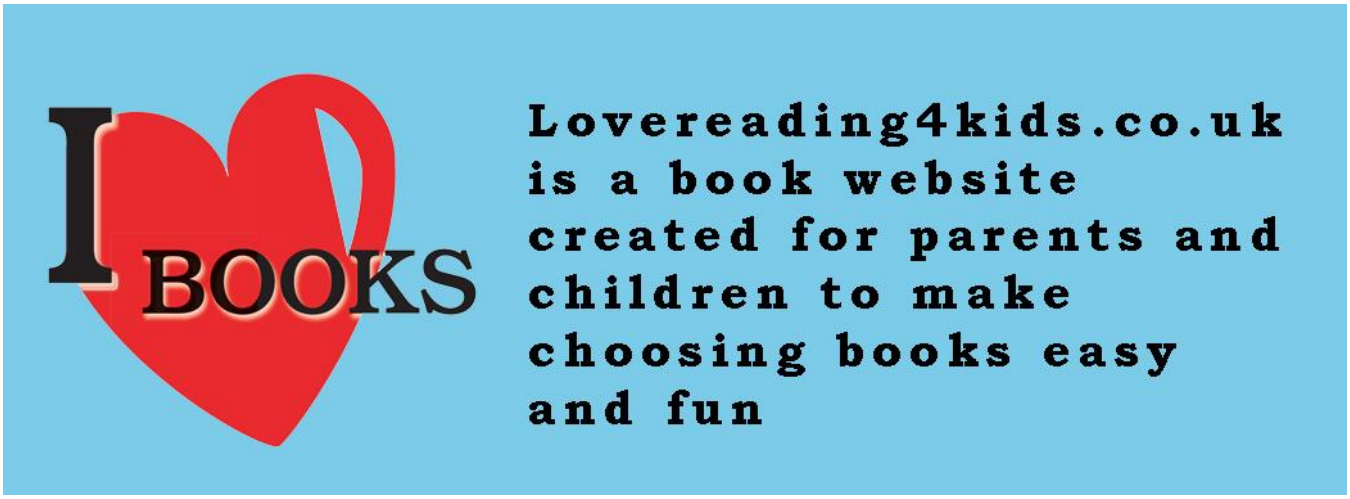


Opening extract from

101 Brilliant Things for Kids to Do with Science

Written by

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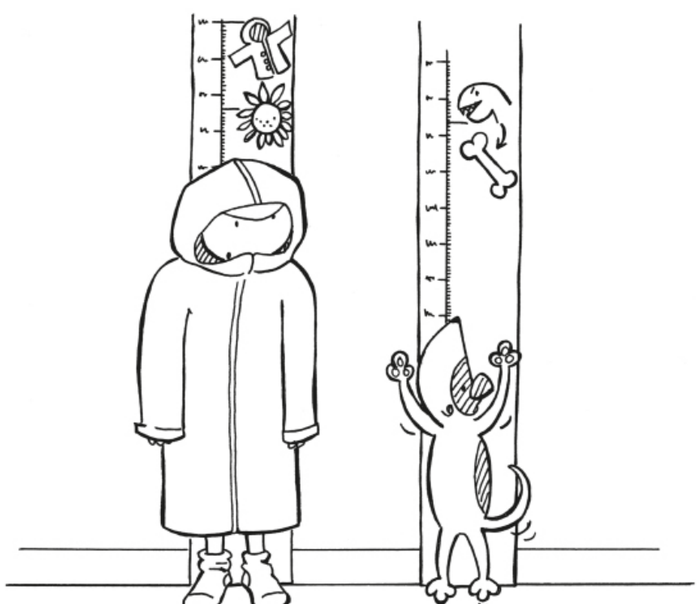
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For my four favourite people:
Reuben, Ava, Oscar and Archie.





Blow a bubble snake

Eat a rainbow





Launch a rocket

Build a snack delivery zipwire





Chop up a fruit salad

Levitate a ping-pong ball









Booby trap a bottle



Polka dot a lawn

Make a giant naked egg



Grow magic roots

Make a gravity-powered water siphon fountain

Why make this? Because when your parents ask you 'What are you going to do today?' you can say 'I'm making a **gravity**-powered water **siphon** fountain' – and watch the look on their faces. Seriously, it's totally worth it.

To begin this impressive-sounding project you'll need a small plastic bottle. Take off the lid, push sticky tack inside the cap and then use something pointed like an old pen or the end of scissors twisted round and round on top of the cap to make two holes (you will need to get your parents to stop gawping at your genius and oversee this bit as it can be a little tricky).

When the holes are large enough, remove the sticky tack and push a straw through each space – one straw should stick out about 10cm below the lid, the other about 4cm. Now take your sticky tack and carefully mould it around the joins between the straw and the top of the lid so all gaps are sealed.

Before replacing the lid, add water to the bottle – it needs to be deep enough to cover the shorter straw end when the bottle is turned upside down.

Fill a glass with coloured water and raise it up on some sort of object (a stack of books for example) before placing an empty glass of the same size on the surface below. Cover the end of the long protruding straw with your thumb and tip your bottle upside down so the short straw end is sitting in the coloured **liquid** and the long straw end is positioned over the empty glass.

Now, take your thumb off the end of the straw and watch!

You will see water running into the lower beaker and then coloured water rushing into the bottle – or gravity pump – causing a fountain of water to erupt inside this. You will also probably see your parents staring in amazement at your brilliance.

If you haven't caused enough mayhem yet:

Try taping straws together to get a longer siphon, and then raise the top glass higher – what effect does this have? Why not set up siphons at different heights and race to see whose upper glass empties first?

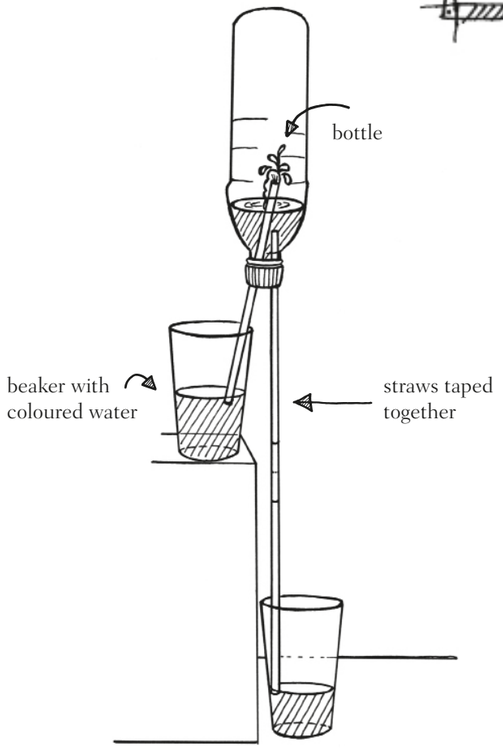
The Sciencey Bit

The **force** of **gravity** pulls the water from the **siphon** pump into the lower glass. In doing this it lowers the **air pressure** in the bottle which pulls up water from the higher glass. The higher the top glass, the greater the effect of gravity and the higher and faster the water shoots in the 'fountain'.

YOU WILL NEED: EMPTY PLASTIC WATER BOTTLE WITH LID, STICKY TACK, SCISSORS OR OLD PEN, STRAWS, 2 GLASSES OR CLEAR BEAKERS, WATER, FOOD COLOURING, SOMETHING TO RAISE UP YOUR BEAKER



Making the fountain









Tip: Choose windows or glass doors that get lots of sunshine so your pictures really 'glow'.

YOU WILL NEED: BLACK WAX CRAYON, PAPER, PAINT, PAINTBRUSHES, PAINT TRAY, VEGETABLE OR OLIVE OIL, KITCHEN ROLL, STICKY TAPE

Create a stained glass window

Poor windows, not only do they have the same view all year round but when anyone comes near, they simply stare straight through them. And really, there is nothing worse than being ignored – it's just so rude!

So maybe it's time to make people take notice of windows – and what better way than adding a bit of stained glass glamour?

To copy the look of the lead edging of stained glass, use a thick black wax crayon to make your pattern or picture on a sheet of paper. Go over the lines lots of times for a dramatic outline.

Now you can add your colour. If you use the three primary colours of red, blue and yellow, you can then mix these to make all the other colours you may need (see Eat a Rainbow on page 120).

Paint each section in a different shade until all the areas are filled with bright colours. Try to keep inside the black wax crayon lines – after all, your windows are counting on you to do a good job.

When the painting is dry, turn it over so you are looking at the plain white back of the paper and begin to paint this with oil. Almost immediately you will see something amazing happening: what was once a blank white sheet is now magically displaying your colourful picture. When you're done, leave it to dry and then press it between two sheets of kitchen roll to mop up any oily bits.

Finally, use sticky tape to attach it to your window and watch as the sun shines through your masterpiece giving the effect of stained glass. Right – try to ignore that window NOW!

If you haven't caused enough mayhem yet:

You could paint several pictures this way until the window becomes a stained glass art gallery. In fact, before you know it that pane of glass will have so many visitors it might start wishing for a quieter life.

The Sciencey Bit

Paper **fibres** are actually **transparent** (see-through), but when light is trying to pass through them they **refract** it (changing its direction slightly) so it cannot travel in a straight line. This makes the paper appear **opaque** (you can't see through it) because it has **absorbed** the light. When you paint it with oil, the oil fills up the air gaps and allows *some* of the light to pass straight through the paper making it look semi-transparent – or **translucent**.

Blow a bubble snake

YOU WILL NEED: 500ML PLASTIC BOTTLE, SCISSORS, SOCK, ELASTIC BAND, SHALLOW BOWL, TABLESPOON, WATER, WASHING-UP LIQUID, FOOD COLOURING

Science can explain many things, but it is still baffled by the amount of odd socks in the world. Seriously, where do the other ones go?

Thankfully, you now have the perfect use for this mountain of odd socks – making bubble snake blowers.

Begin by cutting the base off a clean and empty 500ml bottle. Do this by taking off the top, squashing it flat and making a slit near the base. You can now re-inflate the bottle and carefully cut around the rest of it to remove the bottom.

Next, slip an old sock over the open end. This should be a *clean* sock – a snake is okay but the idea of one of your stinky unwashed socks … now that is terrifying. Stretch the sock nice and tight and then secure it in place with an elastic band.

Mix up a bubble **solution** in a shallow bowl using three tablespoons of water and one tablespoon of washing-up liquid before adding a splash of food colouring.

Now take everything outside and dip the sock end of your bottle in the bubble mixture, take it out and blow. You'll immediately see a colourful snake start to appear. As the bubbles stick together you can keep blowing and blowing until the bubble mixture is used up and the snake is as long as you can make it.

And if you can find another odd sock you could even make a bubble blower for a friend. What do you mean, you have enough to make them for your entire class? Where have the other socks gone? Come on science – we need answers!

If you haven't caused enough mayhem yet:

You can try making a rainbow snake by dribbling lots of different food colourings onto the bubble mixture-soaked sock end before blowing.

The Sciencey Bit

When you blow air into the bottle, it forces the bubble mixture through all the tiny holes in the sock, making little bubbles. Bubbles like to minimise their **surface area,** so they join together to share common walls, making a huge snake.





Tip: Why not challenge a friend to see who can blow the longest bubble snake?



Make a nesting dolls set

YOU WILL NEED: COLOURED CARD, RULER, PENCIL, PAPER AND FELT-TIP PENS, SCISSORS, GLUE, STICKY TAPE OR STAPLER

Grown-ups say some weird stuff sometimes. They might tell you, for example, that 'It's a dog-eat-dog world out there'. If you stumble across such a deluded person, sit them down and explain that this makes absolutely no sense as a **food chain**.

If the poor person still doesn't get it, you can put together a simple food chain in a way even grown-ups will understand.

Begin by deciding the food chain you want to demonstrate. You could start with the sun as it's the source of our **energy**, then go on to some sort of plant because these capture the sun's energy to produce food (which is also why they are called **producers** – see, it's so straightforward I reckon even an adult might get it).

The plant is then eaten – or *consumed* – by an animal – making it a **primary consumer**. But sadly for primary consumers they can also be eaten by **secondary consumers**. And before those secondary consumers get too smug, they should remember there is often someone else higher up the food chain – those pesky **tertiary consumers**.

When you have decided on the elements in your food chain, use coloured card to make a rectangle for each one, progressively getting bigger as they move up the chain (see diagram).

Now you can decorate each food chain step by using pieces of paper glued on or drawing in details with felt-tip pens. Remember to keep any drawings of animals, plants or even the sun to the middle third of the card so they can be viewed from the front when the rectangles are rolled into tubes.

When your rectangle is decorated, mark a line 1.5cm in from the edge of your card, overlap along this line and sticky tape or staple your tube together.

Finally, stand your food chain up in a row and slot one over the other, while explaining to the grown-ups in simple terms how dogs might eat ducks but definitely not dogs. Of course, you may have to do this a couple more times before they *fully* understand – they can be a little slow sometimes.



If you haven't caused enough mayhem yet:

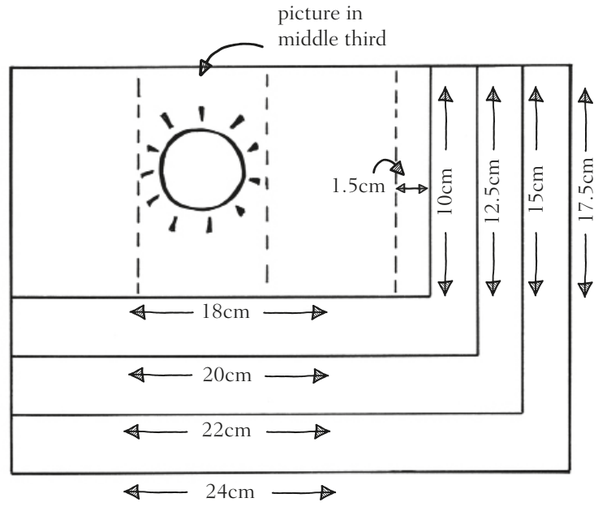
Try making alternative food chains and see which is the longest one you can create.



The Sciencey Bit

All living things need food for survival. A **food chain** shows how plants, animals and humans rely on each other for food. All chains start with plants (also called **producers** in food chains) that capture **energy** from the sun. These are eaten by **herbivores** (plant-eating animals) which then receive the energy. The herbivores are in turn eaten by **carnivores** (meat eaters) who get the energy from the herbivores' bodies. Animals eaten by other animals are called **prey** while the animals that eat them are called **predators**. Grown-ups who are confused about this are called 'very silly'.

Making the nesting dolls



Launch a rocket

YOU WILL NEED: 500ML CLEAN AND EMPTY PLASTIC BOTTLE, MASKING TAPE OR DUCT TAPE, FOUR PENCILS, MEASURING JUG, 75ML WHITE VINEGAR, 75ML WARM WATER, SCISSORS, KITCHEN ROLL, TWO TEASPOONS BICARBONATE OF SODA, CORK, SAFETY GOGGLES, ADULT SUPERVISION (FOR THE 'EXPLODING' BIT), FUNNEL (OPTIONAL)

This is a great example of an **acid-base reaction**, a brilliant way to show the effect of temperature, and a clever way to synthesise **carbon dioxide**. But forget all those things – look at the title – we're going to *launch a rocket* – how cool is that?

Take the cap off your bottle and then use tape to attach four pencils, all the same size, to the outside (see diagram). Just make sure they are evenly spaced out with their ends lined up so the rocket doesn't … well … rock when you place it on the ground.

Pour the vinegar and warm water into the bottle, then cut a piece of kitchen roll in half and add the bicarbonate of soda to the centre before folding in the ends and rolling it into a thin sausage shape. Take these outside, along with a cork, which you need to wrap with a small piece of kitchen roll until you know it will fit snugly in the top of the bottle.

Right, now find a space, well away from anything and anyone else. At this point you will want to don your safety goggles and enlist the help of an adult. Carefully push your kitchen paper sausage into the bottle and then very quickly push in the cork, turn it upside down so it's resting on the pencil ends and RUN!

Within seconds the acidic vinegar and bicarbonate of soda will have made a **chemical reaction** and formed a **gas** which escapes from the bottle with such a force it will launch your rocket into the sky. And if anyone tells you 'That's not rocket science', you need to correct them.

If you haven't caused enough mayhem yet:

Try altering the amount of vinegar or bicarbonate of soda and record any changes this makes to the way the rocket launches. You can also try using cold water – what difference does this make?

The Sciencey Bit

Bicarbonate of soda contains something called a **carbonate** – or a base – which reacts with acids such as vinegar. One of the products of this reaction is **carbon dioxide gas** and as this builds up in the bottle it increases **air pressure,** which eventually forces the cork out of the bottle and pushes the rocket upwards.







Tip: Make sure there is nothing above where the rocket is going to be launched.





Making the rocket

