



**TECHFEST**

# Sociable Science



*miles of smiles :)*

# 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.

Activity 1: Make Others Smile Challenge  
p.2

Activity 10: Milk Art  
p.11

Activity 2: Making Your Own Toothpaste  
p.3

Activity 11: Animal Adventure from CREST  
p.12-13

Activity 3: Growing A Smile Activity  
p.4

Activity 12: Leaf Veins  
p.14

Activity 4: Making a Windflower Seed Ball  
p.5

Activity 13: Make your own medals  
p.15

Activity 5: Paper Cup Challenge  
p.6

Activity 14: Water cycle in a bag  
p.16

Activity 6: Music Maker from CREST  
p.7

Activity 15: Make a rain gauge  
p.17-18

Activity 7: Coding and Cyphers  
p.8

Activity 16: Make a rainbow rain  
p. 19

Activity 8: Soda and Mentos Explosion  
p.9

Activity 17: Alka-Seltzer rocket experiment  
p.20

Activity 9: Rocket balloon  
p.10

Activity 18: Making Non-Newtonian Fluid  
p.21

# 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.

# 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

**An empty pot/paper plate Cotton wool/Soil Cress seeds  
Water**

1 Take an empty pot.

2 Fill your pot up with soil/cotton wool up to about 1cm below the top of the pot.

3 Now sprinkle some cress seeds in a shape of a SMILE on the top of the soil, lightly press the seed into the soil/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 pot home with you 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.



# 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 compresses 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.

# 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 sound 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.

# Coding and Cyphers

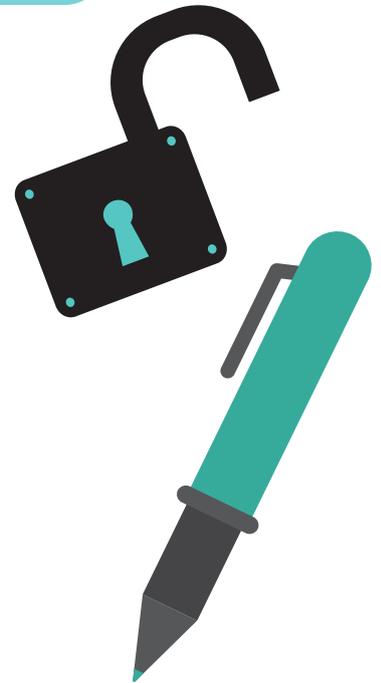
Become a special agent with a variety of activities where you will learn about making invisible ink and the secrets of cyphers. Why not use this method for making invisible ink to send secret messages to a friend?

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.

# 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 coca-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.

# 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.

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

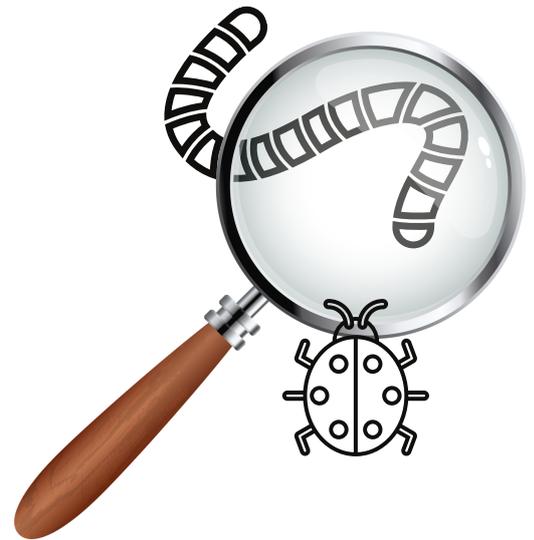
We're going on a mini beast hunt! Think about which areas the mini beasts will be hiding?

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 beasts 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).

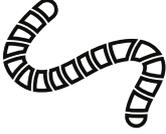
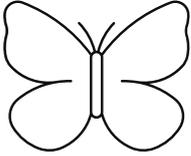
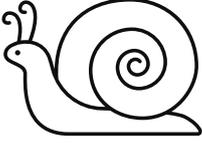
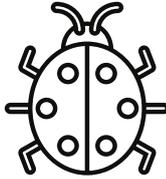
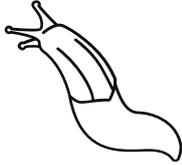
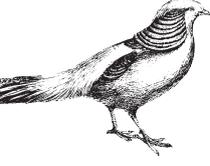
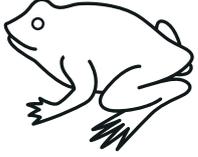
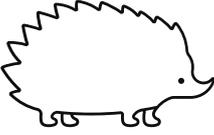
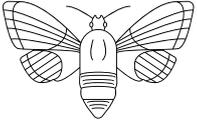
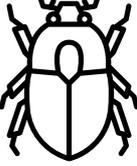
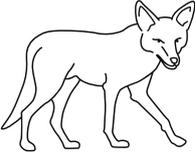
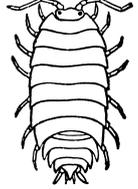
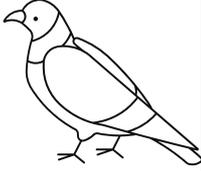
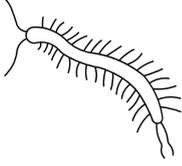
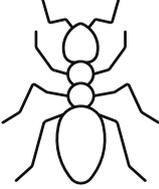
### Where can I find mini beasts?

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

# Animal adventures with CREST

## Animal Identification sheet

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

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

# Leaf Veins

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

Suitable for primary and secondary

## What will you need

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

1

Get outside and collect some green leaves 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.

# 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 acrylic 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.

# 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 important 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 bag 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".

# 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!

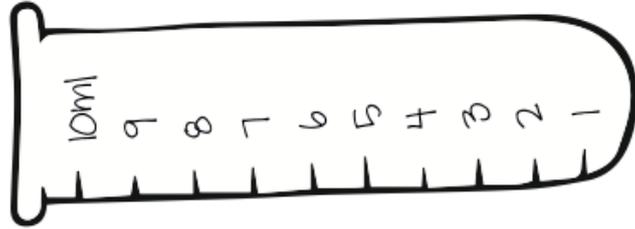


## So why is this useful?

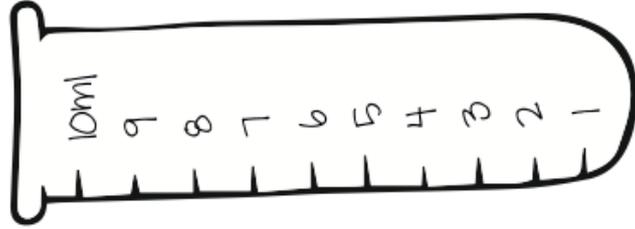
Now that your rain gauge is in place, either in the ground or hung up somewhere secure, you can start to track the rainfall in your garden. At the same time each day take a look at how far up the jar the water has reached- you can track this using the sheet on the next page!

# Weekly Rainfall Tracker

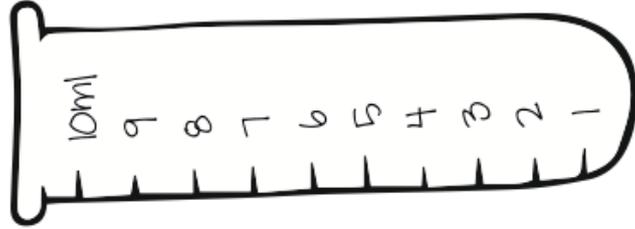
Monday



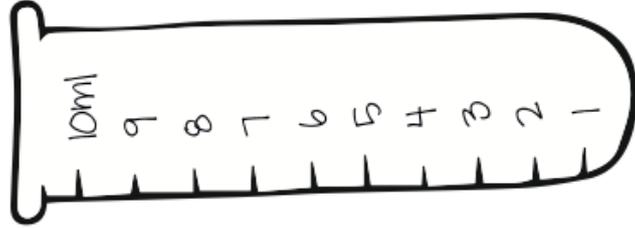
Tuesday



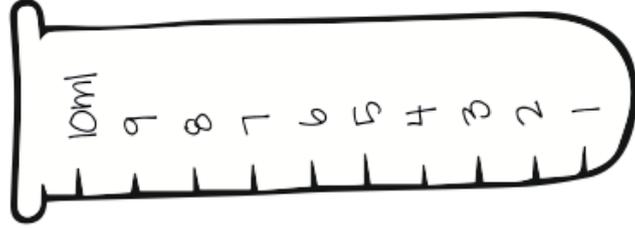
Wednesday



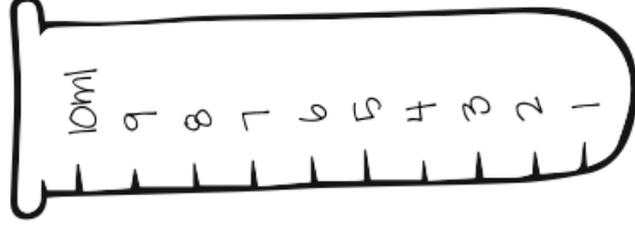
Thursday



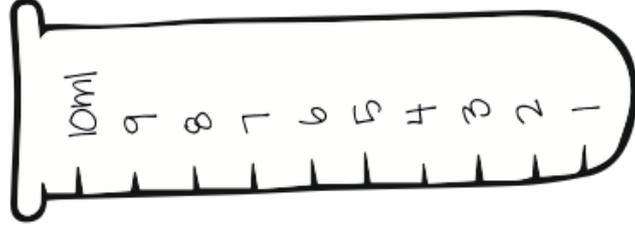
Friday



Saturday



Sunday



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).

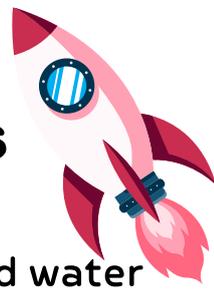
## What does this teach us about weather?

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/>

# 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  $\frac{1}{3}$  full.

3

Break an Alka-Seltzer tablet into quarters.

4

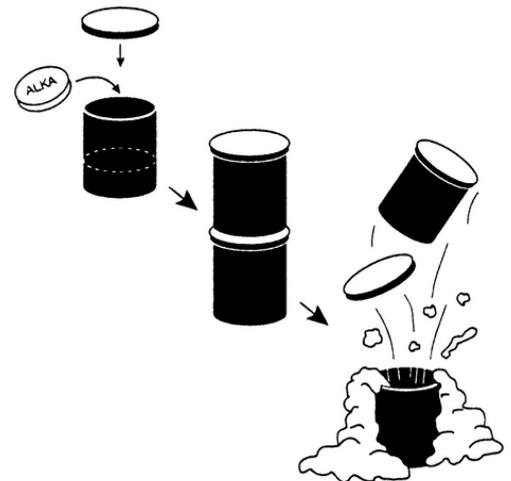
Put 1 quarter of the tablet on to the lid of the pot

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.

# Apply for your CREST Award

Star Awards - 5-7 year olds

Super Star Awards - 7-11 year olds

In order to gain your CREST Star or SuperStar Award you will need to complete 8 activities in total. You have already completed 4 during our Summer of Play Sociable Science workshops so why not complete 4 more activities provided in our booklet.

The children develop their investigative and teamwork skills. After completing all eight challenges, each child will receive a CREST SuperStar certificate and iron-on badge.

To apply for your CREST Star or SuperStar award for £1 visit

<https://apply.crestawards.org/>



THE **CREST AWARDS** SCHEME IS THE BRITISH SCIENCE ASSOCIATIONS FLAGSHIP PROGRAMME FOR YOUNG PEOPLE, PROVIDING SCIENCE ENRICHMENT ACTIVITIES TO INSPIRE AND ENGAGE 5 – 19 YEAR OLDS.

It is the only nationally recognised accreditation scheme for project work in science, technology, engineering and mathematics (STEM) subjects.

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.

To find out more about CREST Awards and to see how you can get involved visit the TechFest website: [www.techfestsetpoint.org.uk/crest](http://www.techfestsetpoint.org.uk/crest) or email: [kirstycranna@techfest.org.uk](mailto:kirstycranna@techfest.org.uk)

**TECHFEST**  
*digital*

TechFest is your Regional CREST Support Organisation for Scotland.  
[TechFest.org.uk](http://TechFest.org.uk)

To find out more information about CREST and how to register for awards follow the link below:  
[www.crestawards.org](http://www.crestawards.org)