

On the following 4 pages are some great science investigations (with thanks to @MrsBpriSTEM):

1. How to Grow a Rainbow
2. Unpoppable Balloon
3. Invisible Ink
4. Grown your own Hanging Crystals.

As I read through and thought about each one, I came up with loads of questions:

**Do permanent markers work too?**

**Is the ink invisible in all types of light?**

**Could I make the crystals coloured?**

**Could I make crystals out of salt? Or sugar? Or a mixture of both?**

**Does the shape of the balloon matter?**

**Does loo roll work aswell as kitchen roll?**

**Your task:**

Choose one of the activities to investigate thoroughly.

Gather the resources you need and set the investigation up.

Consider what results you will be recording, and how you will record them (results table, tally chart etc)

In your red book record:

1. The question you are investigating
2. Your prediction: What you think is going to happen, and why.
3. A diagram of the equipment all set up.
4. Draw your results table to complete with your findings
5. Write a sentence to explain what you have find out.
6. Was your prediction correct? Why? Why not?

I have prepared a template for you to copy to record this information. It's on the last page of this document if you wish to use it.

# How to Grow a Rainbow

## You will need:

- Kitchen roll/paper towel
- Felt tip pens
- Two small bowls of water
- Paper clip
- Thread



1. Cut your kitchen roll into the shape of a rainbow.
2. Colour a rainbow with felt tips about 2 cm up on both sides.
3. Attach your paper clip to the top and tie a piece of thread to it. This will give you something to hold your rainbow with.
4. Fill each small container with water.
5. Hold your rainbow with the ends slightly submerged in the water then watch your rainbow grow!



## THE SCIENCE

A brief introduction to 'capillary action'! Water molecules like to stick to things - including themselves. Sticking to things is called *adhesion* and sticking to itself is called *cohesion*. The fibres in kitchen roll make lots of little holes. Water is 'sucked' through the holes because of adhesion (liking to stick to other things) and cohesion (liking to stick to itself) means the rest of the water follows. The water pressure will eventually slow down and the pressure of gravity will mean it stops moving.

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# Unpoppable Balloon

## You will need:

- Balloon
- Skewer
- Oil or liquid soap



1. Inflate the balloon until it's nearly full size and then let about one-third of the air out.
2. Tie a knot in the end of the balloon.
3. Look at the balloon – there's a thick area of rubber at both ends of it (where you tied the knot and at the opposite end).
4. Coat the wooden skewer with a few drops of vegetable oil or dish soap.
5. Push the skewer through the thicker area of rubber at each end of the balloon – your family and friends will be amazed with your magic!

## THE SCIENCE

Think back to the polymers in the Leakproof Bag activity. The balloon is made of a similar polymer which contains molecules attached in long, flexible chains. Blowing up the balloon stretches these strands of polymer chains. At either end of the balloon, the rubber molecules are under the least amount of stress or strain so they are flexible enough to push apart by the skewer. The polymer chains at any other part of the balloon are under too much strain to be pushed apart without breaking.

How full can you blow the balloon and still get the skewer through?

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# Invisible Ink

## You will need:

- Lemon juice
- Cotton bud or a paint brush
- Cup
- Paper
- Candle



1. Add about 1 tablespoon of lemon juice to the cup. Fresh squeezed or bottled juice will work just fine.
2. Soak the cotton bud or paint brush in lemon juice and use it to write a message on your paper.
3. Once it is dry, it will be invisible.
4. CAREFULLY hold your paper over a lit candle to reveal your message – try not to set fire to the paper. Get an adult to help you and make sure you have a bowl of water next to you just in case!

You can also “iron” your paper but don’t use the steam setting. Put a dry cloth between the paper and iron to protect the iron’s surface.

## THE SCIENCE

The paper discolours before the rest of the paper gets hot enough to do so. Lemon juice contains carbon compounds which are colourless at room temperature. Heat breaks down these compounds and releases the carbon. When carbon comes in contact with air (specifically oxygen), oxidation occurs and the substance turns light or dark brown.

Try different fruit juices – or milk! – and compare the results.

# Grow your own Hanging Crystals

## You will need:

- Two glass jars
- Hot water
- Bicarbonate of soda
- Two paper clips
- String or wool
- Small plate

1. Pour hot water into the two jars and stir in bicarbonate of soda until no more will dissolve (about 6 teaspoons). When a layer forms at the bottom of the jars, this means no more will dissolve.
2. Tie a paper clip to each end of the piece of wool or string and place each end in each jar so it hangs between.
3. Put a small plate underneath the wool between the jars.
4. Leave the jars for a week. Crystals will begin to form along the wool - hanging down like stalactites. You may even get crystal stalagmites forming on the plate!

## THE SCIENCE

You've created a super-saturated solution. Hot water can hold more dissolved bicarb than cold water because the molecules are further apart. When the water cools, the bicarb can no longer 'fit' in the water and 'clings' to the wool. As the water evaporates, crystals form. These crystal strings get longer as more water drips down.



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My Investigation Question: \_\_\_\_\_

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**Equipment**

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**My Prediction**

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**Reasons for My Prediction**

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**Method - What I will do**

1. \_\_\_\_\_


2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

**Drawing of the Investigation****Results (What I found out)**

Material	Height of Rainbow (cm)

**Results (What do the results show you)**

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**Conclusion (Explain what happened and what you would change if you did this again)**

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