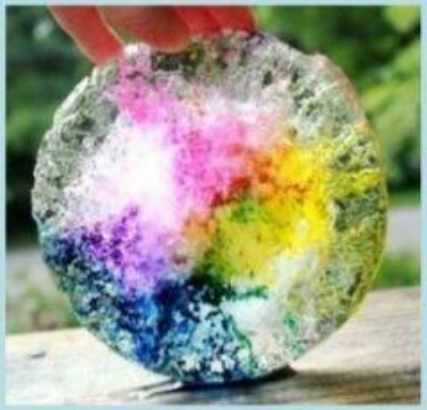
Ice and Salt Rainbow

You will need:

- Plastic containers and bowls
- Water
- Salt
- Tray
- Food colouring/liquid watercolours
- Pipette/spoon/ paintbrush



1. Fill different sizes and shapes of container or bowl with water and freeze overnight.
2. Remove the ice from the containers and place in a tray. Mix food colouring/paint with water and put aside for now.
3. Sprinkle salt over the ice or leave small piles of salt and watch the ice begin to crack.
4. Using a pipette, spoon or a paintbrush, dot the surface with food colouring/paint. This won't colour the ice – but will highlight the ravines, crevasses and tunnels that form in the ice as the salt melts it.
5. You can add more salt and colouring - or not - explore however you like!

THE SCIENCE

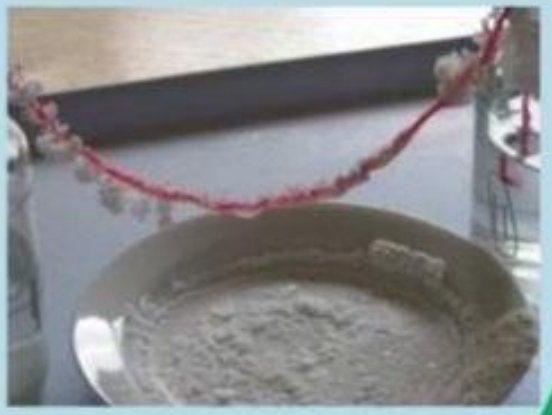
Water turns to ice at 0°C. Ice without salt melts due to the difference in temperature of the ice and the air round it. When you add salt, it dissolves into the water on the surface of the ice. Salt water has a lower freezing point than water so there is a bigger difference between the air temperature and ice. This is why ice with salt melts quicker.

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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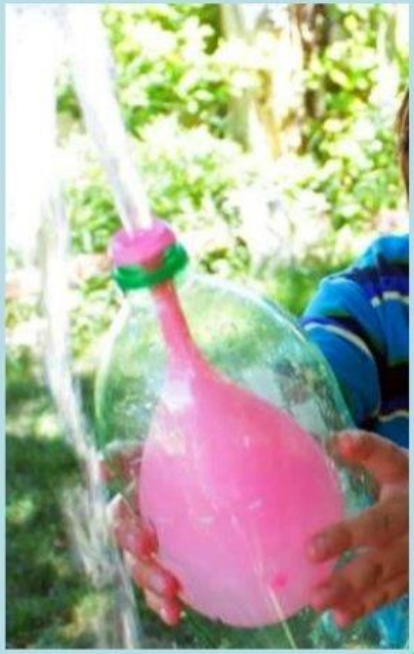
Water Volcano in a Bottle

You will need:

- 2l plastic bottle
- Balloon
- Water

1. Put the balloon inside the bottle and stretch the end around the opening. Try to blow up the balloon – you won't be able to!
2. Cut a ¼ inch hole in the side of the bottle near the bottom and try again. The balloon will inflate as the air inside the bottle can escape through the hole. If you put your finger on the hole it will lock the pressure and keep the air inside.
3. While the balloon is blown up (with your finger over the hole) fill the balloon with water.
4. When you're ready, move your finger to start your water volcano!



Put the lid on your bottle to keep the balloon inflated without having to cover the hole. The balloon needs both holes uncovered to deflate!

THE SCIENCE

The balloon won't inflate much the first time because the bottle is already filled with air. There's no room for the balloon to expand inside the bottle. However, when you put a hole in the bottle, the air is pushed out as the balloon fills the space inside. As long as you plug the hole, the balloon stays inflated. When you take your thumb off the hole, outside air flows back into the bottle which pushes air (or water!) out of the balloon.

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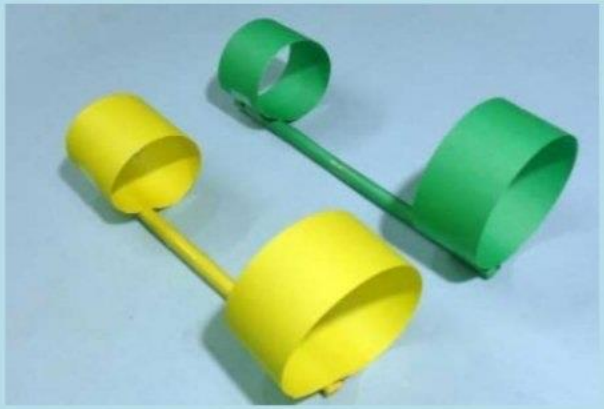
The Incredible Hoop Glider

You will need:

- Card
- Tape
- Paper straw (or a tube of rolled up card if you don't have one)

1. Cut 2 strips of card so that one is twice as long as the other (you may need to stick some together!)
2. Loop your strips into a bigger and a small circle then tape to secure.
3. Using a straw (or tube of rolled card), tape the hoops you have just made to either end of the straw. It works better if you tape the straw to the inside of the hoops.



4. You're ready to fly! Hold the straw in the middle with the hoops on top and throw it in the air slightly angled upwards. With some practice, you can get it to fly much further than many paper aeroplanes.

THE SCIENCE

Gravity pulls the glider down and the hoops acts as wings and lift the glider up. The two sizes of hoops help to keep the straw balanced as it flies. The big hoop creates "drag" (or air resistance) which helps keep the straw level while the smaller hoop in at the front keeps your glider from turning off course.

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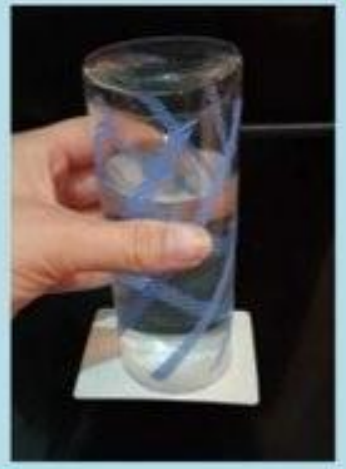
Upside Down Glass of Water Trick

You will need:

- Glass
- Card big enough to cover the top of the glass (a playing card is good)
- Water

1. First, check the card is big enough to completely cover the opening of the glass.
2. Fill your glass with water almost to the top.
3. Place the card over the opening of the glass and tip the glass upside down (with your hand on the card).
4. When you're feeling brave, remove your hand. Make sure you practice over the sink a few times first!
5. Mastered the technique? Hold it over someone's head!



Try filling your glass with different amounts of water and see if the trick still works.

THE SCIENCE

In fact, this isn't a trick at all – it's all to do with air pressure! Even though it doesn't feel like it, the air around us pushes in all directions. The water acts as a 'seal' between the glass and the card. The air pushing up from underneath the paper is strong enough to stop the weight of the water from pushing the card down. Because of this air pressure, the card will stay on the glass and the water will not spill out. When the seal is broken (even a tiny bit), air enters into the cup and gravity pushes the water out.

How are the Moon's Craters Formed?

You will need:

- Cake tin
- Flour
- Hot chocolate powder
- Rocks

1. Fill a cake tin with about an inch of flour.
2. Use a sieve to add a thin layer of hot chocolate powder.
3. From a height, drop different sizes of rock and watch the craters form!

What do you notice about different sized rocks dropped from the same height?

What do you notice about the same size rock dropped from different heights?

What happens if you throw the rock at an angle?

THE SCIENCE

Craters are formed when rocks hit the moon. These collisions also cause 'ejecta patterns' which are the lines coming from the craters which you can sometimes see on a clear night. As your rocks hits your 'moon surface' you will see the crater and ejecta patterns which will be different for different sized rocks. Throwing your rocks at an angle will also cause changes to your ejecta patterns.

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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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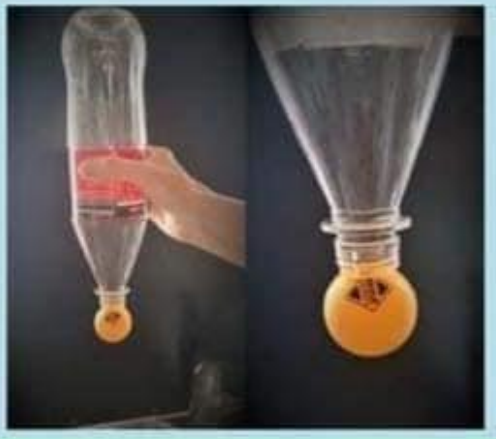
Levitating Ball Trick

You will need:

- Plastic or glass bottle
- Ping pong ball
- Water

1. Fill the bottle so that the water is almost overflowing.
2. Place your ping pong ball over the opening and push down.
3. While holding the ball, turn the bottle upside down.
4. Let go of the ball and watch it stay in place!



If you're having difficulties with this, slightly roll the ball while it is upside down before letting go.

THE SCIENCE

This is similar to the upside down glass of water trick (refer to that one for the Science behind air pressure). Just like the glass of water, the air pressure outside the bottle is higher than inside so the ball stays in place. But can't air get through the gap between the opening and the ball? The small water particles on the surface of water cling together very strongly. This property of water is called a strong "surface tension". The weaker this surface tension is, the easier air can pass through the surface. The surface tension of water is big enough and the slit between ball and bottle small enough that air can't penetrate the surface and get into the bottleneck.

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Nature's Paintbrushes

You will need:

- Twigs
- A selection of leaves, grasses or flowers
- Elastic bands
- Paint
- Paper

1. Collect some strong twigs and a selection of leaves, branches, grasses or flowers with stalks. You can use whatever you find and whatever you like so have a good explore.
2. Carefully secure your leaves or flowers to the end of a twig by wrapping an elastic band round and round them. Use all sorts of different flowers and leaves that will give you different textures and make different marks when they are used as paintbrushes.
3. Dip your nature paintbrushes into paint and see what textures, lines and patterns they make when you paint with them on paper.

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Colour Mixing Spinner

You will need:	
• White paper • Card • Felt tip pens	• 3 different sized circular objects to draw around (glass, bottle top etc.) • String

5. Draw around your biggest circular object onto paper then the other two smaller circles inside this. Try to make the circles equal distance apart.
6. Draw a line through the middle of the disc. Each of the three circles in the disc should now be divided in half.
7. Repeat so you have two.
1. Colour half of each circle in a different colour – alternating so the same colours aren't next to each other.
2. Cut out a circle of card and stick your coloured discs to either side.
3. Poke two holes in your spinner and thread though about a metre of string. Tie the ends to secure.
4. Now you're read to spin! Hold each end of your string and spin your disc so the string winds up. Once the string is twisted, pull it tightly to start your disc spinning! Watch as your colours mix together!

THE SCIENCE

The colour mixing that happens is due to the speed at which the wheel is spinning as the string twists. The colours are spinning at such a rate that your brain is unable to process them as the individual colours that are on the wheel. Instead, your brain takes a shortcut and mixes the colours.

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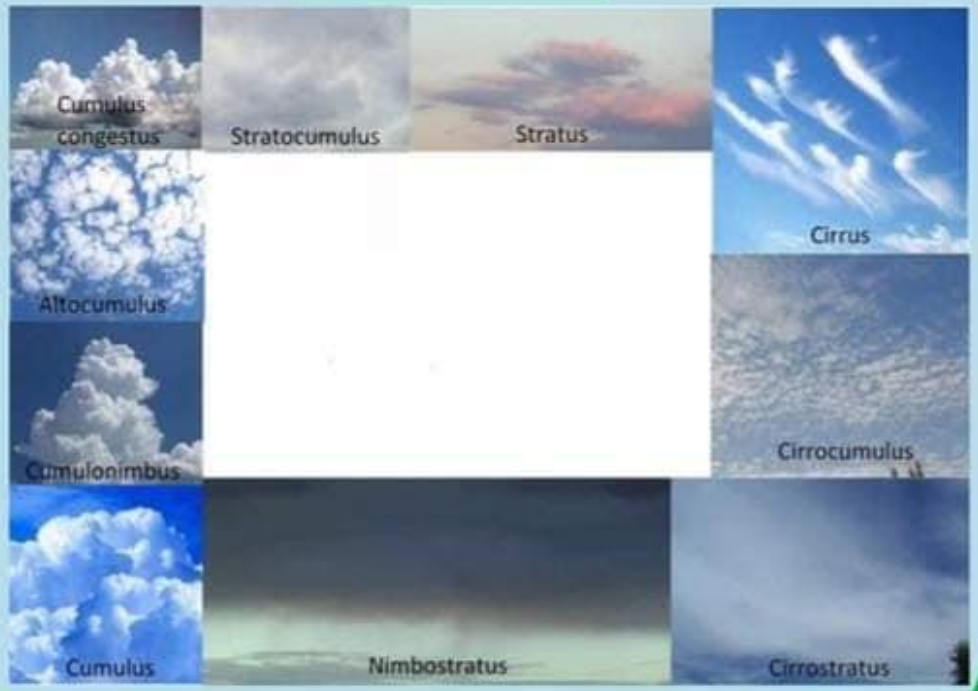
Cloud Viewer

You will need:

- Cloud viewer
- Card
- Lolly stick

1. Print the cloud viewer, remove the white rectangle then stick it to a piece of card to reinforce it.
2. Add a lolly stick to hold (optional)
3. Hold it up to the sky and see which clouds you can spot!

WARNING – never look directly at the sun



High altitude clouds:

Cirrus
Cirrocumulus
Cirrostratus

Low altitude clouds:

Cumulonimbus
Cumulus
Stratus
Stratocumulus

Middle altitude clouds:

Cumulus congestus
Altostratus
Nimbostratus

http://sprout-and-squidge.blogspot.com/2012/10/cloud-viewer.html

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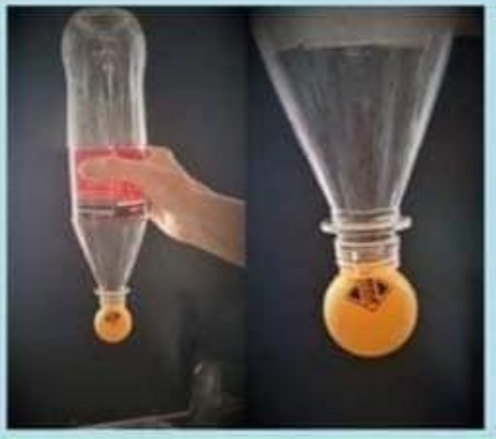

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