

Bubbling wizard's brew

YOU WILL NEED: a clean glass jar, clear vinegar, food dye, glitter, washing-up liquid, bicarbonate of soda



1. Half-fill a glass jar with clear vinegar. Add several drops of food dye, then sprinkle a little glitter over the top of the vinegar.



2. Add a good squeeze of washing-up liquid to the jar. Then, gently stir the mixture with a metal spoon to mix everything together.



3. Put the jar in the middle of a large baking tray or a sink. Add a heaped teaspoon of bicarbonate of soda to the jar and see what happens.

Foaming brew

The foam that pours out of the jar is formed by a simple chemical reaction. When the vinegar and bicarbonate of soda mix, they make lots of tiny bubbles of gas. The bubbles churn up the washing-up liquid, making lots of foam.

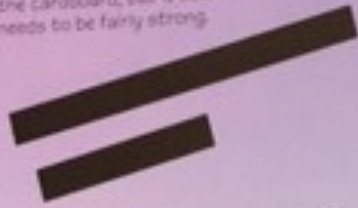
The wizard's brew is not a drink, so don't drink it.



Zappy zoomer

YOU WILL NEED: cardboard, drinking straws

You need to be able to bend the cardboard, but it still needs to be fairly strong



1. Cut a cardboard strip that is 2.5 x 24cm (1 x 9½in) in size. Then, cut a second strip that is the same width, but only 12cm (5in) long.



Overlap the ends by about 1cm (½in)



2. To make the strips into round loops, press a piece of sticky tape onto one end of each strip. Overlap the ends, then press down the tape.



3. To make the joins in the loops stronger, cut two longer pieces of sticky tape. Wrap one piece around the join in each loop, like this.



4. To make the sides of the zoomer, cut off the bendy part of four drinking straws. The straight pieces of straw should all be the same length.

You could make a zoomer with three straws, like this one – it will still fly well!

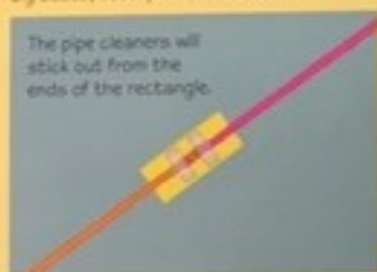




Blow on the back of the sail to make the car whoosh forward.

Sail cars

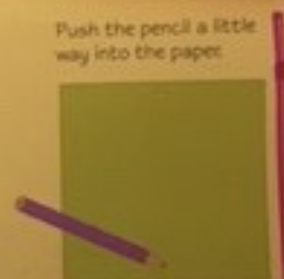
YOU WILL NEED: thin cardboard, two pipe cleaners, three bendy drinking straws, big beads, toothpicks, small beads



1. Cut a 5 x 11cm (2 x 4in) rectangle of thin cardboard. Twist together the ends of two pipe cleaners, then tape them onto the rectangle.



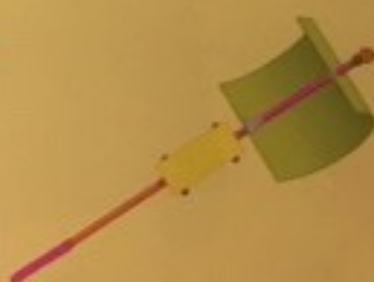
2. Cut two 6cm (2½in) pieces from a drinking straw. Then, tape the straws across the rectangle, over the pipe cleaners, like this.



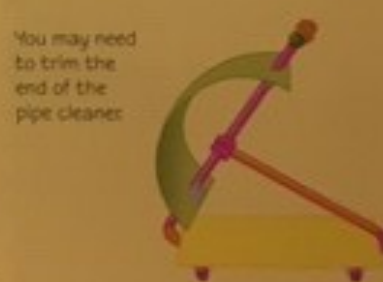
3. Cut a square paper sail the length of the bottom part of a bendy straw. Use a sharp pencil to make a hole at the top and bottom of the sail.



4. Cut the top off the bendy straw to make a tall mast. Slide the sail on and tape it in place. Slide the mast onto one of the pipe cleaners.



5. Push a big bead onto the pipe cleaner and twist the end. Then, cut an 11cm (4in) piece from another straw and slide it onto the other pipe cleaner.



6. Bend the mast and short straw over the top of the base. Twist the end of the pipe cleaner around the middle of the mast to hold it in place.



Spooky shadow puppets

YOU WILL NEED: thick paper, a drinking straw, a torch or desk light



1. Fold a piece of thick paper in half. Push the fold into one side of a hole punch. Punch a hole for an eye about a third of the way down the paper.



2. Draw a mouth with pointed teeth against the fold, like this. Then, keeping the paper folded, cut out the mouth. Unfold the paper.



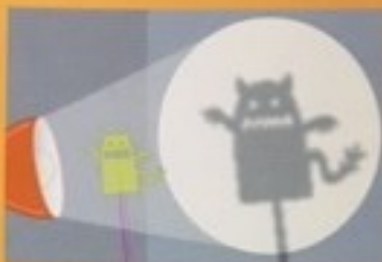
3. Draw a monster's body coming up from the bottom of the paper. Add horns, then draw the monster's arms and a pointed tail.

Use the ideas on these pages to make different kinds of monsters.

On page 86 you can find out how other materials act when held against a light.



4. Cut out the monster and tape a straw onto the body for a handle. Then, hold a torch or angle a desk light, so that light shines onto a wall.



5. Hold the puppet in front of the light to cast a shadow on the wall. What happens if you move the puppet away from the light, or tilt it or twist it?

Casting shadows

When you hold the puppet in front of the torch or desk light, it stops some of the light from reaching the wall and casts a dark shadow on the wall. Moving the puppet closer to the light makes the shadow bigger, because the puppet is blocking more of the light. Tilting and twisting the puppet changes how it blocks the light, so it changes the shape of the shadow, too.

The monster below is symmetrical. Find out more about symmetry on page 33.

You could decorate your monster puppet like the one below.



Dangly monkeys

YOU WILL NEED: thick paper, felt-tip pens, pipe cleaners, thread



1. Fold a piece of thick paper in half, then in half again. Draw a monkey's head, ears and body on the paper. Add an arm curving up over the head.



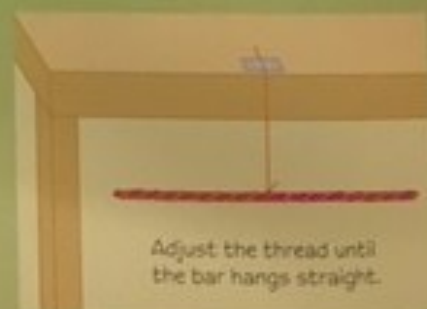
2. Draw the other arm curving down, then add legs and a long tail. Cut out the monkey through all the layers of paper. This will make four monkeys.



3. Turn one or two monkeys over, then decorate them all using felt-tip pens. Then, add the monkeys' faces using a thin black pen.



4. Bend two pipe cleaners in half and pinch the middle. Then, unbend the pipe cleaners a little and tie a piece of thread around the middle.



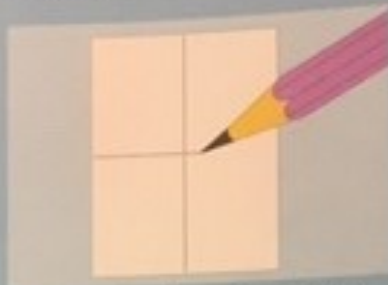
5. Straighten the pipe cleaners, then twist them together to make a bar. Tape the thread onto a table or other surface, like this.



Rocket patterns

YOU WILL NEED: thin cardboard and paper

Add flames to the rockets at the top to make them look like they are launching.



1. Cut a 3 x 4cm (1 x 1½in) rectangle from cardboard. Draw a line down the middle of the rectangle, then add a line across it, halfway down.



2. Cut a corner from the top of the rectangle. Then, keeping the corner the same way up, move it to the bottom of the rectangle and tape it on.



3. Cut off the other top corner in the same way, then tape it to the bottom as well. Then, draw around the shape on several scraps of paper.



4. Cut out the rockets and glue one onto some paper. Add more rockets above it, with the tails fitting onto the tips. Glue on more lines of rockets.

You could press on stickers from the sticker pages for windows.

Fitting perfectly

The rockets fit together again and again to make a pattern without any gaps in it. This is called a tessellation. Some shapes tessellate, but others don't. Try cutting other shapes, such as circles, triangles and stars... Do they tessellate?

Folded robot

YOU WILL NEED: different shades of paper



1. Fold a piece of paper in half. Draw half a robot's head, neck and body against the fold. Add an antenna, then draw the robot's arm and a leg.



2. Cut out the robot. Draw shapes for an eye and a mouth against the fold, then add shapes on the body. Cut out all the shapes down the fold.



3. Unfold the robot, then glue it onto a piece of paper. Fold scraps of paper and draw eyes and control panels. Cut them out and glue them on in pairs.



There are pairs of stickers in the middle of this book that you can stick onto your robot, too.

Two halves make a whole

When you unfold the paper, it changes from a meaningless shape into a robot. The robot is symmetrical, which means that each half of the robot is exactly the same, but the opposite way around. Shapes that have different halves are asymmetrical.

Swirly snake

YOU WILL NEED: a pipe cleaner, a drinking straw, poster tack, thick paper, pens or stickers for decorating

Don't bend the straw.



1. To make the stand, push a pipe cleaner through a drinking straw, so that one end sticks out of the top. Trim the end so that it is 1cm ($\frac{1}{2}$ in) long.

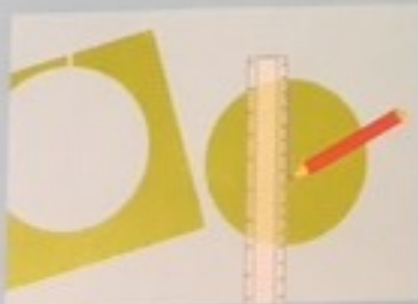
A heavy, wide base will make the stand more stable.



2. Press a big blob of poster tack onto a flat surface, for the base. Then, firmly push the bottom of the straw into the poster tack, like this.



Try drawing around different-sized bowls, plates and mugs to make different snakes.



3. For the snake, draw around a small bowl or mug on a piece of thick paper. Cut out the circle, then draw a straight line down the middle of it.

Make sure that the head is in the middle of the circle.



4. Draw another line across the middle of the circle. Draw a shape for the snake's head around where the lines cross, then add a spiral for the body.



You could use stickers from this book to decorate the snake's body.

5. Turn the paper over. Then, draw or stick on spots around the circle. Try not to put spots in the middle of the circle, where the head will be.



Floating Flowers

YOU WILL NEED: paper and a bowl

Cut along the lines through the layers of paper.



1. Cut out a square of paper. Fold the paper in half, then in half again. Draw a petal shape coming from the folded corner, then cut it out.



2. Open out the paper. Then, fold the tip of each petal into the middle, like this. Crease each fold well, then unfold the flower again.



3. Cut paper circles for the middle. Glue them onto the flower, and fold over the petals. Fill a bowl with water, then place the flower on the water.



You could make flowers from different types of paper.



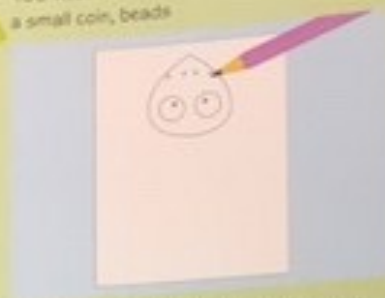
Flowers made from very absorbent paper will open quickly, but thicker, less absorbent paper will open more slowly.

Soaking in

Paper is absorbent, which means that water can soak into it. As the flower absorbs the water, the tiny strands that make up the paper swell. They push out as they grow, forcing the paper petals to open.

climbing lizard

YOU WILL NEED: thin cardboard, felt-tip pens, thick thread or string, a straw, a small coin, beads



1. Draw a lizard's head near the top of a piece of thin cardboard. Then, add big round eyes, dots for nostrils and a mouth.



The lizard should be about as long as your hand.

2. Draw two curved lines for the sides of the lizard's body. Add a spiral for the tail at the bottom of one of the lines. Then, add four feet.



3. Draw a spiky spine down the lizard's back, then fill in the lizard with felt-tip pens. Then, carefully cut around it with scissors.



4. Cut a piece of thread or string, about 1m (3ft) long. Then, cut two pieces from a straw, making each piece about 3cm (1in) long.

The weight of the coin will help the lizard to work better when you use it.



5. Turn the lizard over and tape the pieces of straw about halfway down. Then, tape a small coin near the bottom, like this.

The beads need to be wider than the straws.



6. Push the thread up through one straw, then down through the other one, to make a loop at the top. Thread beads onto the ends and knot them.

As you pull the threads, pull them out to the side.



7. Loop the middle of the thread over a door handle. To make the lizard climb, pull one end of the thread, then pull the other, again and again.



8. When the lizard has climbed up to the door handle, let go of both ends of the thread. The lizard will slide back down to the bottom again.

Up and down

When you pull the threads, they press against the inside of the straws. This creates a force called friction that stops the two things from sliding past each other. When you let go of the threads, they stop pressing against the straws, so there is less friction and the lizard slides down. If you turn your lizard over, you can see this happening.



You could make a climbing bug or spider in the same way.



Triangle tower

YOU WILL NEED: thin cardboard



1. Cut five cardboard strips that are 12cm (6in) long. Make marks 4cm (2in) and 8cm (4in) along each strip, then make folds at the marks.



2. Tape the strips into triangles, like this. Put three triangles in a line next to each other. Then, cut a strip of cardboard and lay it on top.

Put an object in the middle, then add more.



3. Stand two triangles on top, then cut a shorter strip and lay it on top of the two triangles. Try putting different objects on top of the tower.

The tower looks quite flimsy, but it can hold a bigger weight than you might think.



Strong support

The tower can support a large weight because it is made of triangles – the strongest shapes of all. Triangles are strong because they have a small point at the top and a wide base.

The weight above presses down on the point of the triangle...

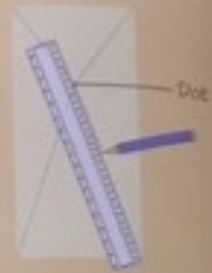
...spreads evenly down the sides...

...and out over the base.



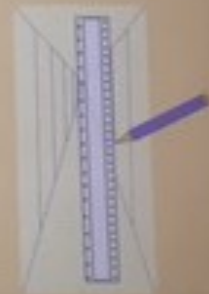
Monster in the city drawing

YOU WILL NEED: paper, a ruler, pencils

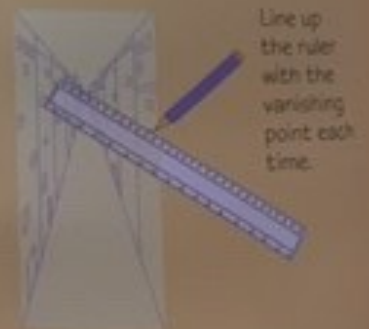


The dot is known as the 'vanishing point'.

1. Draw a dot halfway across a piece of paper, part of the way down. Use a ruler to draw lines from the dot to the corners of the paper.



2. Draw vertical lines for buildings between the diagonal lines. Draw them further apart at the edges, getting closer nearer the vanishing point.



3. Draw roofs on top of some of the buildings. Then, add some doors and windows, using the ruler to draw their top edges, like this.

Make the people in the distance smaller than the ones in the foreground.



4. Go over the outlines and fill in the doors and windows with bright pencils. Add people on the road, then erase any pencil lines.

See what happens to the size of the monster in relation to the people and buildings as you move it.

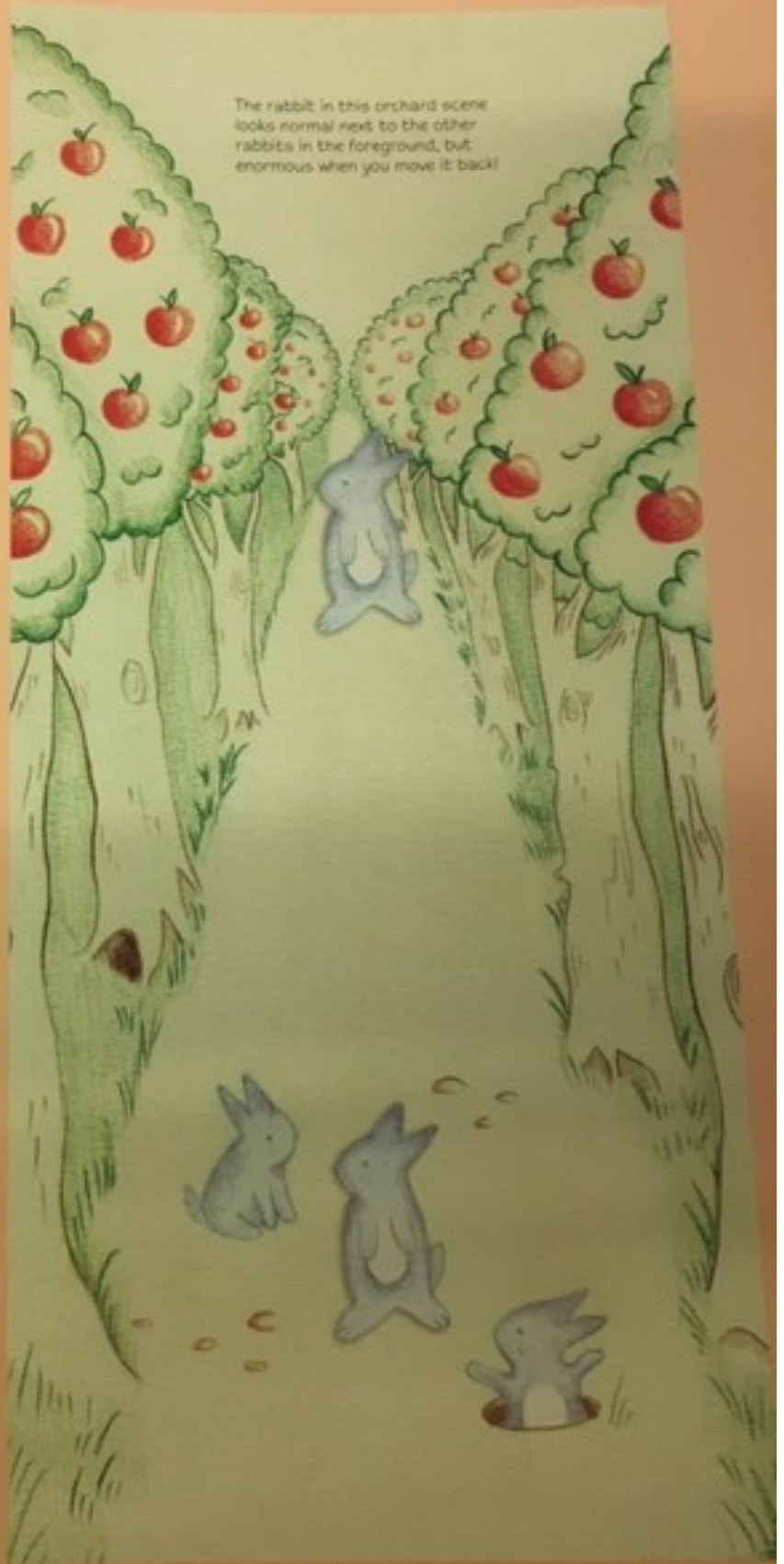


5. Draw a small monster on another piece of paper. Cut it out and put it on the far end of the road. Then, move it 'nearer' to you, down the road.

Big and small

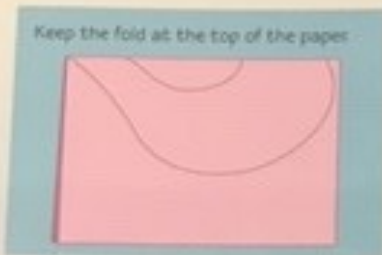
Drawing a city in this way makes the picture look 3-dimensional. Buildings that are far away look smaller than ones nearby. This is called perspective, and your brain uses this to judge how near or far things are from you. The monster will seem big when it's 'far away' and tiny when you move it nearer!

The rabbit in this orchard scene looks normal next to the other rabbits in the foreground, but enormous when you move it back!



Floating water beastie

YOU WILL NEED: thin cardboard, pencils, a large container or sink



1. Fold a rectangle of thin cardboard in half, so that its short ends are together. Draw a shape for a beastie's body, with a curve for its back.



2. Add spikes along the back. Then, draw a line across the paper, a little way above the bottom. Draw two big feet below it, then add two legs.



3. Holding the layers together, cut around the shape, taking care not to cut along the fold. Then, decorate the beastie with pencils.

You could make a beastie with six legs.



Lower the beastie onto the water so that all four feet touch the water at the same time.



4. To make the beastie stand, fold out its feet until they lie flat. Fill a large container with water and carefully place the beastie on top of the water.



Big Feet

The surface of water is like a very thin skin. The beastie's big feet spread its weight over the top of this 'skin', and it floats. If it had very small feet, they would break through the water's skin and the beastie would sink.

Windy wonders

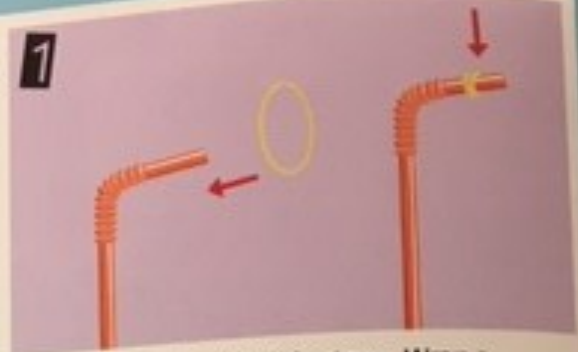
Fold a few of these fun paper windmills and then head outside to set them spinning.

You will need:

- Flexible straw
- Coloured paper
- Ruler
- Hole punch
- 2 rubber bands
- Double-sided sticky tape
- Card
- Scissors
- Pencil
- PVA glue

⚠ Ask an adult for help with this make.

1



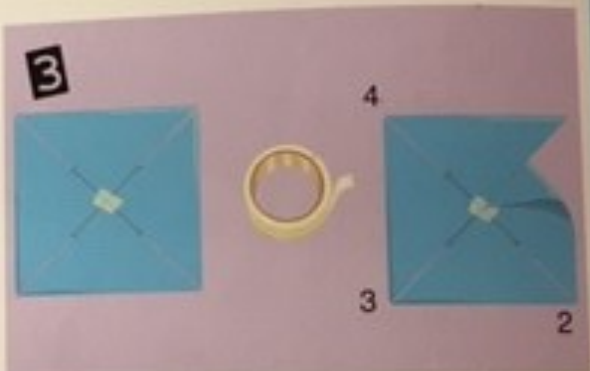
Bend the top of a flexible straw. Wrap a small rubber band around the short end a few times. Push it along so that it's just in front of the bend.

2



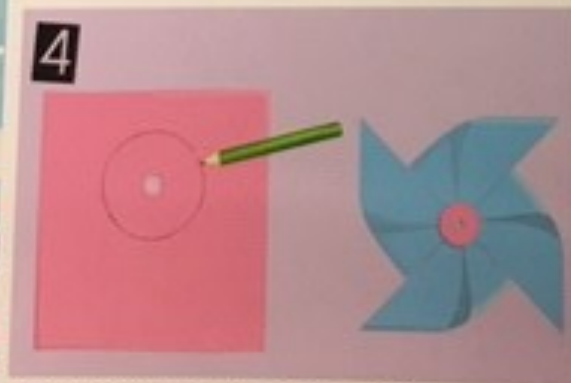
Cut out a 12 cm square of paper. Draw lines from corner to corner with a pencil and ruler. Starting at the centre point, mark 3 cm along each pencil line. Carefully cut along each line, from the outside corner to the mark.

3



Fix a piece of double-sided tape over the centre spot and peel off the backing. Take one corner of your square at a time, and fold over so the point meets the centre. Press down firmly onto the sticky tape.

4



Punch a hole in a piece of card. Draw a small circle around the hole and cut it out. Cover one side with glue and stick over the middle of your windmill. Allow to dry.

5



Push a pencil through the hole and pull out again. Slide the windmill onto the straw and add a rubber band in front to hold in place. Trim the straw in front of the rubber band and glue a circle of card over the end.



TIP!

Be careful not to flatten the curved windmill sails when you're folding the paper corners in to the centre.

TIP!

Use a stick to make a hole in the soil at one edge of a plant pot. Stand your windmill in the hole, and watch the sails whizz round in the breeze!

TIP!

Use patterned paper to make an even more dazzling windmill!

Super socks and fancy streamers

Grab some colourful carrier bags and make one of these brilliant, wind-blown wonders!

Blast off!

Use plastic bags in different colours to cut out two identical rocket shapes, with flames at the bottom. Stick the rockets together at the sides to make a tube. Add a length of thread at the top, then hang your rocket windsock out to flutter in the breeze!

TIP!

If you're not confident cutting out a rocket shape, draw it on scrap paper first. Cut around your drawing and use it as a template to help you make the plastic version.



Spooky spider

Draw and cut out a big, dangly spider! Give him eyes, tiny fangs and long legs to blow in the breeze. Make two holes at the top, to tie on your hanging thread.



Two-colour tube

Cut two rectangles from plastic bags the same length but one twice as wide as the other. Tape the bottom edge of the smaller one to the top edge of the wider one. Snip the wider rectangle into streamers, cutting from the bottom up to the tape. Wrap the smaller rectangle around a piece of cardboard tube and stick in place. Tie thread to the sides of the tube for hanging.

TIP!

Feeling cheeky? Hide your spider in a tree to give your friend a fright!



The odd-sock zoo

Recycle your odd socks and old tights to make a zoo full of crazy creatures!

Sock snakes

Take a long sock or one leg from a pair of tights and stuff with cotton wool. Tie the end shut. Cut a forked tongue from felt and sew on buttons for eyes.

Tip!

You can use wool, thread, curly string or a rubber band to tie up the end of your snake.

Top caterpillar

Make a long, stuffed body following the snake instructions. Tie thread or rubber bands around the body to make six small sections. Thread two pieces of wool through the middle of each section as legs. Knot on either side to hold in place. Sew on two buttons for eyes.

Incy Wincy

Fill the toe section of a sock with cotton wool. Wrap a rubber band underneath to hold the stuffing inside. Cut the rest of the sock into eight equal pieces. Sew or glue them against the side of the body to make spider legs. Stick on some googly eyes and thread to the top as a hanger.

Tip!

Stripy socks are especially brilliant for making lizards, snakes and caterpillars!

We're off to see the lizard

Cut one leg from a pair of old tights. Stuff with cotton wool and tie the end shut. Cut four feet from green felt. Glue into place. Sew on two buttons for eyes. Add stitches in a zigzag pattern to make a mouth.

200

Octo-pal

Stuff the toe of a sock, following the spider instructions. Cut the bottom section into eight pieces to make legs. Glue a circle of card just below the body so the legs hang down evenly. Cut two felt eyes and glue into place.

Beady-eyed bird

Turn odd socks into cute hand puppets. To make a bird, stick craft feathers near the top of the head. Cut two circles of felt. Add a bead on top of each one and glue or stick to the bird as eyes.

Woolly lizard

Sew through and knot pieces of wool all the way along the top of the head to make a cool lizard. Sew on a pair of button eyes. Cut out a felt tongue and stick it inside the mouth part of your sock.

Fish foot!

For a fun fish puppet, cut out some felt fins. Glue to the top and sides of the sock. Add a piece of pink felt inside the mouth section and stick on two button eyes.

2/0/1

Bottle-top bugs

Start saving up your bottle lids so you can make these brilliant bugs!

You will need:

- Red or black bottle lid
- Thin card
- Pencil
- FVA glue
- Glue stick
- Scissors
- Felt-tip pen
- Glue spreader

1



Draw around your bottle lid onto black card and again onto red card. Cut out both pieces. Cut a smaller circle of black card for the head.

2



Stick the black circle onto the lid. Glue the head on top so it overlaps the edge a little bit.

3



Snip a small piece off one side of the red circle. Cut out a triangle on the opposite side to make the wings. Spread glue along the flat edge of the wings. Stick to the lid, just behind the head.

4



Cut out two circles of white card and two smaller black circles. Stick together to make eyes, then glue to the front of the head. Use a felt-tip pen to draw black dots on the wings.



2 1 2



Tip!

If you can't find lids in the right colour for your bugs, have a go at painting a plain white one the colour you want instead.

Tip!

Bend the wings up a little bit at the back. It will make your ladybird look like it's about to fly away home!

Bottle-top bumblebee

Draw felt-tip pen stripes onto yellow card to make a cute bumblebee. Cut petal shapes from white paper to make wings and add small black dots for eyes.

Dragonflies

Make double wings by cutting out four long petals. Use shiny paper for an even prettier bug!

Meet the beetles

To give your bug a smart, patterned body like these beetles, stick a circle of stripy card to the lid. Snip two circles in half to make two sets of wings and add a smaller half-circle on top for the head. Use sequins for eyes.



Making music

Have fun making these cool musical instruments.
Then get noisy and try playing them!

Guitar hero

Cut 3 cm slits around the end of a cardboard tube. Bend the pieces back and stick them to the side of an old tissue box. Paint the tube and the outside of the tissue box. Carefully stretch elastic bands around the box to make guitar strings.

TO PLAY: Strum and pluck the strings.

Tip!

Decorate the front of your guitar with a painted pattern or stencil. This one has flowers made from finger and thumb prints!

Rainmaker

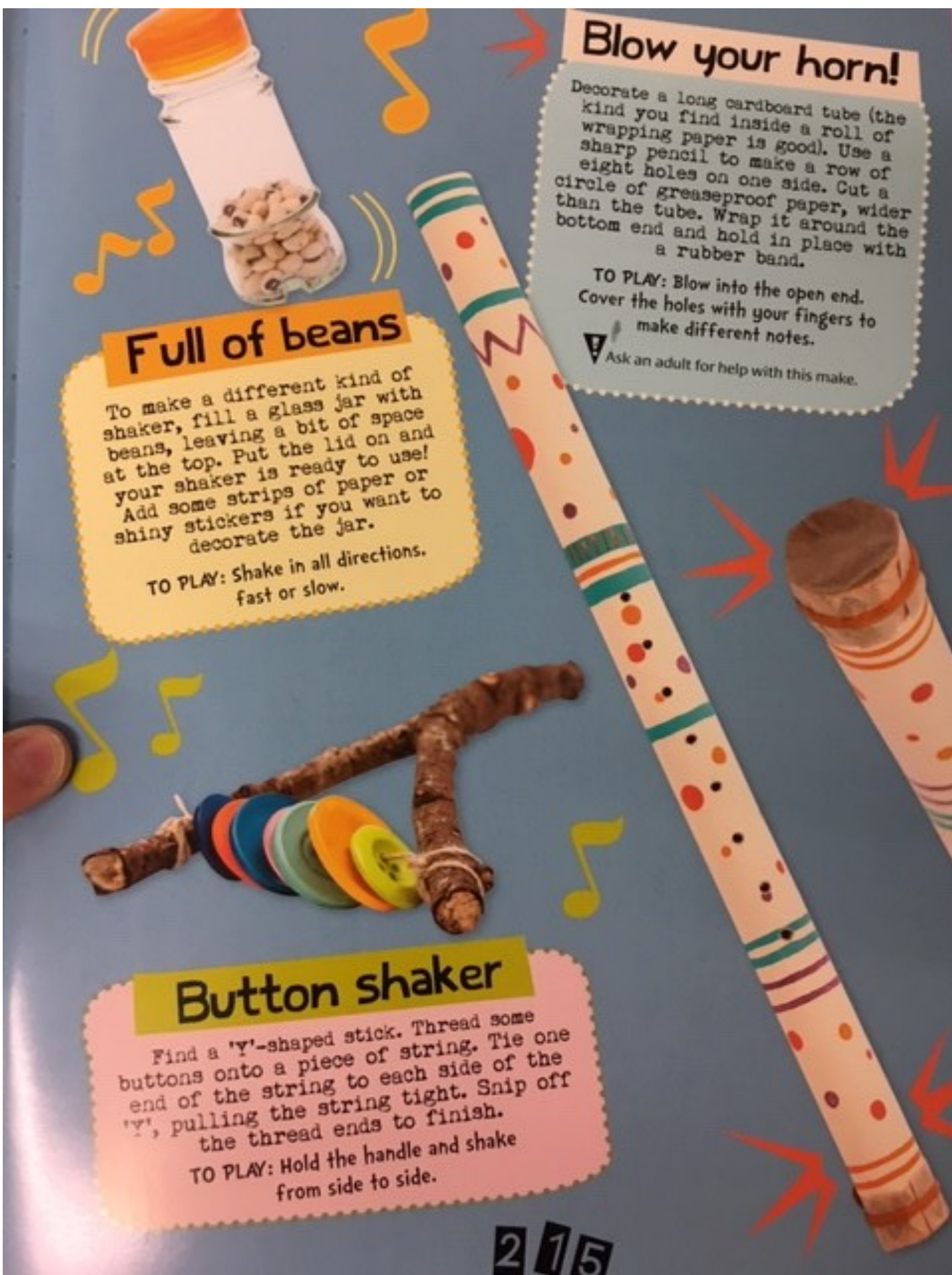
Glue small tightly scrunched balls of tinfoil randomly to the inside of a cardboard tube, as far inside as you can get them. Cut a circle of card a little bit bigger than the end of the tube. Snip around the edges to make a fringe. Glue the fringe inside the end of the tube so the circle fits nicely at the end. Drop in some dry beans or lentils. Stick another fringed circle in the other end of the tube to hold the beans inside. Decorate the outside of your rainmaker with paper and ribbon.

TO PLAY: Tip from side to side so the beans fall through the tube, making the sound of rain.

Shaker maker

Paint and decorate the bottoms of two paper plates. Pour dried beans or lentils onto one of them. Glue the plates together at the edges to seal the beans inside. When the glue is dry, your shaker is ready to shake!

TO PLAY: Shake like a tambourine.



Full of beans

To make a different kind of shaker, fill a glass jar with beans, leaving a bit of space at the top. Put the lid on and your shaker is ready to use! Add some strips of paper or shiny stickers if you want to decorate the jar.

TO PLAY: Shake in all directions. fast or slow.

Blow your horn!

Decorate a long cardboard tube (the kind you find inside a roll of wrapping paper is good). Use a sharp pencil to make a row of eight holes on one side. Cut a circle of greaseproof paper, wider than the tube. Wrap it around the bottom end and hold in place with a rubber band.

TO PLAY: Blow into the open end. Cover the holes with your fingers to make different notes.

⚠ Ask an adult for help with this make.

Button shaker

Find a 'Y'-shaped stick. Thread some buttons onto a piece of string. Tie one end of the string to each side of the 'Y', pulling the string tight. Snip off the thread ends to finish.

TO PLAY: Hold the handle and shake from side to side.

Pop-up Pals

Turn a plain yoghurt pot and straw into jolly jumping characters!

You will need:

- Plastic yoghurt pot
- Paint
- Tissue paper
- PVA glue
- Pencil
- Bendy straw
- Paintbrush
- Scissors
- Thin card
- Felt-tip pens
- Sticky tape

⚠ Ask an adult for help with this make.

1



Ask an adult to make a hole in the bottom of your yoghurt pot with a craft knife. Get the adult to cut two slits in a cross shape and push a pencil through to make a hole.

2



Paint your yoghurt pot a bright colour. You might need to brush on a few coats to cover up the words and pictures on the pot.

3



Cut out triangles of tissue paper in two or three different colours. Use PVA glue to stick the triangles around the edge of the pot. Do one row facing down and one facing up. Mix up the colours as you go.

4



Draw a clown onto a piece of card. Colour in with felt-tip pens, then cut out. Tape to the straight end of your bendy straw.

5



Push the straw through the hole in your yoghurt pot. This is now the clown's drum! Slide the straw up and down so it looks as though the clown is jumping on the drum.

