

# DIY Lava Lamps

You will need:

- Vegetable/sunflower oil
- Vinegar
- Food colouring
- Bicarbonate of soda
- Tall glass or bottle
- Spoon
- Small cup



1. Add three spoons of bicarbonate of soda into the tall glass or bottle.
2. Fill two thirds of the container with oil – but don't mix!
3. In the small cup, add some vinegar and several drops of food colouring.
4. Slowly add drops of your coloured vinegar into your oil/bicarb mixture and watch your lava lamp come to life!

Why not try adding different colours to your lava lamp?

## THE SCIENCE

Oil and vinegar do not have the same density (how heavy something is for its size). Vinegar is more dense than this type of oil - that's why it sinks to the bottom of the container.

Once the vinegar touches the bottom of the container, it reacts with the bicarb.

This chemical reaction creates bubbling carbon dioxide which rises – these are the bubbles you see within the container.

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# Fireworks in a Glass

You will need:

- A glass or jar
- Small bowl
- 3-4 tablespoons of oil
- Warm water
- Food colouring (different colours)
- Fork



1. Fill the glass or jar about  $\frac{3}{4}$  full with warm water.
2. In a separate bowl, add 3-4 tablespoons of oil and carefully add a few drops of different coloured food colouring.
3. Mix it all gently with a fork - just enough to disperse the food colouring a little bit. You'll notice it doesn't mix with the oil - it just breaks up into smaller dots.
4. Pour the oil and colour mixture into the warm water.
5. Watch as the coloured drops sink down into the water and mix together creating a firework effect.

## THE SCIENCE

This is all to do with the density of each liquid (how heavy it is for its size). Food colouring dissolves in water but not in oil. Because the oil is less dense than the water, it will float at the top. The coloured droplets sink because they are denser than the oil. As they sink to the bottom of the oil, they mix with the water and begin to dissolve, creating tiny 'explosions'.

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# The Leakproof Bag

You will need:

- Sharpened pencils or skewers
- A sealable bag
- Water

1. Make sure your pencils are sharp before you begin.
2. Fill three quarters of your bag with water and seal it.
3. Holding the top of the bag with one hand, use the other hand to push a pencil right through to the other side. Like magic, there are no leaks!
4. Repeat with several pencils – making sure they are pushed through in different places on the bag.

Test how many pencils your bag can hold!

Do pencils with flat or round edges work best?

Try different thicknesses of bag to see which works best.



## THE SCIENCE

The Science for this one is quite complicated! The bag is made out of a polymer which has lots of molecules attached together in long chains (think strands of cooked spaghetti!). The tip of the pencil can easily push apart the flexible strands of spaghetti but the strands' flexible property helps to form a temporary seal against the edge of the pencil. When the pencil is removed, the hole in the plastic bag remains because the molecules were pushed aside permanently and the water leaks out.

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# Nature Bracelets

You will need:

- Tape of any variety - I prefer the wider, transparent parcel tape but any tape will do!



1. Cut tape so it fits loosely around the wrist.
2. Attach so the 'sticky' part of the tape is facing out.
3. Decorate and enjoy!

## EXTENSION

Why don't you create a rainbow bracelet, hunting for something to include for each colour of the rainbow?



Use a wild flower or leaf identification chart to name the flowers and leaves you are attaching to your bracelet.

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# Tornado in a Bottle

## You will need:

- Two empty plastic bottles (same size)
- Either a metal washer or a sharp knife
- Strong tape
- Water
- Glitter (optional)



1. Fill 1 bottle about two thirds full of water.
2. You have two options here. Either place a metal washer between the two bottles and use strong tape to join the bottles together. Alternatively, ask an adult to use a sharp knife to cut a hole in the plastic lid of one bottle before taping the bottles together.
3. Tip the bottles so the full bottle is on top.
5. Quickly move the top bottle in a swirling motion to create your tornado.

## THE SCIENCE

If you've ever watched the water drain from the bath, you've seen a vortex. A vortex is a type of motion that causes liquids to travel in spirals around a centre line. The vortex in this experiment is created when gravity pulls the water through the opening to form a rotating tornado.

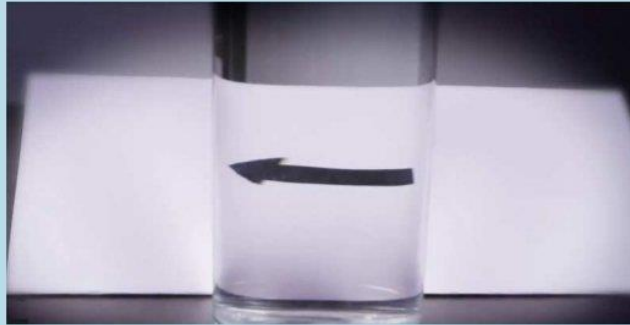
4. You can also add glitter to the water to make your tornado stand out.

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# Reversing Arrows

You will need:

- Glass
- Paper
- Pen
- Water



1. Draw an arrow on a piece of paper and prop it up against something so it stands. Make sure you pay attention to the direction the arrow is pointing!
2. Put an empty, transparent (see-through) glass in front of the arrow.
3. Fill the glass with water and watch what happens to the direction of the arrow!

Does it still work with different sizes and shapes of glass?

Try writing backwards messages to reveal as you fill the glass!

## THE SCIENCE

This concept is called *refraction* which means the bending of light as it passes from one 'medium' to another. During the experiment, the light travelled from the image, through the air, into the glass and water, then out of the glass and into the air once more before it reached our eyes. This means that the light bends once when it travelled through the glass into the water, and then it bends again when it travelled out of the glass and into the air. As a result, the light paths cross and the image appears to be flipped horizontally (left/right).

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# Unpoppable Balloon

You will need:

- Balloon
- Skewer
- Oil or liquid soap



## 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.

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!

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

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# Balloon Rockets

## You will need:

- Balloon (round ones work but the longer ones are best)
- String
- Straw
- Tape
- Clothes peg



## THE SCIENCE

The rocket moves by something called thrust. As the air rushes out of the balloon, it creates a forward motion called thrust. Thrust is a pushing force created by energy. This thrust comes from the energy of the balloon forcing the air out. Different sizes and shapes of balloon will create more or less thrust. In a real rocket, thrust is created by the force of burning rocket fuel as it blasts from the rocket's engine – as the engines blast down, the rocket goes up.

1. Tie one end of a piece of string to a chair, door handle etc. or have someone hold the end.
2. Put the other end of the string through a straw and pull the string tight.
3. Inflate the balloon, twist the end and secure it with a clothes peg.
4. Use tape to attach the balloon under the straw.
5. Release the peg to launch your rocket!

Mark on the string with pen where your balloon ends and try to beat it.

Why not set up two and have a race?

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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.

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# Framing Nature

You will need:

- Cereal box
- Scissors
- Camera



1. Cut out a cardboard frame from a cereal box. Ask an adult to help with the centre!
2. On a walk or in the garden, use your frame to capture nature.
3. Take a photograph and create a nature collage!



## EXTENSION

Why don't you draw or paint what you have captured in your frame?

Use your images to create a book about nature. Label each flower, plant or tree and add a description.

Start a project about cloud formations and use your frame to capture the different cloud formations.

Take time to notice and appreciate the beauty of nature around you.

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# Floating Ghosts

You will need:

- A tissue (or tissue paper if you have it)
- Balloon
- Tape
- Scissors
- Pens to add detail!



1. Draw a ghost on your tissue or tissue paper and cut it out. If you are using 2-ply tissues, peel apart the 2 layers to get the tissue as thin as possible.
2. Tape the bottom of your ghost to the table with a very small amount of tape.
3. Blow up the balloon and tie it.
4. Rub the balloon very quickly on your hair or jumper for 10 seconds.
5. Slowly bring the balloon near the ghost and the ghost will begin to rise towards the balloon.



## THE SCIENCE

An introduction to static electricity! All things are made of matter and matter is made up of tiny things called atoms. Inside of atoms, there are even smaller particles called neutrons, protons and electrons. When you rub the balloon on your hair, electrons (with a negative charge) transfer from your hair and build up on the surface of the balloon. The electrons have the power to pull very light objects (with a positive charge) toward them – in this case, the tissue ghost!

Try different designs (birds, butterflies, flowers etc.) and make them float!

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