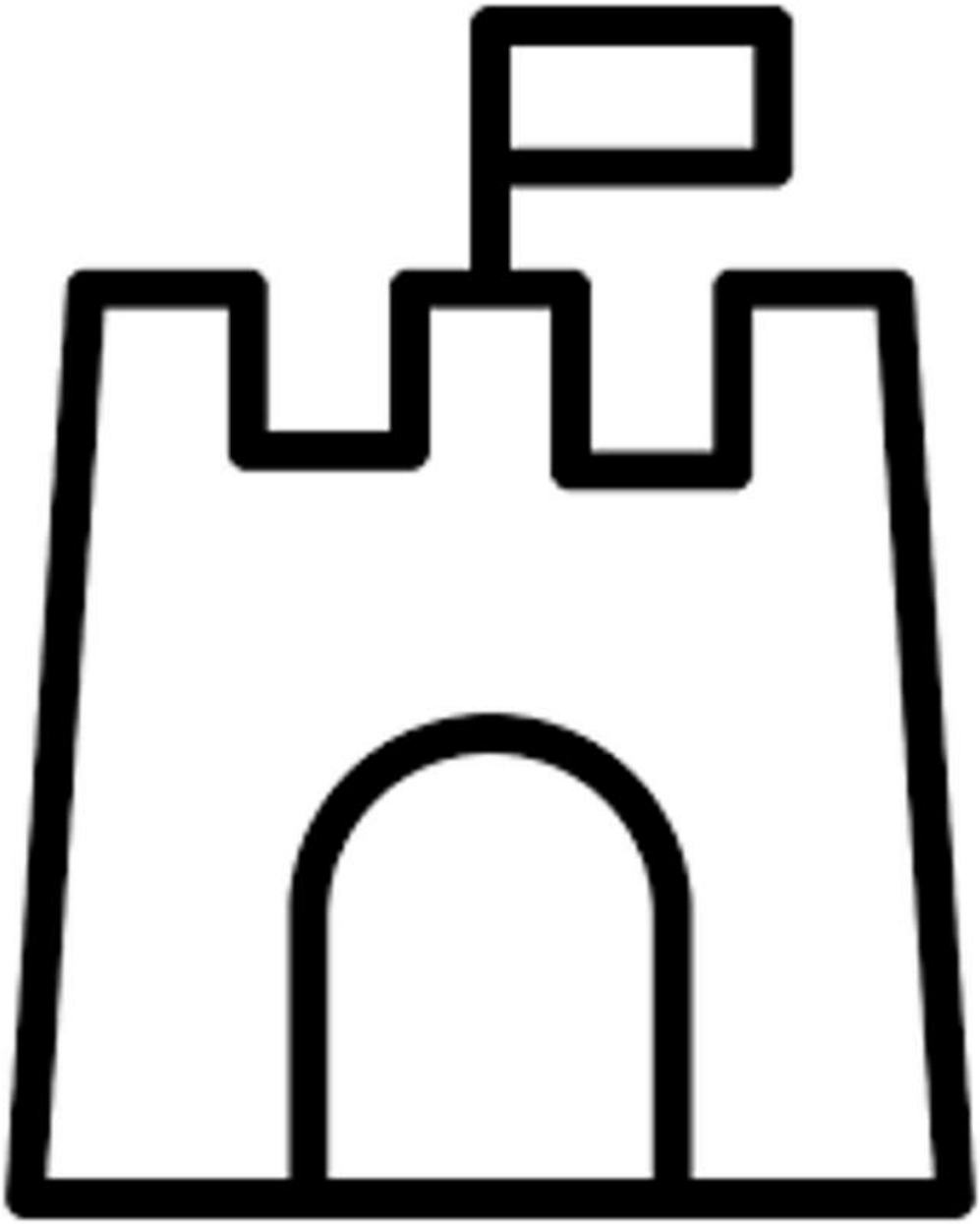
5. Mix a few tablespoons of water with your choice of food colouring or paint to make your watercolour paint.

6. Use a pipette or paint brush to slowly drip the watercolour mixture onto the salt. Try not to drench the patterns but rather watch the salt soak up one droplet of colour at a time. Leave your salt painting to dry overnight!

Why does this happen?

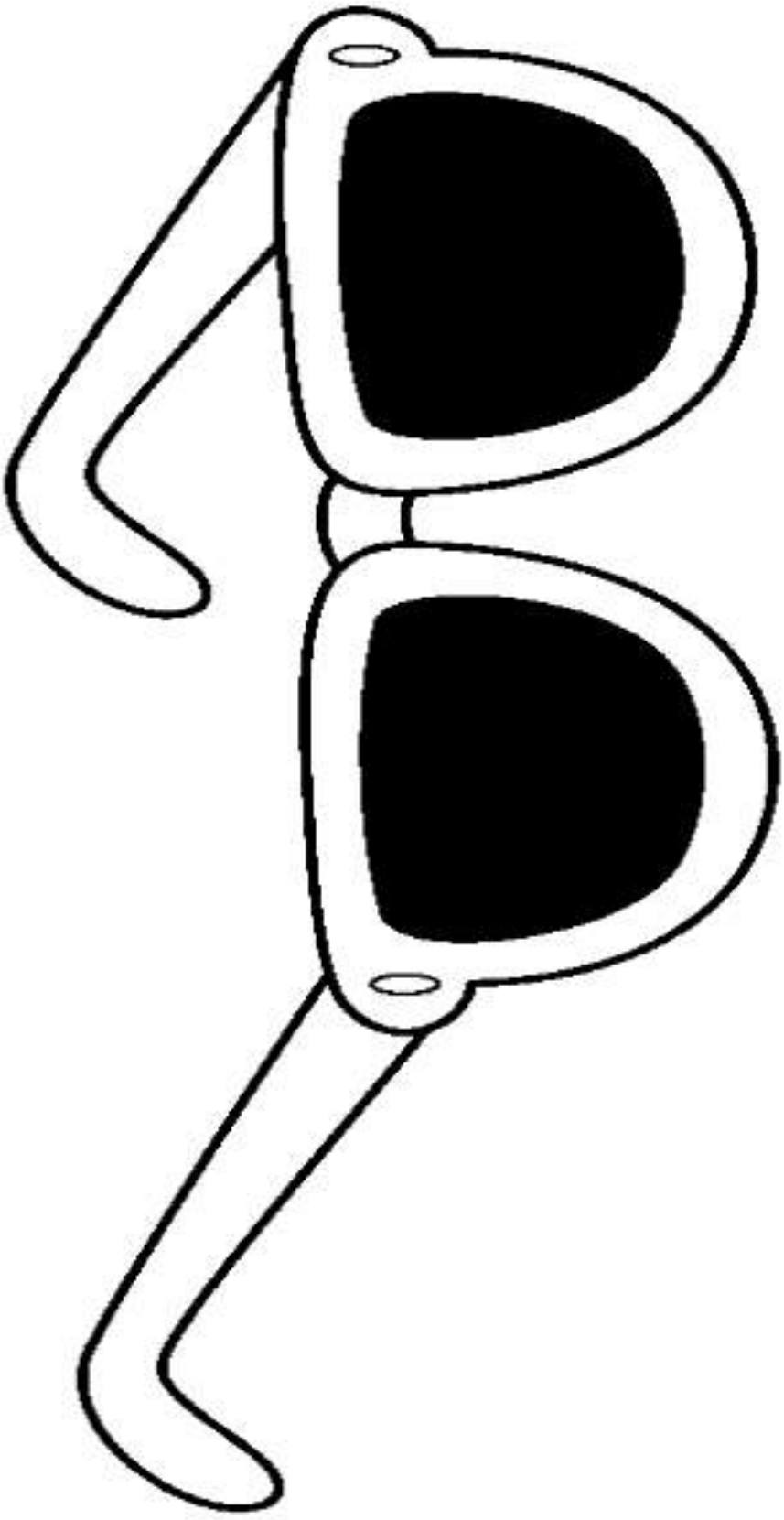
Salt is a really useful product that has the ability to absorb moisture from its environment. Its ability to absorb water is what makes salt a good preservative. This property of absorption is called hygroscopic.
Hygroscopic means that salt absorbs both liquid water (the watercolour paint mixture) and water vapour in the air. Notice how the salt absorbs the watercolour mixture below with your raised salt painting.

Salt Painting Templates

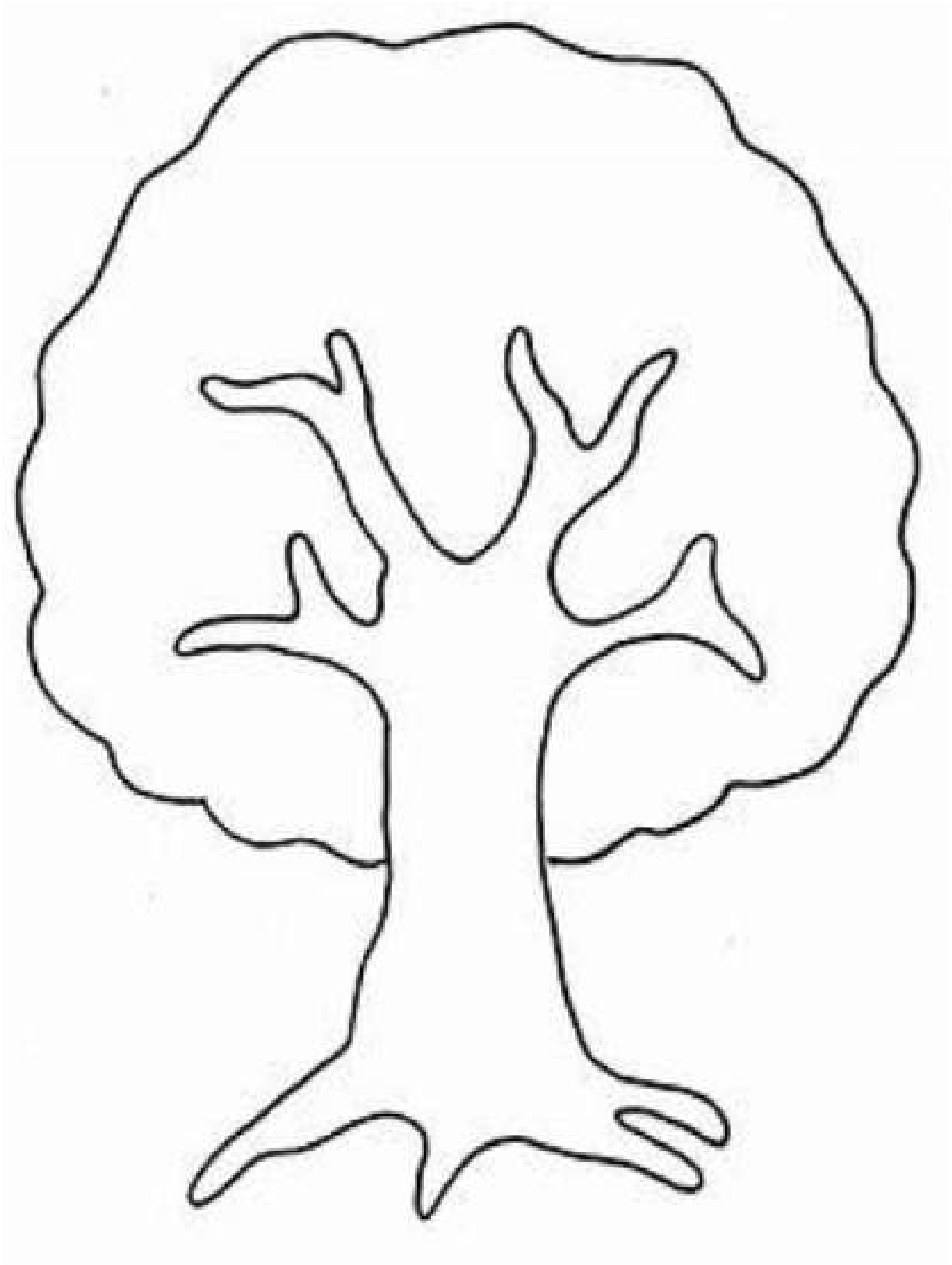


Salt Painting Templates

Salt Painting Templates



Salt Painting Templates



Quiet Fireworks

Real fireworks may not be safe to handle, but fireworks in a jar are the best!.Find out below how to create your own fireworks in a jar.

Suitable for primary

What will you need

Water. Food colouring (4 colours or more) Vegetable Oil. Tablespoon. Jar. Glass or container

1. Fill a jar 3/4 way full with water
2. In a small glass bowl, add 4 tablespoons of vegetable oil and 4 drops of each colour food colouring. Use a spoon or fork to slowly mix around the drops of food colouring to break them up into tinier droplets.
3. Slowly and carefully pour the food colouring and oil mixture on top of the water.
4. Watch the jar to see what happens. You should see the fireworks start to fall down in the water.

Why does this happen?

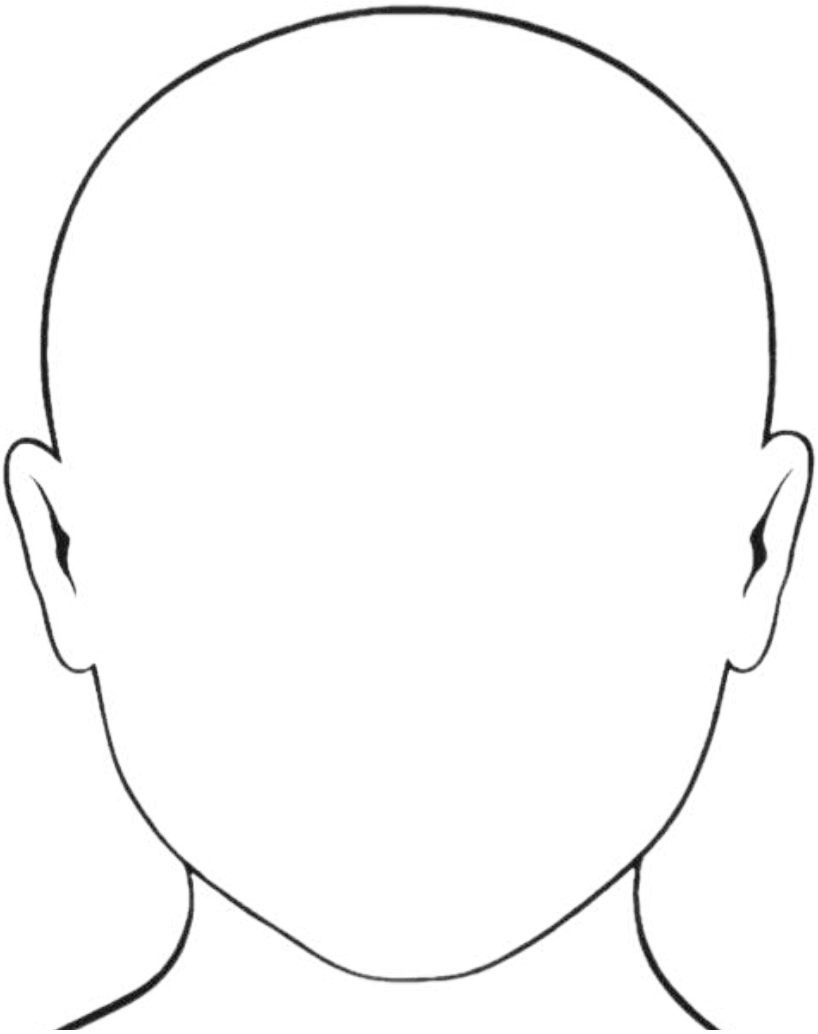
Liquid density is a fun experiment for kids to explore as it combines a bit of physics and also chemistry! As you observed above with your fireworks in a jar, oil and water do not mix. But why don't oil and water mix if they are both liquids?

Liquids can have different weights or densities because of their molecular structure. Water is heavier than oil so it sinks because it is made up of a different amount of molecules.

DNA Detectives

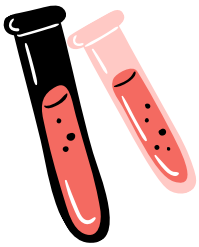
Can you help the DNA Detectives work out what person X looked like just by looking at their DNA sample?
Use the key on the following page to decode the DNA clues and work out what person X looked like

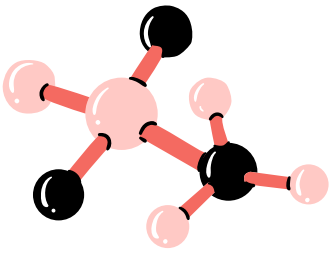
Suitable for primary

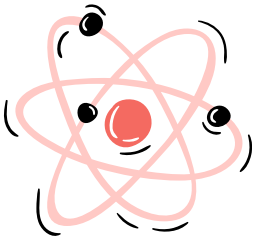


Person X DNA Sample

Feature	DNA Clue
Gender	XX
Hair Colour	GGCTAA
Hair Texture	CCCTGA
Eye Colour	ATTGGG
Freckles	GGGCCG
Nose	AAGACT
Lips	GGGGAT







DNA KEY

Feature	DNA Clue	Outcome
Gender	XX	Female
	XY	Male
Hair Colour	AGGCTA	Blonde Hair
	TCAGTC	Brown Hair
	AATCCC	Black Hair
	GGCTAA	Red Hair
Hair Texture	TTAAAT	Straight Hair
	ATCGAT	Wavy Hair
	CCCTGA	Curly Hair
Eye Colour	CTCAGA	Blue Eyes
	GGCTCA	Brown Eyes
	ATTGGG	Green Eyes
Freckles	TGTACA	No Freckles
	GGGCCG	Some Freckles
	AGTCGT	Lots of Freckles
Nose	ACCGTA	Pointy nose
	CACGTA	Small round nose
	AAGACT	Big round nose
Lips	GGGGAT	Thin lips
	TAGCAT	Small round lips
	CATTAG	Big lips

What is DNA?

DNA is an amazing molecule that contains the biological instructions to make all living things on Earth. Everyone's DNA is slightly different, and it's the variation in your DNA that makes you unique! Everything from the colour of your eyes, the shape of your nose, and even your blood type - it's all down to DNA!

Terrific Trees

When we're outdoors there are trees around. We're so used to seeing them that we hardly notice them

Suitable for primary

What will you need

Observation Sheet (on a clipboard), HB Pencils (sharpened, Trees

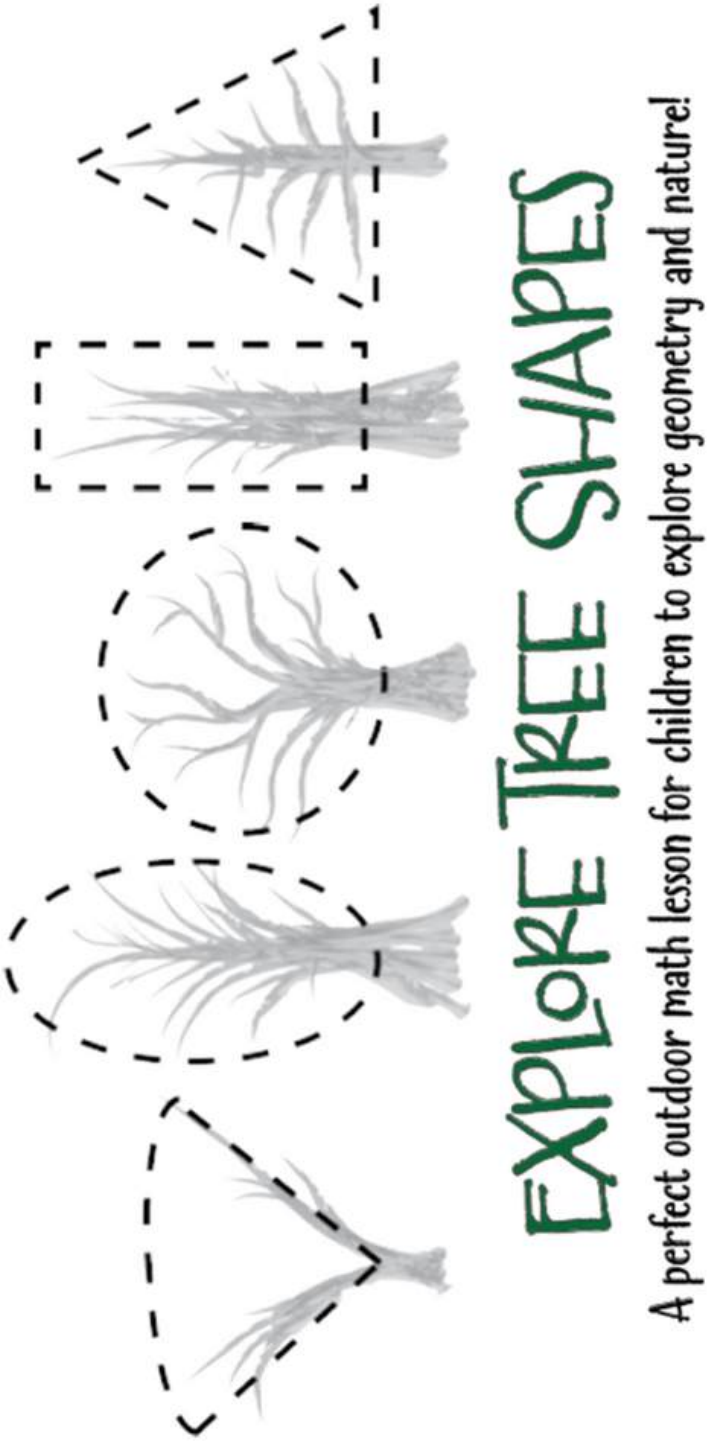
1. Look at the Information Sheet showing the shapes of trees. See page below.
2. Look at the Information Sheet showing the shapes of leaves. See page below,
3. Look at the Information Sheet showing the textures of bark. See page below.
4. Take your Observation Sheet & pencil around the trees that you can see. Record the shape of the tree and sketch the shape of the leaf.
5. Do a rubbing of the bark - place the Observation Sheet against the bark and, with the pencil lead flat against the paper, rub it gently to and fro. (Ask the helpers if you don't know what to do)
6. Can you see flowers or seeds? Draw them or describe them if you can. (What colour are they? What shape are they? Are they growing singly or in bunches?)
7. Can you identify the tree? If you know its name, write it on your sheet. If you don't you can try looking it up in the books - ask a helper.

We are fortunate to live in a part of the world where we have many trees providing a backdrop to our landscapes. There are trees in gardens, in parks and on urban streets - and yet we often overlook them, failing to observe the detail. In this activity we learn to look more closely, examining the texture of the bark, the shape of the leaves and the outline of the trees themselves.

Terrific Trees Images

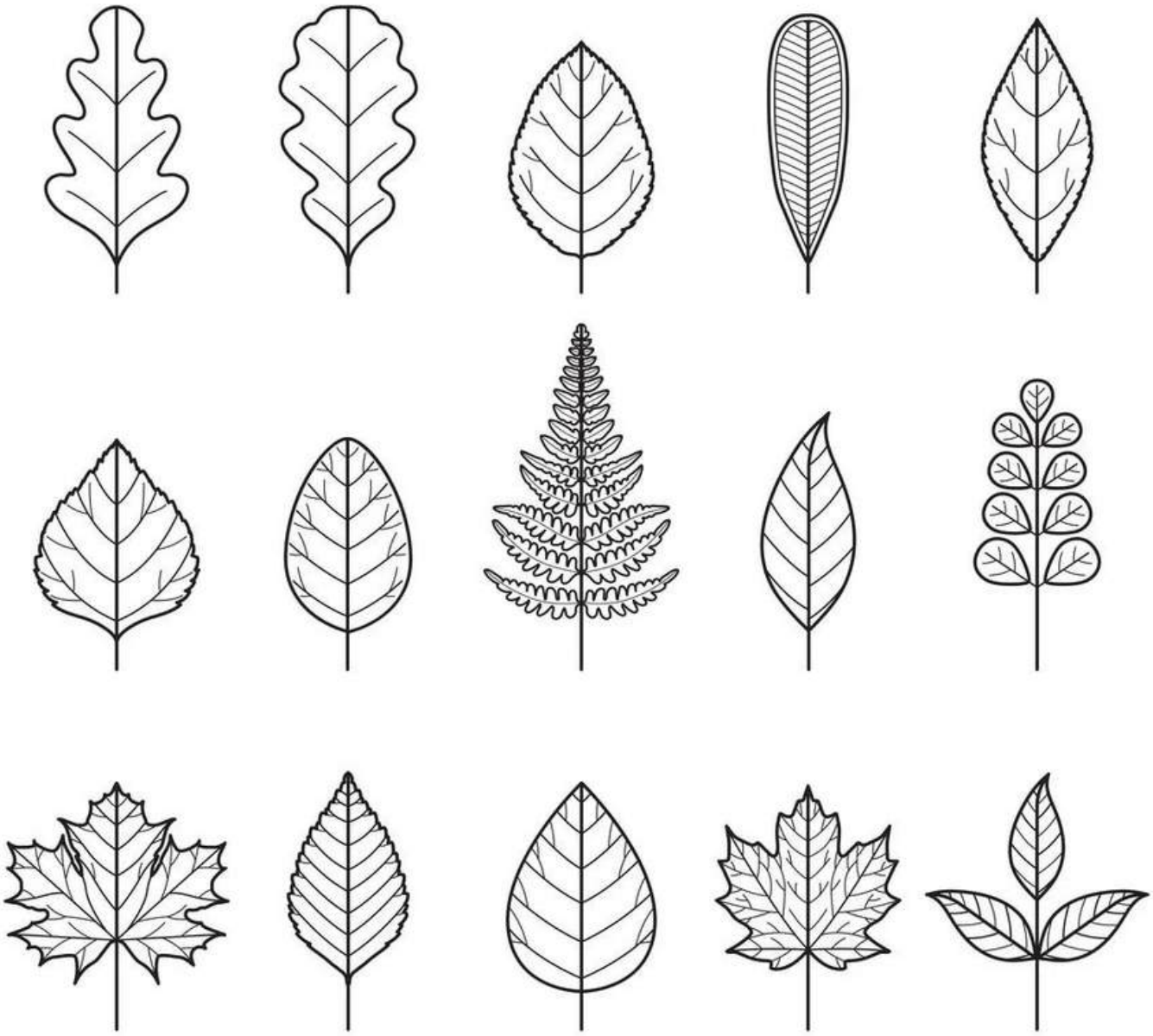
These images are intended to illustrate the shapes that the children are to look for in the surrounding trees. Ideally, they would be printed and laminated. It may be helpful to have more than one copy of each available.

Tree Shapes



Terrific Trees Images

Leaf Shapes



Download these free tree identifying apps here or here or scan the qr codes.

SCAN ME

SCAN ME

Terrific Trees Images

Download a free tree bark poster and matching game for kids or scan the qr code!

SCAN ME

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Ecosystem in a Jar

Create your own ecosystems in jars! These miniature marvels serve a variety of purposes, from enhancing décor and hardscape design to educating children about ecosystem and sustainability in a practical way.

What will you need

A clean, empty container with lid (all labels removed), standing water, soil, small rocks, small plants/plant seeds, moss or algea

Suitable for primary

1. Place small rocks at the bottom of the jar
2. Cover the rocks with a thin layer of soil
3. Place moss and/or algea on top of the soil
4. Add small plants and/or flower seeds to moss
5. Sprinkle standing water over plants & moss (use standing water from a natural source like a pond, stream, or puddle because standing water includes lots of bacteria and potentially also seeds as well as eggs, meaning that this way your mini-ecosystem will get some inhabitants.)
6. Seal your ecosystem in a jar
7. Place the jar at a sunny location

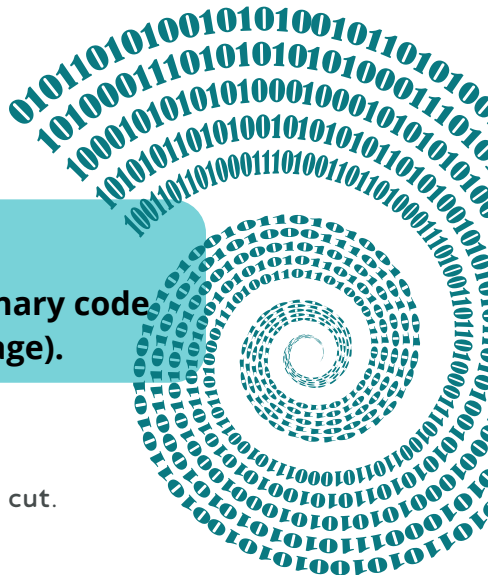
How does it work?

An ecosystem in a jar mimics a natural ecosystem, with plants and algae producing oxygen through photosynthesis while live organisms consume oxygen and emit carbon dioxide. Waste products from organisms, like nitrogen-rich waste and decaying matter, nourish the plants. Worms play a crucial role in maintaining ecosystem health by consuming algae and aiding in decomposition. Bacteria and microbes further contribute by breaking down organic matter and providing essential nutrients to plants. Condensation perpetuates the water cycle within the closed system. These intricate interactions create a self-sustaining circular system that can be observed and appreciated in detail, making the study of jar ecosystems a fascinating endeavor.

Make Your Own Binary Code Necklace

Binary is extremely important to the computer world. The majority of computers today store all sorts of information in binary form. This activity helps to demonstrate how it is possible to take numbers and translate them into messages.

Suitable for primary



What will you need

String, scissors, beads in 2 different colours, binary code reference sheet (provided on the below page).

1. Measure a string from the tip of your index finger to your elbow then cut.
2. Now you need 2 bowls of beads. Make sure they are in 2 different colours, for example blue and yellow.
3. Look at the binary code reference sheet (page below and associate colours with 1 or 0, for example: (number 1=blue colour beads and number 0=yellow colour beads)
4. Start at the last initial of the word you're coding. For example, if the last initial was E, the beads would be: 00101. When finished, tie a knot and wear it!

What is binary coding?

Binary coding is used to communicate and store information inside computers and other digital devices. Think of binary coding like a special language that computers understand. Instead of using letters or words like humans do, computers use only two symbols: 0 and 1. These symbols represent two states: off and on. This might seem limited, but when you put many 0s and 1s together in different patterns, you can represent all sorts of information, like numbers, letters, colors, sounds, and more!

For example, let's say you want to tell a computer to show the letter "A" on the screen. In binary, this might be represented as a specific pattern of 0s and 1s. Each letter, number, or symbol has its own unique pattern in binary.

So, binary coding is essential for computers to understand and process the information we give them. It's the backbone of everything we do with technology, from browsing the internet to playing video games to sending messages.

BINARY CODE ALPHABET REFERENCE SHEET

A	00001	N	01110
B	00010	O	01111
C	00011	P	10000
D	00100	Q	10001
E	00101	R	10010
F	00110	S	10011
G	00111	T	10100
H	01000	U	10101
I	01001	V	10110
J	01010	W	10111
K	01011	X	11000
L	01100	Y	11001
M	01101	Z	11010

Source: https://www.steampoweredfamily.com/

Earth in True Colours

In this activity, you'll explore the concept of the Overview Effect and get the chance to colour the Earth with your fingerprint!

Suitable for primary

What will you need

Earth template (page below), paint, water or wet wipes

1

Imagine you're on a spaceship, traveling far away from Earth, and then suddenly, you look out the window and see our planet from space. An unfamiliar experience hits you-it's called - the Overview Effect. It is what astronauts feel when they see Earth like that. It's a special feeling of awe and wonder that comes from seeing our planet as a whole, beautiful blue ball floating in space.

When astronauts see Earth from space, they realise how small and precious it is. They see how all the countries and oceans fit together like puzzle pieces. They notice that there are no lines dividing the land or oceans like on a map. Instead, they see how everything is connected, and they feel a strong sense of unity with all living things on Earth.

The Overview Effect makes astronauts feel grateful for our planet and want to take care of it. They understand how important it is to protect Earth's environment and make sure it stays healthy for future generations.

So, the Overview Effect is like a big "wow" moment that makes astronauts appreciate Earth even more and want to keep it safe and beautiful. It's a reminder that we're all part of one big family living on this amazing planet.

Want to learn more cool facts about space? Watch our interview with an astronaut by scanning (or clicking) this QR code.

2

Now, that you have learnt all about the Overview Effect - dip your fingers in paint and using your fingerprints - colour in the Earth! Don't forget to clean off the paint after you're done colouring.

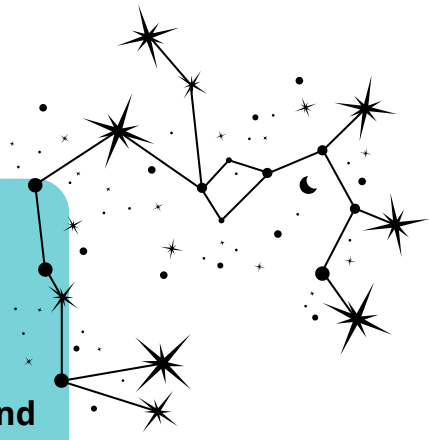
Did you know?

Earth Day is an annual event celebrated worldwide on April 22nd. It is a day dedicated to raising awareness about environmental issues and promoting sustainability efforts to protect our planet.

Marshmallow Constellations

Explore the constellations and create your very own 3D models of your favourites with sweets and marshmallows.

Suitable for primary



What will you need

- Marshmallows
- Spaghetti
- Black paper or fabric
- Images of Constellations (print out copies and laminate)

1. Invite participants to look at the constellation images provided.
2. Invite participants to choose a constellation that they would like to recreate using marshmallows and spaghetti.
3. Assemble the constellation, pushing spaghetti firmly into the marshmallows to secure them.
4. Display the constellations against black background.

Did you know?

A constellation is a recognisable (but imaginary) group of stars, visible in the night sky. Modern astronomers recognise 88 constellations.

Many of the constellations were named by ancient Greek astronomers using names of mythological people, creatures or objects.

When we observe the sky, the sun, moon and planets in our solar system appear to travel along a path called the ecliptic, which runs through the 12 famous constellations that we call the zodiac.

Some constellations shift with the seasons and others can only be seen depending on where you are on the earth ie northern or southern hemisphere.

Spinning Tops

In this activity, you'll make a spinning top from card and a split pin. You'll explore how your eyes see colour by spinning your top and recording what you can see.

Suitable for primary

What will you need

- Some card
- Felt tips or crayons
- A split pin
- Scissors

(Alternatively, you could use a cocktail stick or short pencil instead of the split pin.)

1. Draw a circle or hexagon on your card or use one of the templates (see page 43). Colour in your spinning top template or draw your own pattern on a blank one.
2. Carefully cut out around the circle or hexagon
3. Ask an adult to insert the split pin into the middle of your circle with the rounded end underneath, carefully open the split pin, this is where you will hold it as you spin it.
4. What do you predict will happen when you spin your disc, will you see all the different colours, or will they blend into one colour? What colour will it be? Will you still see your pattern?
5. Carefully spin your circle so that it rotates, was your prediction correct?

How does it work?

The light we see is made up of the different colours of the spectrum, these are the colours of the rainbow. The coloured pen on your spinner absorbs some of the colours of light and reflects some back to us. So, the blue section absorbs all the colours apart from the blue - which is reflected back for us to see.

When the spinner is moving, the colours are changing too quickly for you to see which colour you are looking at. This means that the colours appear to blend into each other.

When you used the pattern of two primary colours, you see this as a mixture of the colours, so a yellow and blue disc becomes green as it spins. When you spin a disc that is coloured with all of the colours of the rainbow, you see it as white.

Spinning Tops

What do you notice about how the spinning tops work? Here are some questions you might like to consider:

- Which size spinning top works best?
- How does your art design look as the top spins?
- Does the way you use your hand to spin the top make a difference to how well it spins?
- What do you think makes the tops spin and not fall over?
- What makes them stop spinning?
- What happens if the top of the split pin gets blunt?

The science behind spinning tops

What makes a spinning top spin? Forces!

When we use our fingers to set a top spinning, we are giving the top a force that converts its potential (stored) energy into kinetic energy (the energy of motion).

The law of the conservation of angular momentum states that if there are no other influences, something that is spinning will keep on spinning.

When the spinning top is spinning, it's balancing on the fine point of the split pin. This tiny tip minimises the amount of friction generated by its contact with the surface it is spinning on.
With only a tiny amount of friction influencing the spinning top it keeps on spinning for much longer. After a while, friction does slow the spinning. The spinning top will start to wobble and eventually stop spinning on the axis of the split pin and it will fall to one side. This change in orientation is called precession.

When the spinning top begins to tip, the force of gravity exerts a torque on the top. This makes it swing out more. The slower the top spins, the faster it tips. This is why you see it lurch outwards just as friction finally makes the top stop spinning.

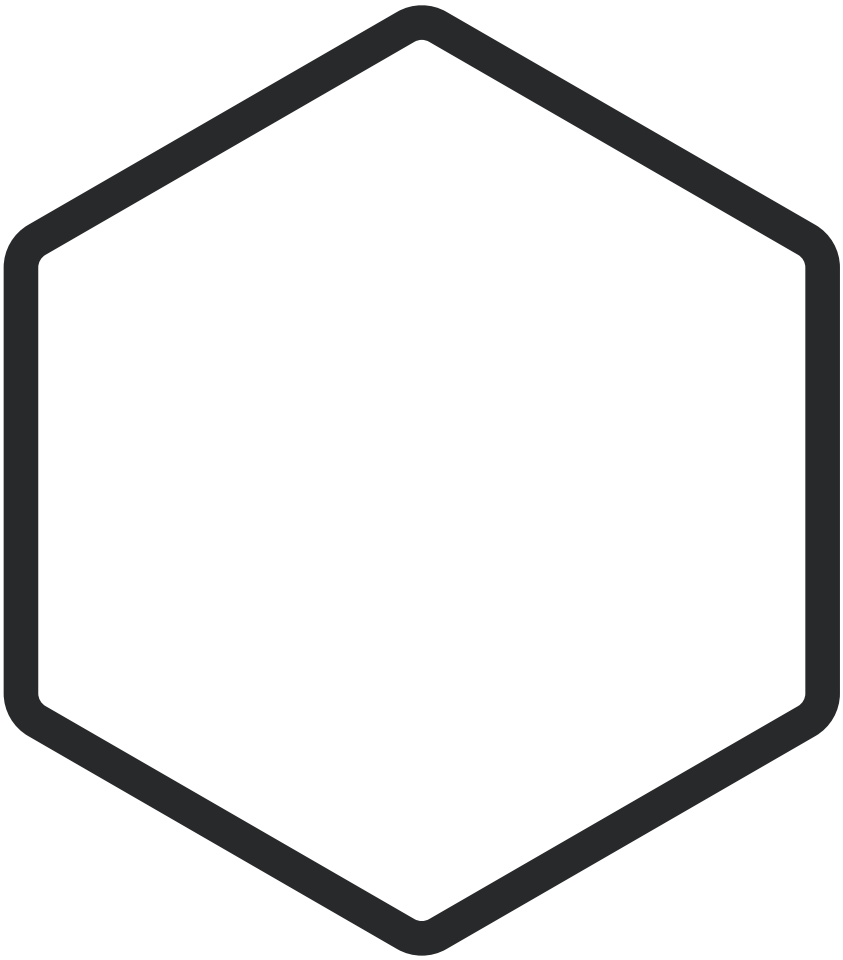
Extension Activities

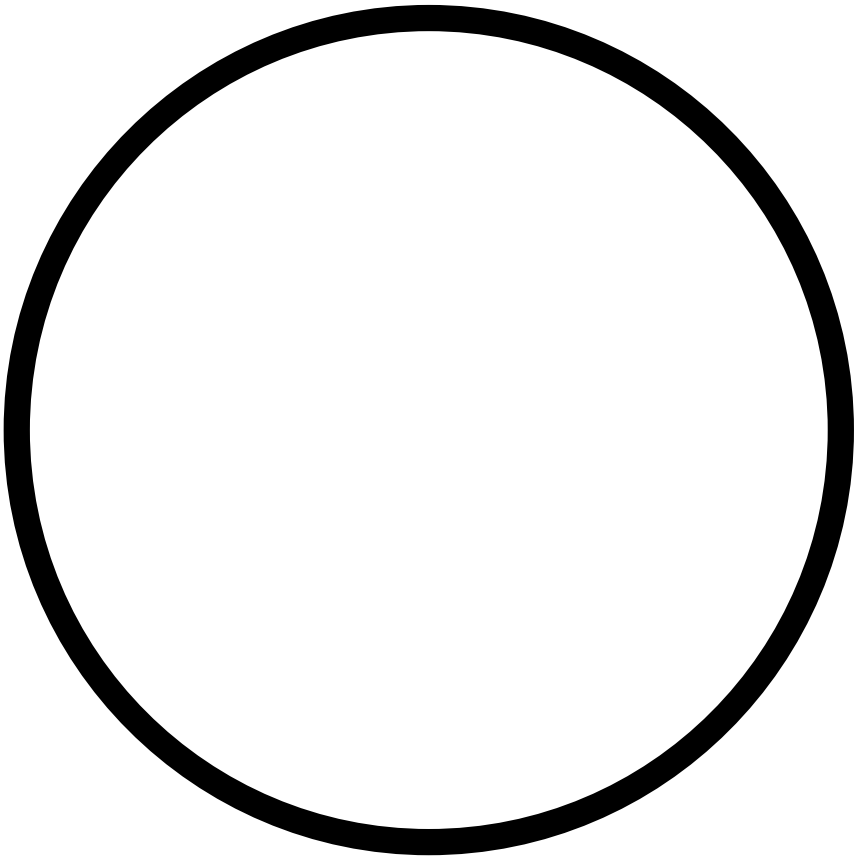
Once you have had a play with your spinning tops and considered how they work, you might like to try out these variations:

- Time how long the spinning tops spin. Does one spinning top consistently spin longer? Test out the spinning tops on of a variety of surfaces: on different textures and different gradients
- Test out spinning tops of different shapes. Instead of circles, make spinning tops out of squares, rectangles, and triangles. Make a prediction about how well they will spin and then test out the different shapes.
- Test out spinning tops of different sizes. Make predictions about whether a bigger or smaller spinning top will work best. Try out the different variations and see if you can explain why the different designs spin differently.

References

https://nurturestore.co.uk/easy-forces-science-lesson-plan-with-free-spinning-tops-printable
https://nustem.uk/wp/wp-content/uploads/2020/05/SAH_spinners.pdf https://heidisongs.com/blogs/heidi-songs/diy-optical-illusion-spinning-top-free-download





Can We Make Aluminium Float?

We want to think about density. If we want something to sink it has to be denser than the water. Therefore, any little air bubbles in the aluminium will help it float–think about a metal submarine.

What will you need

- **Plastic basin, half filled with water**
- **Aluminium foil**
- **Marbles**

1. Use a scrunched up ball of aluminium foil to show that it does not float.
2. Come up with a way to make the aluminium float. (You will need to hollow the aluminium out into a boat shape.*The aluminium floats when we make it into a hollowed out shape because it can now push aside (displace) its own weight of water.*
3. Try various items to float in your "boat" to see if it successfully stays buoyant.
4. The next task is to make the aluminium sink (much more challenging)
5. Speak through different designs and strategies to make it work.

Challenge:

How many marbles can your boat hold?
Float the aluminium 'boat' on the water in the basin and gently place marbles in the boat until it sinks. Count the marbles - how many did your boat hold?

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Super Star Awards - 7-11 year olds

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In addition to giving young people the opportunity to undertake hands-on science, CREST Awards are designed to help develop skills that are transferrable to other subjects, further education and future employment.

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