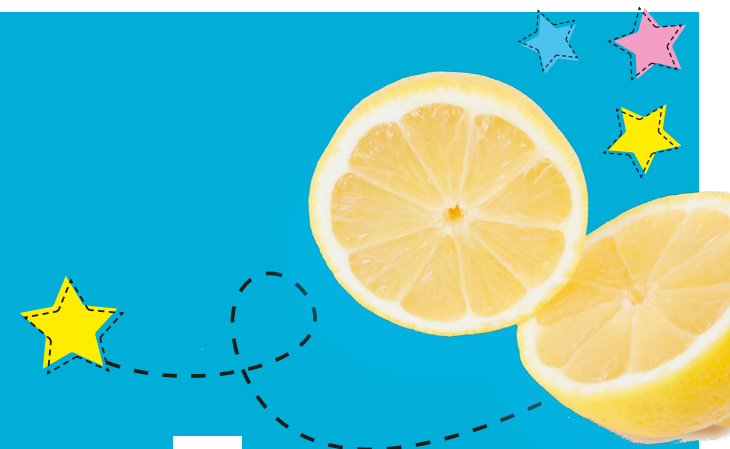


Science Home Learning Pack:

Practical Science



Invisible ink

You'll need to remember what you have written, because you can't see it!

Want to keep something secret? Here's a way to stop your plans falling into enemy hands. You don't need fancy spy equipment – all you need is a lemon!

Now you see it...

You will need:

- Lemon • Bowl
- Paintbrush or cotton buds • Paper
- An Iron

Lemons can do magic!

Making ink



1 Squeeze a lemon into a bowl.



2 Write your secret message on the paper in lemon juice with a paintbrush or cotton bud.



3 To decipher the message, ask someone to iron the paper with a hot iron until the message comes through.

Book of magic

Keep your tricks and spells safe and sound in your very own magic book. Take two pieces of cardboard and some paper, punch two holes down one side of them, and tie them together with a ribbon.



Key Stage 1
5 – 7 years old

These magic messages will remain invisible to all non-wizards

Stick your spells into your magic book.

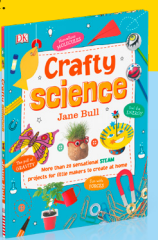


Rub a damp tea bag over your paper to make it look old.

What's the science?

This trick works because **lemon juice is an acid**. When you put it on the paper the **acid destroys some of the paper surface**, so that when you heat it, the areas with the message turn brown first. If you haven't got lemon juice, try it with milk, which is also slightly acidic.

! Ask an adult to help you with the iron – it gets hot!



Extracted from *Crafty Science* by Jane Bull OUT NOW



YOU WILL NEED

- * Rubber gloves
- * Large Pyrex® beaker
- * Vegetable oil
- * Small Pyrex® tube
- * Water



1 Put on some rubber gloves and fill the large beaker about three-quarters full with oil.



The tube is easy to see in the oil...

2 Take the small tube and carefully insert it into the oil.



...and now it's gone!

3 Now push the small tube down to allow oil to flow into it. Watch the tube disappear as the oil rises up!

NOW TRY THIS

Try the experiment again, but this time fill the beaker halfway with water before adding the oil. The tube is now visible... but only in the water! Read The Science Bit to find out why.



The water stays at the bottom, giving you a peek at the tube inside.

DISAPPEARING GLASS



You've probably seen magicians make objects like coins or playing cards disappear. Here's a disappearing act you can do yourself using the science of bending light.

THE SCIENCE BIT...

When you turn on a light, it shines on everything, bouncing off objects and into your eyes. Glass, though, is transparent, meaning that light passes through it instead of bouncing off it.

If light doesn't bounce off glass into your eyes, how can you see it? It's because light bends a bit when it passes from air to glass. If you look at a glass, the light coming through from behind it bends and everything looks wobbly (see image, right). When light passes from oil to glass, it hardly bends – dipping the glass in oil, the wobbles go away and the glass disappears! Light bends a bit between water and glass, which is why you can see the glass in water.



1



Add 600ml (1 pint) water, 6 tsp sugar, 2 tsp lemon juice, and 4-6 drops of a food colouring to a jug. Stir to dissolve the sugar.

2



Pour equal amounts into four glasses so you have four identical-looking coloured drinks.

TRICK YOUR TASTE BUDS

This fun trick proves that flavour is hugely influenced by **senses other than taste**, and that even **sight alone** can fool us.

Don't let people see you set up the trick as it may affect the results.

3

Repeat this process with different food colouring, making up jugs with 6 tsp sugar and 2 tsp lemon juice in each. Pour into glasses until each person has a rainbow of five different coloured drinks.



4

Copy the chart below onto paper and give each of your four friends a copy. Tell them to taste each drink and mark an "X" in the box to show what they think is the flavour of each drink.

5

Compare the answers and see if your friends made choices based on the colour of the drinks. They will almost certainly have strong opinions about what the drinks are, even though the drinks all taste exactly the same!

Why this works

The brain begins to form an expectation of flavour as soon as we see food or drink, way before we've even tasted it. This expectation can be enough to transform our actual experience, and can make us think that identical-tasting drinks taste different just because they are different colours.

You will need

- Water
- Caster sugar
- 3-4 lemons, juiced
- Red, orange, yellow, blue, and green food colouring
- Large jug
- Spoon
- 20 small glasses or cups
- Paper and pens

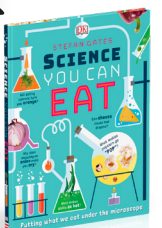
These amounts are for four people, but you can scale the recipe up or down so more or fewer people can take part.

WHAT FLAVOURS ARE THE DRINKS?

Put an 'X' in the box that matches the flavour to the colour

	Lemon	Strawberry	Blueberry	Apple	Orange
Red drink					
Orange drink					
Yellow drink					
Blue drink					
Green drink					

This trick may not work on all your friends - some of them may figure it out! If they do, congratulate them on their sense of taste!



HOW TO MAKE A WIND-UP CAR

This wind-up car is powered by energy stored in a coiled mainspring made of paper. Its axles (the rods connecting the wheels) are made from a garden stick, while its bearings (the tubes that allow the axles to turn freely) are made with paper. The axles and bearings are attached to the car's frame, or chassis.



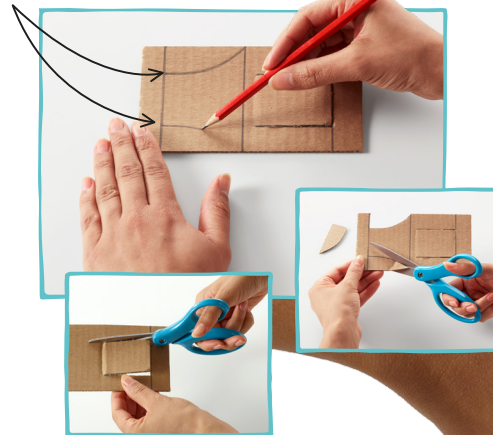
WHAT YOU NEED

- 15 x 8cm rectangle of cardboard
- 2 x 11cm of garden stick
- A4 piece of paper (cut into two 3cm x 29.7cm strips and a 15cm x 29.7cm strip)
- Double-sided tape
- Four plastic bottle tops
- Pencil
- Glue
- Adhesive putty to protect your fingers (optional)
- Ruler (optional)
- Safety scissors

MAKE THE CHASSIS:

- On the rectangle, draw two dots at one end, 2cm in from the end and sides. Join the dots with a line.
- Draw two 5cm lines from each dot at right angles from the first line. Cut along the lines to create a flap.
- At the other end, draw two lines, 1 and 7cm from the short edge.
- Along the 1cm line mark two dots 2cm in from each of the long edges.
- Connect the dots to the ends of the 7cm line with a curved line. Cut along the curve and discard the pieces.

The dots should be 2cm (3/4 in) in from each end of this line.



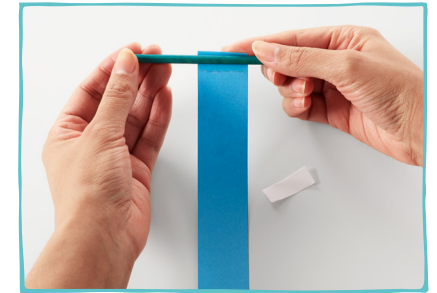
Paper becomes very strong when it is rolled up.

THE BEARINGS:

- Roll the 15cm x 29.7cm strip of paper lengthways to make a tube. Seal the tube with tape.
- Cut into two 1cm pieces and one 4cm piece. These are your bearings.

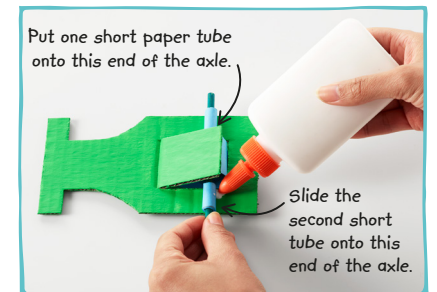
THE SPRING:

- Stick the two long strips of paper together using tape to make one 3cm x 29.7cm piece.
- Tape one end of the long paper strip to the middle of one piece of garden stick. Coil the paper tightly around it (but don't secure it with tape).



ASSEMBLING THE CAR:

- Lift the flap in the chassis. Place the spring over the hole. Turn the chassis upside down and pull the spring through, then fix the end of the spring to the chassis.
- Turn the chassis over. Place a 1cm bearing over each end of the axle so there is one on each side of the flap.
- Put the other garden stick into the 4cm bearing. Glue the bearing to the front of the chassis. Leave it to dry.
- Carefully make the wheels: insert a small hole in each of the bottle tops and put them onto the ends of the garden sticks.
- Wind up the spring by pulling the car backwards and then let go!



You can work out your car's average speed by dividing the distance it travels by how long it takes.



The mainspring's energy is converted into kinetic energy, then lost as heat at the axles and ground, due to friction and air resistance.

