

DO TRY THIS AT HOME

Issue #1

Featuring: **Marvin and Milo**

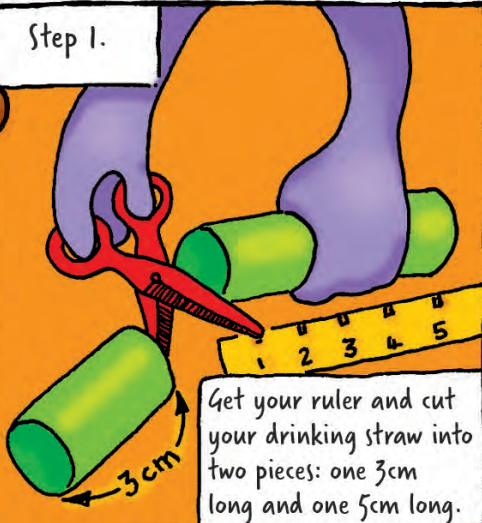
What you need: • Drinking straw • A friend • A ruler • Scissors • Sticky tape • Saucer of water

The Challenge Milo!



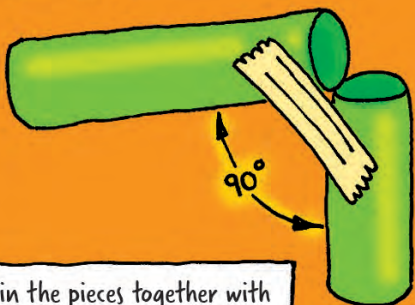
To lift the water from the saucer using a straw without sucking

Step 1.



Get your ruler and cut your drinking straw into two pieces: one 3cm long and one 5cm long.

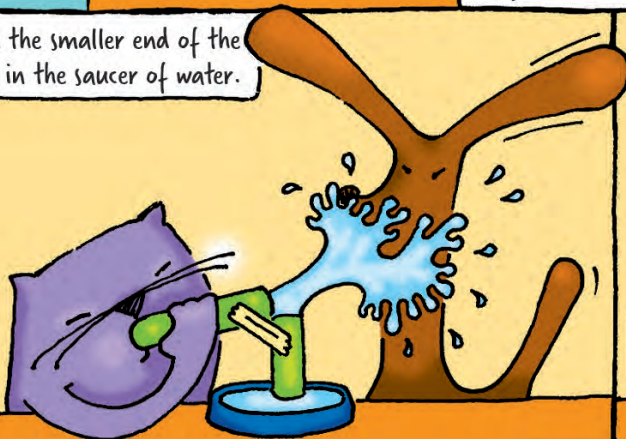
Step 2.



Join the pieces together with sticky tape along one side so they form a 90 degree angle, but leave both ends open.

Vic Le Billon

Stand the smaller end of the straw in the saucer of water.



Now blow hard!

So what happened? Well, when air moves, its pressure falls. So when you blow, the pressure at top of the straw drops. But the air over the saucer keeps the same pressure, so the water is pushed up the straw





DO TRY THIS AT HOME

Issue #3

Featuring: **Marvin and Milo**

What you need: • A microwave • A bar of quality soap

Bonjour! Today we are going to create soap art.

Put the soap on a dish in the microwave.

Heat it on full power for about 1 minute.

WARNING:
The soap may smell strongly so don't do this before heating food!

What happened?

Tiny pockets of gas in the soap get hot and expand in all directions, pushing the soap into strange and artistic shapes.

Vic Le Billon

DO TRY THIS AT HOME

issue #4

Featuring: Marvin and Milo

What you need: • A raw egg • A hard-boiled egg

Amaze your friends with this clever trick

First, spin the hard-boiled egg.

Stop it and let go immediately.

Watch what happens.

Now spin the raw egg.

Stop it and let go immediately.

The egg starts spinning!

The yolk and white aren't attached to the shell so they carry on moving when you stop the raw egg.

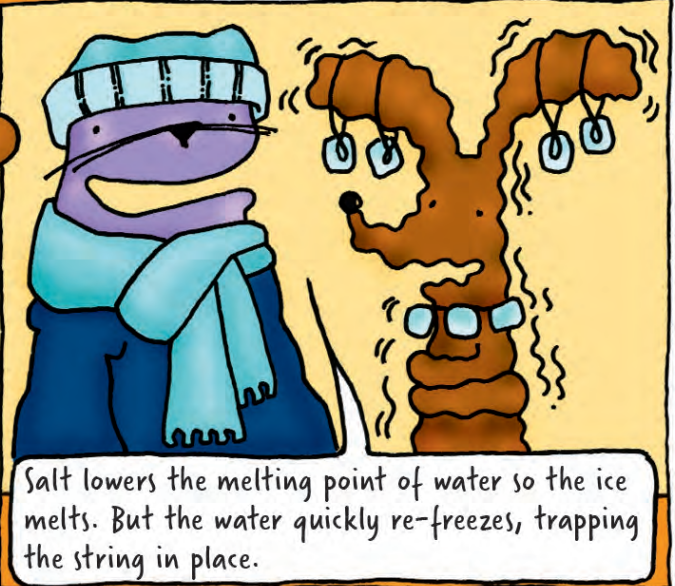
Get a friend to mix up the eggs and use the trick to tell them apart.

DO ~~IT~~ TRY THIS AT HOME

issue #5

Featuring: Marvin and Milo

What you need: • Salt • A cup of cold water • 20cm of sewing thread • An ice cube



Vic Le Billon

DO ~~IT~~ TRY THIS AT HOME

issue
#6

Featuring:
Marvin
and
Milo

What you need: • A large glass • Lemonade
(or fizzy water) • Peanuts (or raisins)

Today we are going to make
a simple lava lamp.

First, fill the glass
with lemonade.

Stir for 1 minute
or leave to go
slightly flat.

Drop some peanuts
into the glass.

The nuts
float
up to
the top
and fall
back
down
again,
like in
a lava
lamp.

Gas bubbles
grow on
the peanuts,
making them
float upwards.
When they
reach the top
the bubbles
burst and
the peanuts
fall back
down again.

Groovy,
baby.

Vic Le Billon

DO TRY THIS AT HOME

issue #7

Featuring: Marvin and Milo

What you need: • A clear plastic bottle • A pen
• A balloon (blow it up a few times beforehand)

Watch my amazing balloon trick!

Make a hole in the bottom of the bottle with the pen.

Push the balloon inside and stretch it over the mouth.

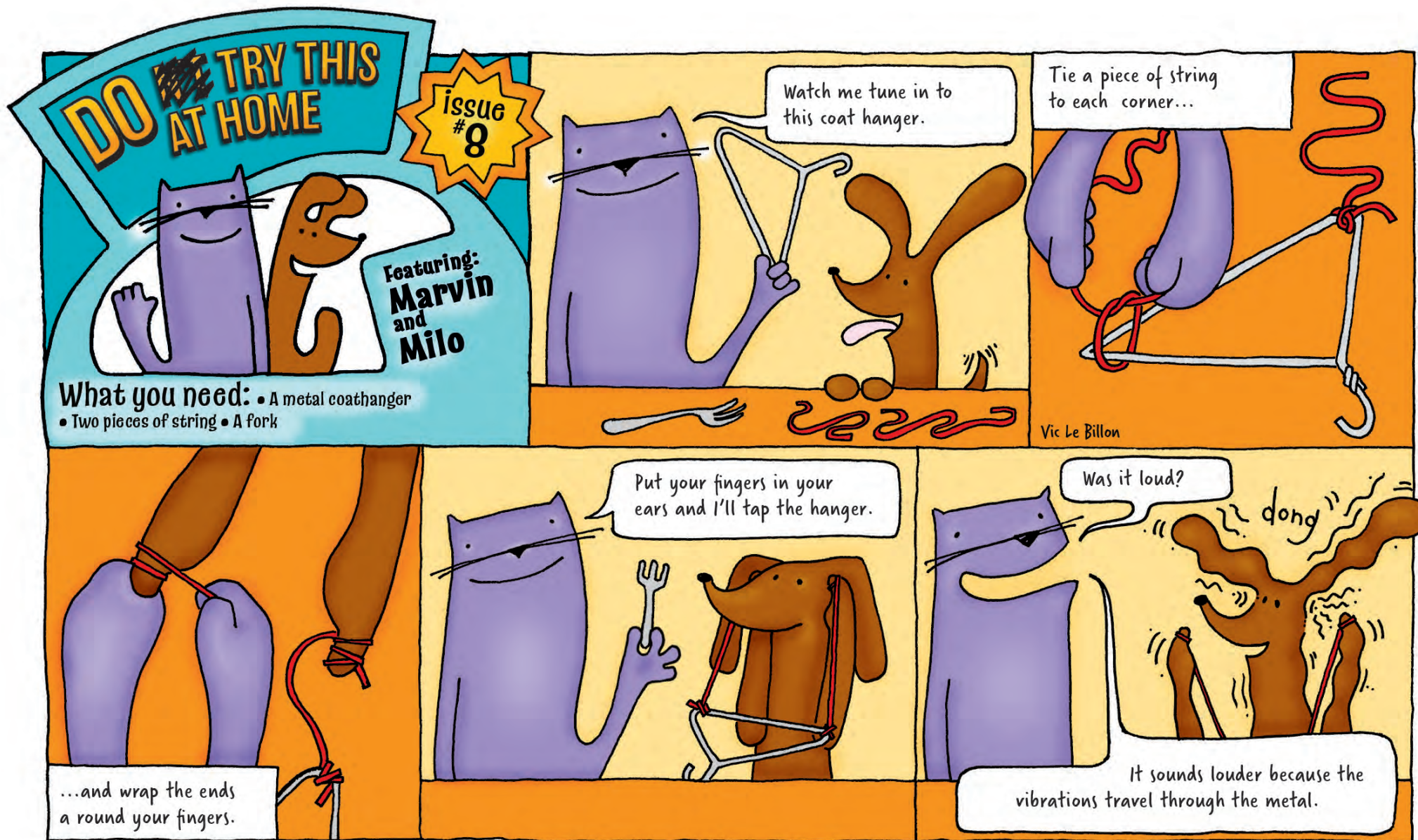
Blow up the balloon. Notice air is coming out of the hole.

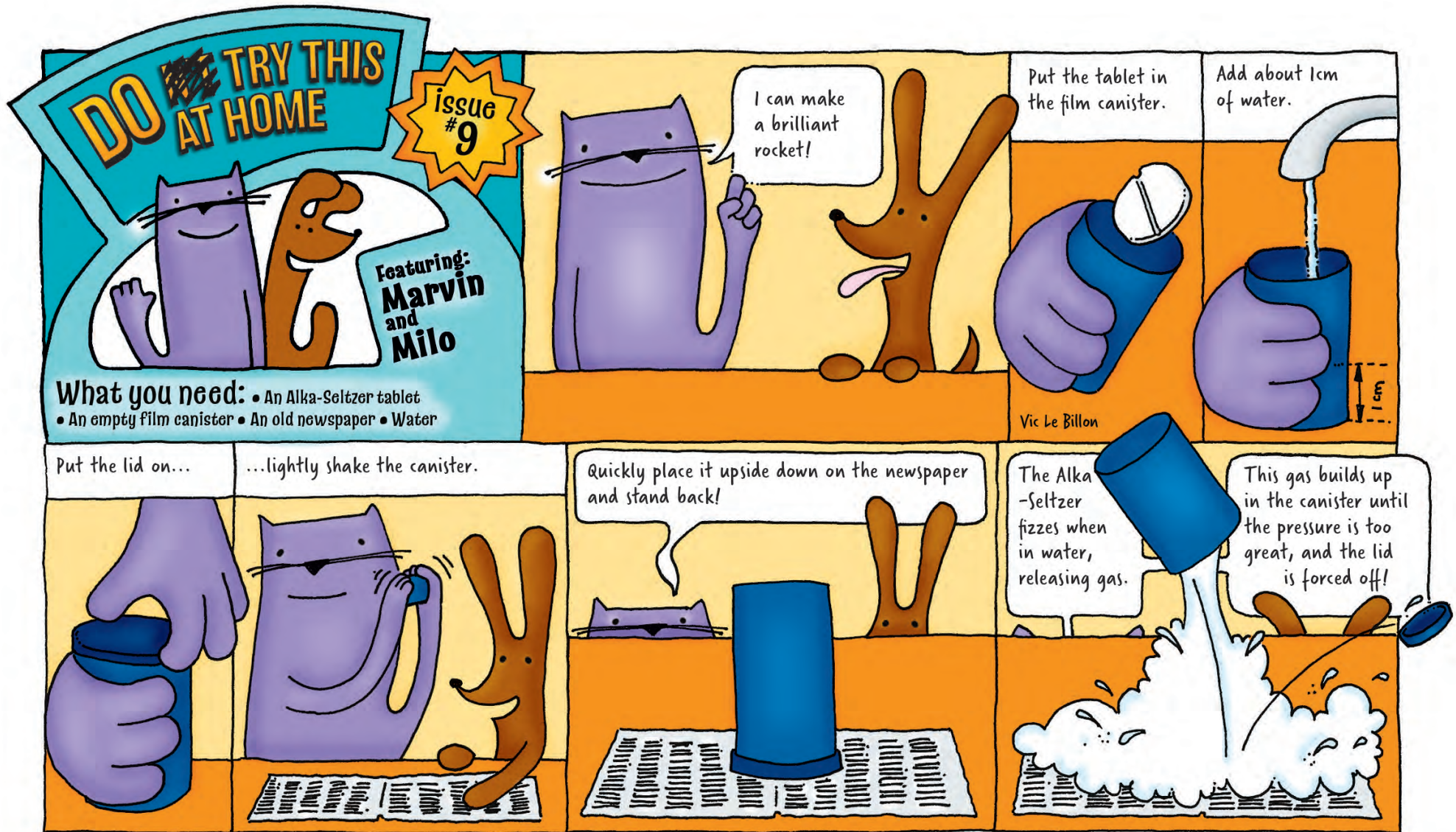
Cover the hole with your finger and stop blowing.

Look! It stays inflated!

As the balloon expanded, it pushed air out of the bottle. That made the air pressure inside the bottle lower than that in the balloon, so it wasn't strong enough to squeeze the air out.

Vic Le Billon





DO TRY THIS AT HOME

issue #10

Featuring: **Marvin and Milo**

What you need: • Five wooden toothpicks
• A small sponge • A plate • A little water

Snap the toothpicks in half but don't break them fully.

Arrange the toothpicks on the plate like this...

Carefully squeeze a drop of water into the middle.

Make sure it touches the end of each toothpick.

Vic Le Billon

Did you see them move?

Just like synchronized swimmers!

The water makes the wood expand, the broken ends press against each other and the toothpick opens out. The same thing happens to doors when it's humid - they swell up and get jammed.



DO ~~NOT~~ TRY THIS AT HOME

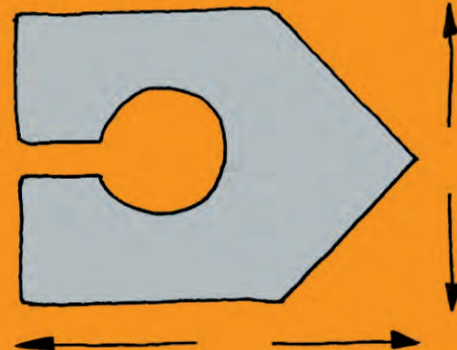
issue
#12

Featuring:
**Marvin
and
Milo**

What you need: • Piece of foil • Scissors
• Washing-up liquid • Sink or bath

Ahoy there me land lubbers! Today we are going to race my metal boat against Milo's ship.

To make a boat like mine, cut out this shape...



...out of the foil.

Gently place your boat into a sink full of clean water.



Carefully place a drop of washing up liquid into the boat's hole.

Vic Le Billon

IT MOVES!



Water molecules are attracted to each other, creating "surface tension". The soap disrupts the surface behind the boat but the molecules in front are still pulling together,

so the boat is pulled forward.



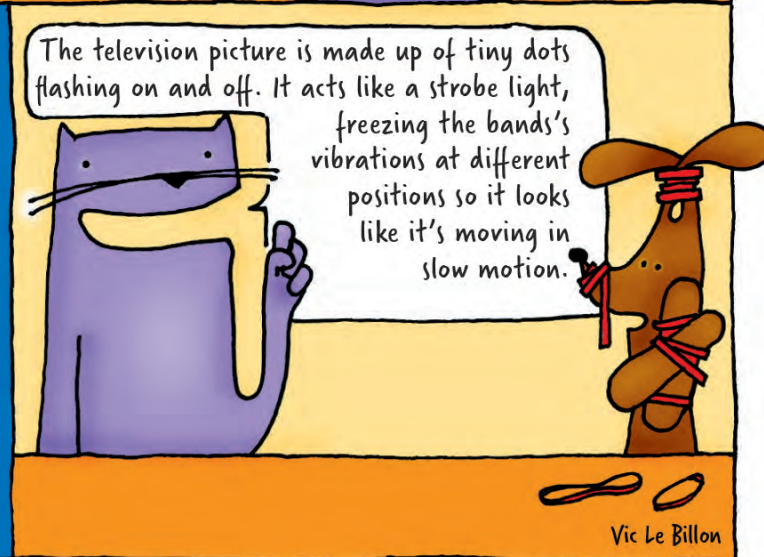
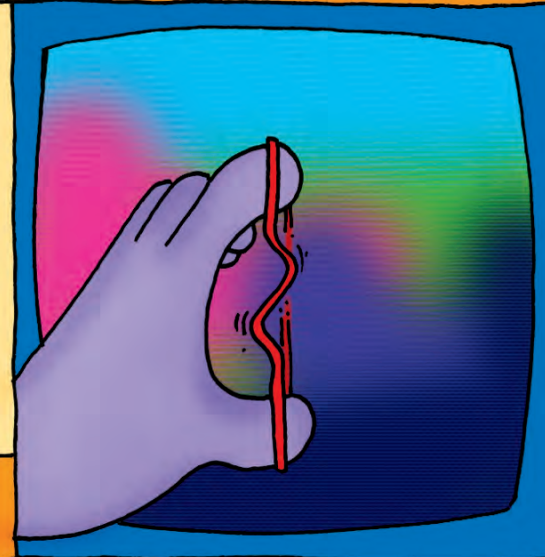
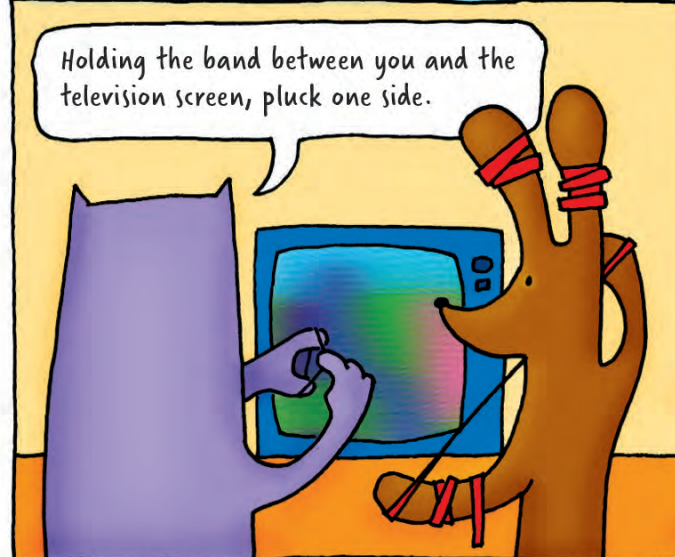
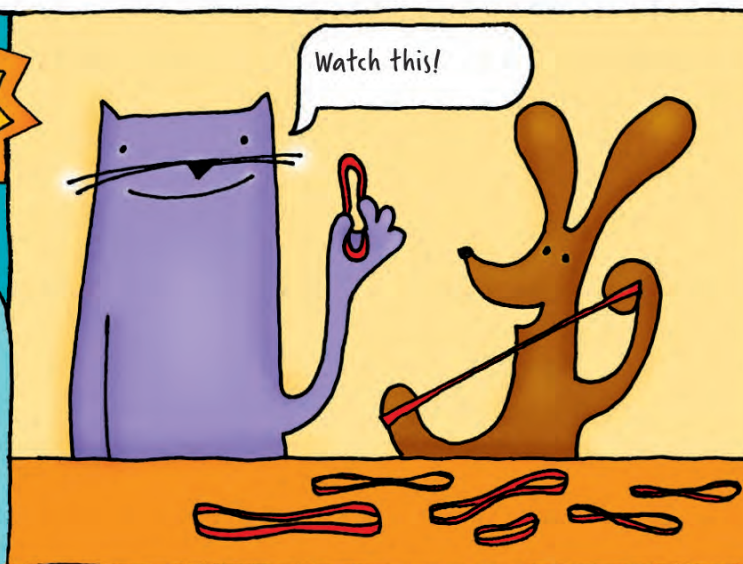
DO TRY THIS AT HOME

issue #13

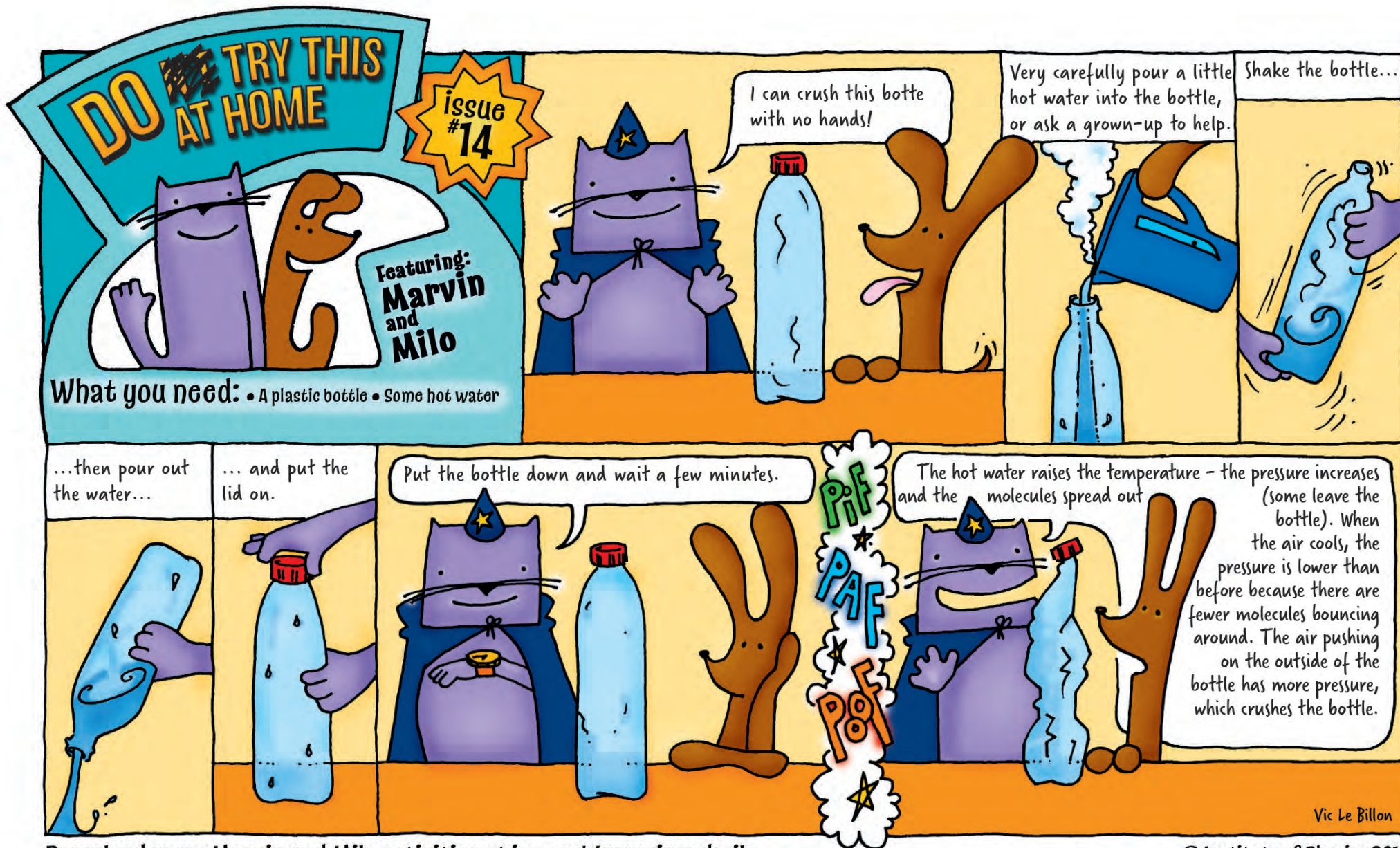
Featuring: **Marvin and Milo**

What you need:

- A television (turned on)
- A rubber band



Vic Le Billon



DO TRY THIS AT HOME

issue #15

Featuring: **Marvin and Milo**

What you need: • A sheet of paper • Cotton thread • Scissors

I can make a moving snake.

Cut a spiral shape from the paper.

Make a hole in the centre and thread the cotton through.

Hang your spiral above the radiator.

The spiral should start to spin slowly. The radiator raises the temperature of the air around it, so the particles move more quickly and spread out. This means the air is less dense and rises upwards. The rising air pushes on the paper causing it to spin.

Vic Le Billon

No snakes were harmed in the making of this cartoon.

DO TRY THIS AT HOME

issue #16

Featuring: Marvin and Milo

What you need: • A tennis ball • A basketball
• A room without breakables!

Let's see how high we can make these balls bounce.

Vic Le Billon

Drop the tennis ball from waist height. See how high it goes.

Waist height

Now watch the basketball.

Put the tennis ball on top of the basketball and drop them both at arm's length.

Did you see how high that went?

When the balls hit the ground, momentum from the basketball was transferred to the tennis ball making it go much higher than before.

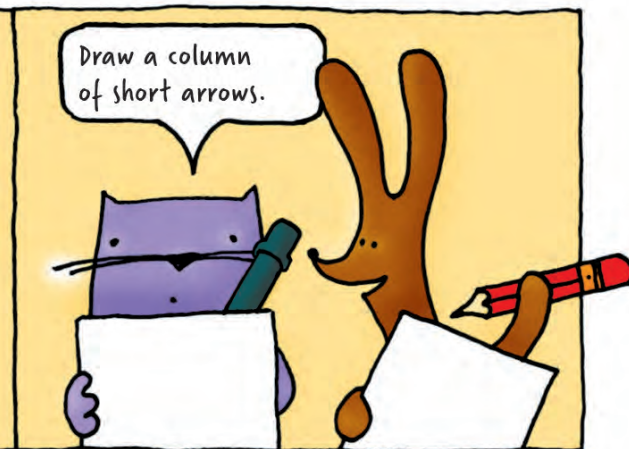
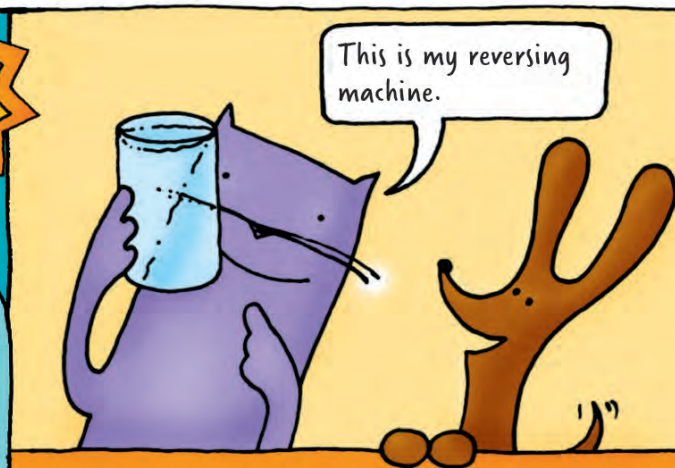
Ooof!

DO TRY THIS AT HOME

issue #17

Featuring: Marvin and Milo

What you need: • A glass of water • A piece of paper • A marker pen



Vic Le Billon

DO TRY THIS AT HOME

Issue #18

Featuring: **Marvin and Milo**

What you need: • An empty juice carton • Water • A piece of string • A pair of scissors • A washing-up bowl

You can make your own garden sprinkler.

Get an adult to poke a hole in the bottom left-hand corner of each face of the carton.

Poke another hole in the top flap...

...and thread the string through it.

Put some water in the bowl, stand the carton in it, then fill it up to the top.

Lift the carton out by the string.

As the water shoots out it pushes back on the carton with an equal force. Because the holes are off-centre this force makes it spin around.

do be doo doo

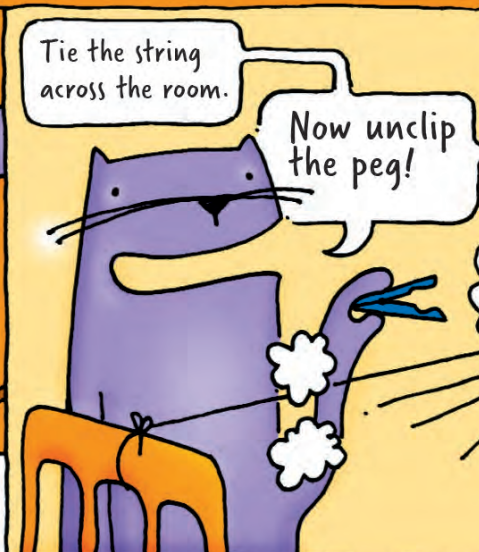
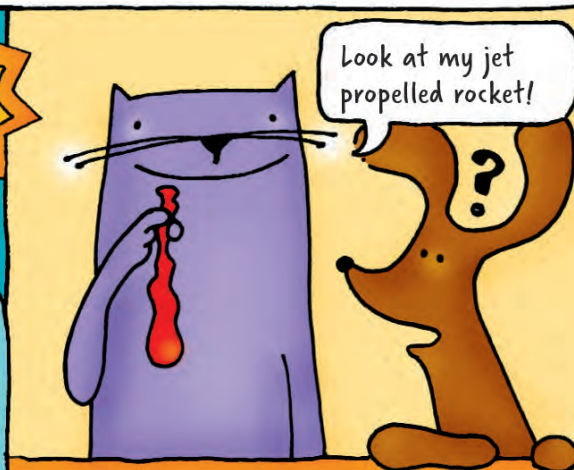
Vic Le Billon

DO TRY THIS AT HOME

issue #19

Featuring: **Marvin and Milo**

What you need: • A drinking straw - cut in half
• A balloon • A long piece of string • A clothes peg • Sticky tape

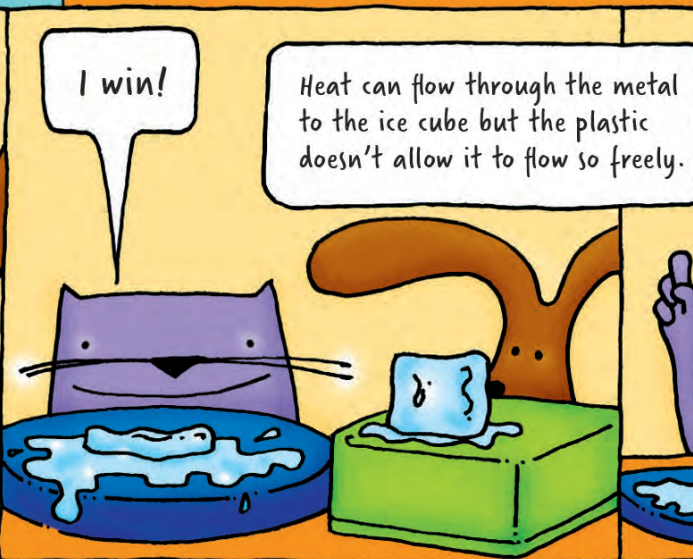
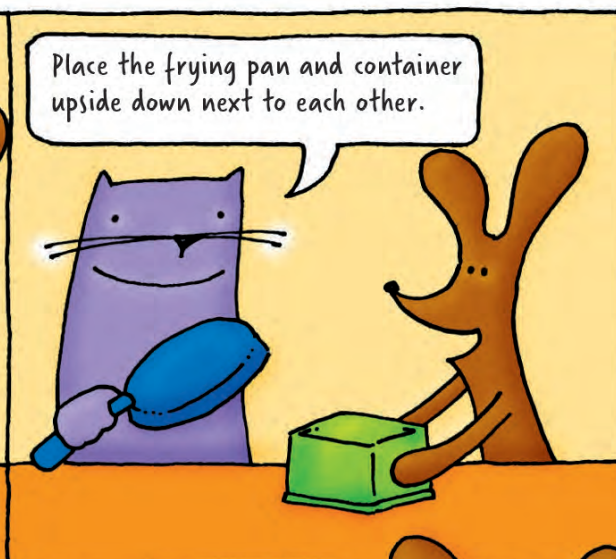


DO TRY THIS AT HOME

issue #20

Featuring: **Marvin and Milo**

What you need: • A plastic container
• A metal frying pan • 2 identical ice cubes



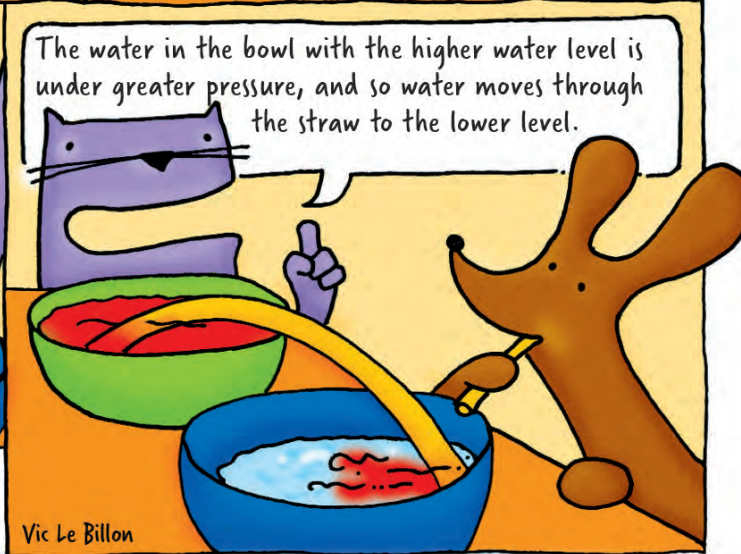
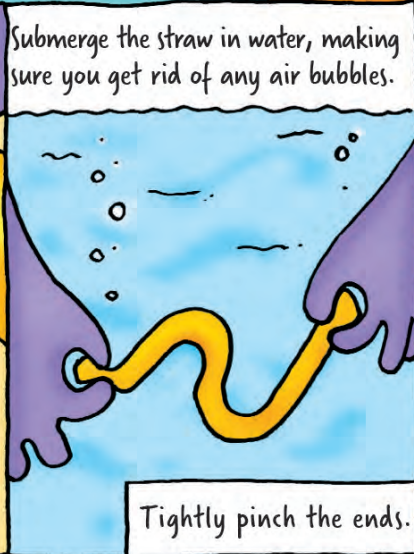
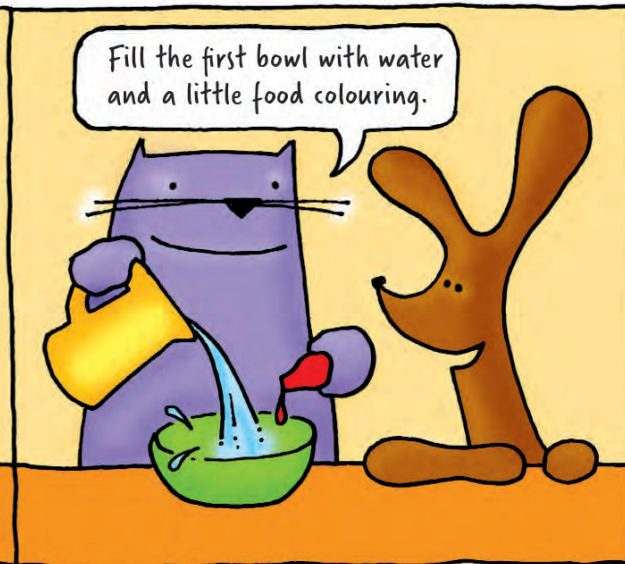
Vic Le Billon

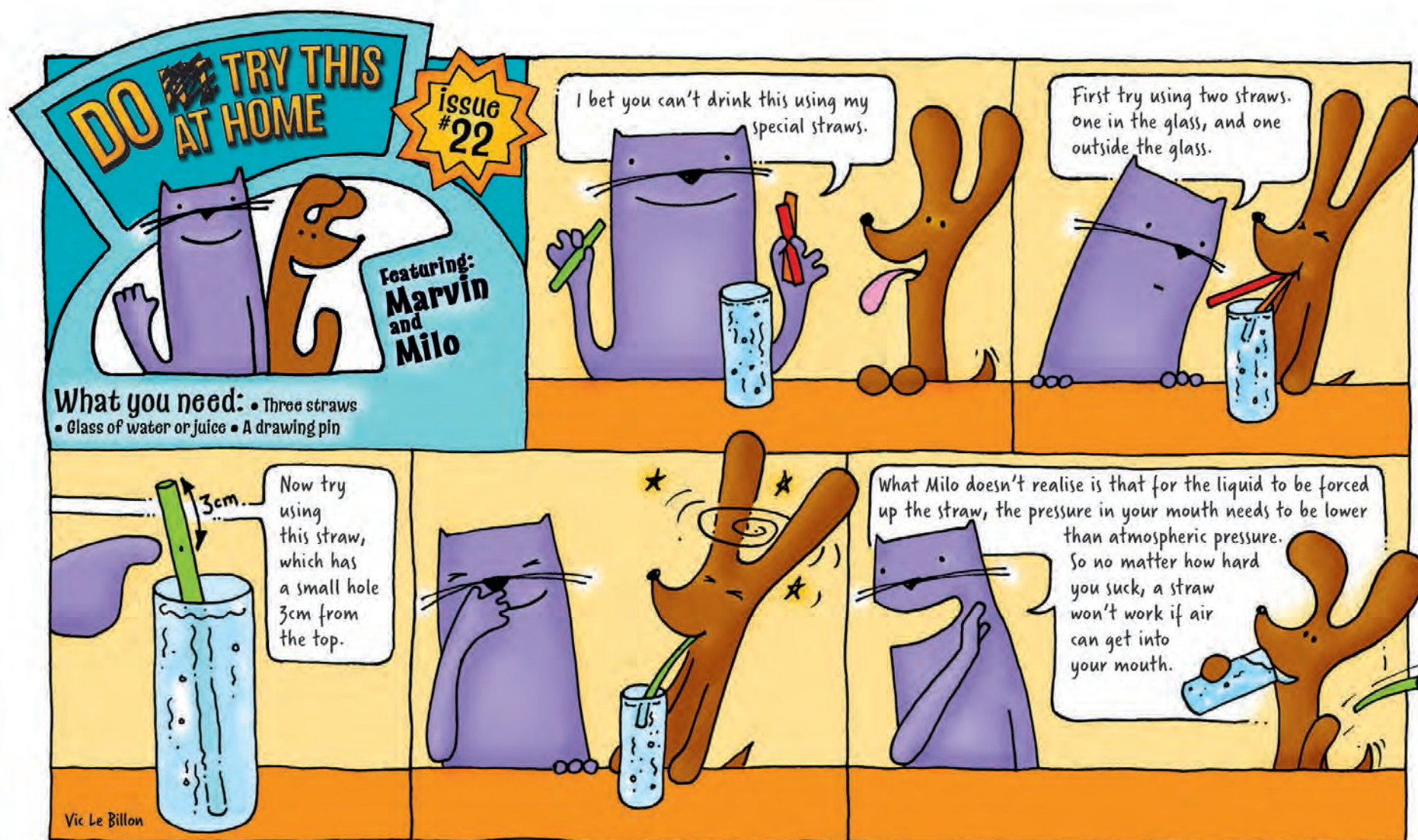
DO TRY THIS AT HOME

issue #21

Featuring: Marvin and Milo

What you need: • A bendy straw • Water • Two small flat bowls • Food colouring



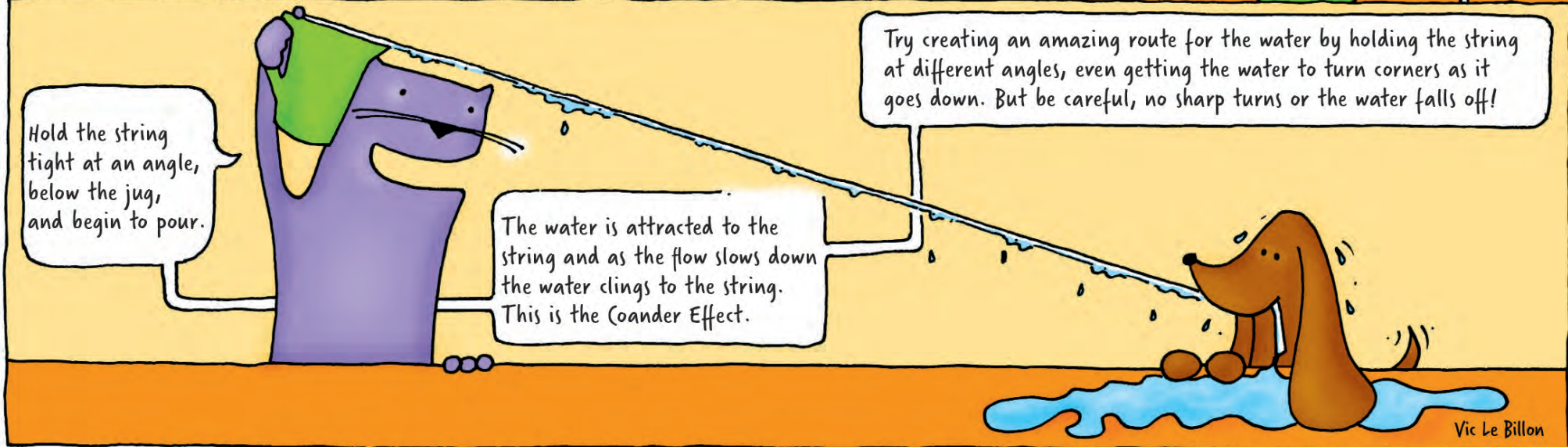
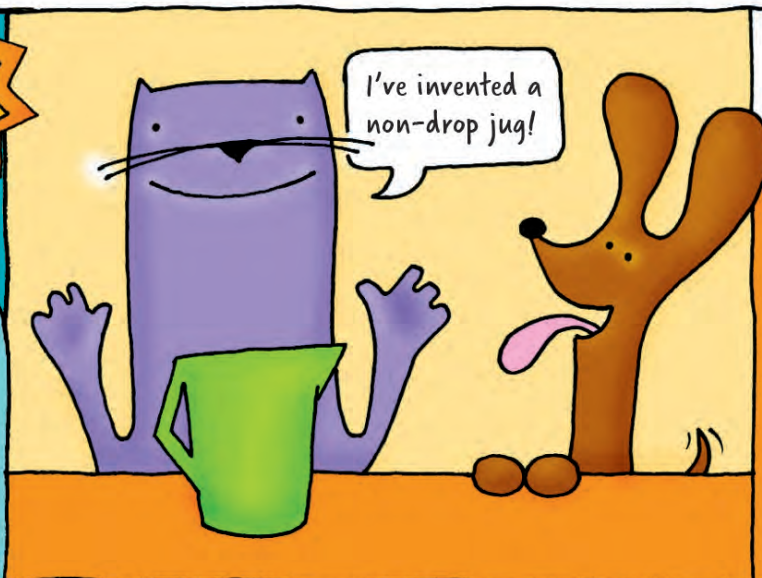


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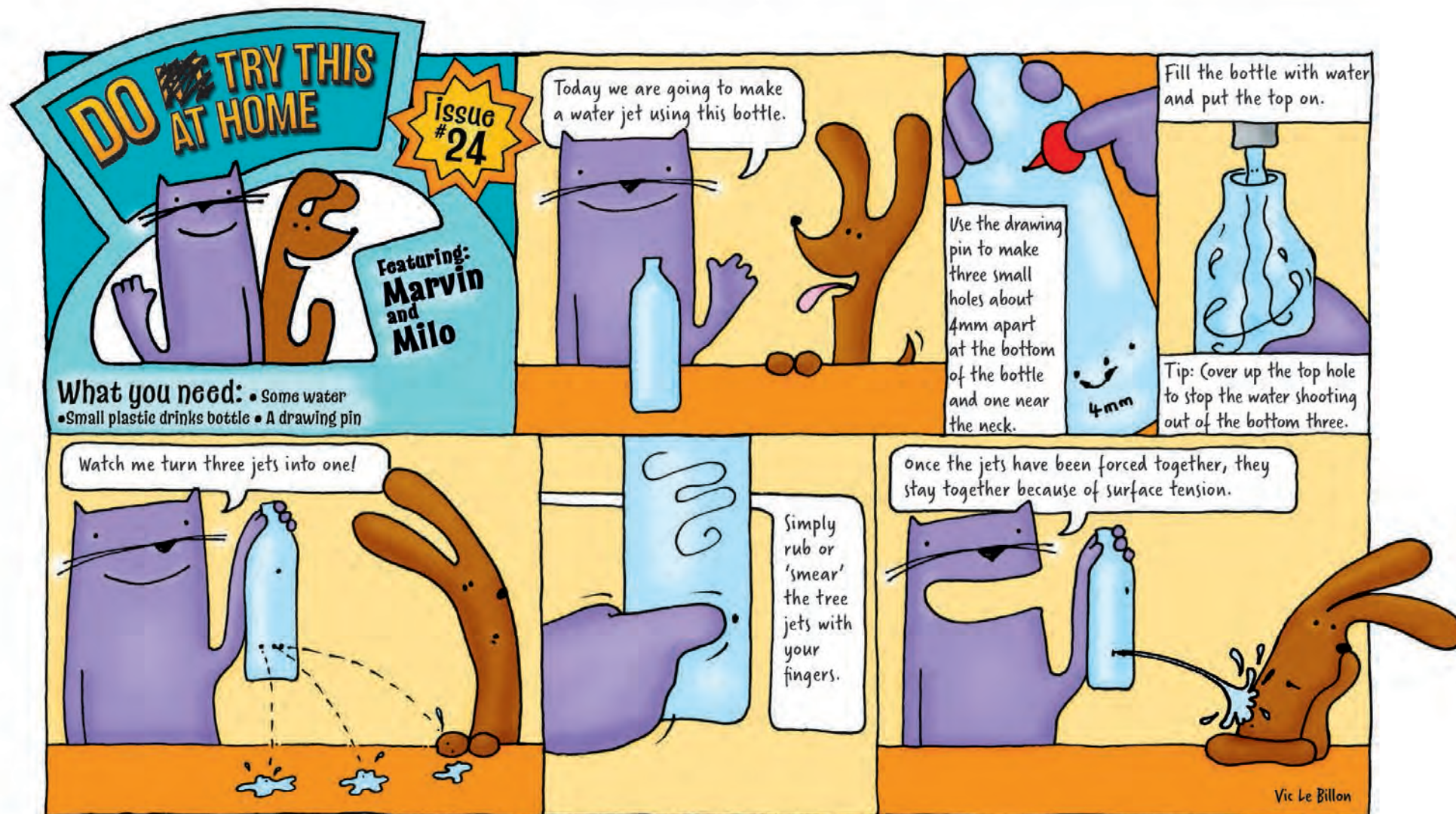
issue #23

Featuring: **Marvin and Milo**

What you need: • A jug • Water
• About 50cm of string • A basin or sink



Vic Le Billon



DO TRY THIS AT HOME

Issue #25

Featuring: **Marvin and Milo**

What you need:

- Some water
- A clear plastic watertight bag
- Some pencils

Have you seen my Ingenious Indestructible Bag?

Fill the plastic bag with water.

Push a pencil through the bag.

Then another... and another.

The bag doesn't burst because the plastic stretches rather than tears as the pencils are pushed through it.

If you take a pencil out, you can plug the leak simply by putting it back through the holesMILo!

Vic Le Billon

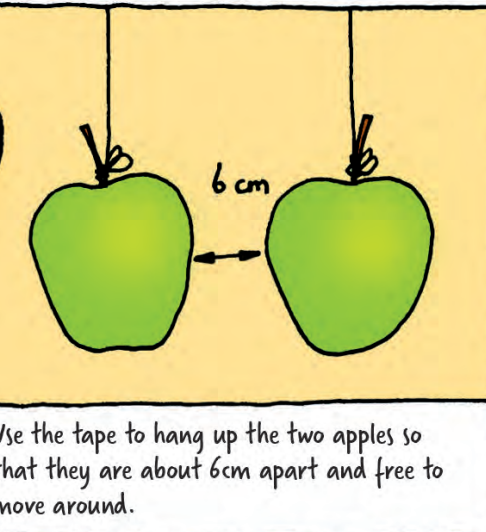
DO TRY THIS AT HOME

Issue #26

Featuring: **Marvin and Milo**


What you need: • Two apples with stalks
• Two pieces of string about 30cm long • Some sticky tape

Watch this! Tie a piece of string to the stalk of each apple.

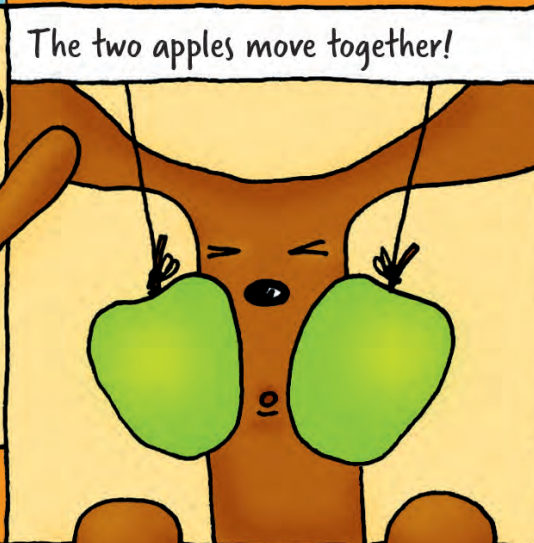



Use the tape to hang up the two apples so that they are about 6cm apart and free to move around.

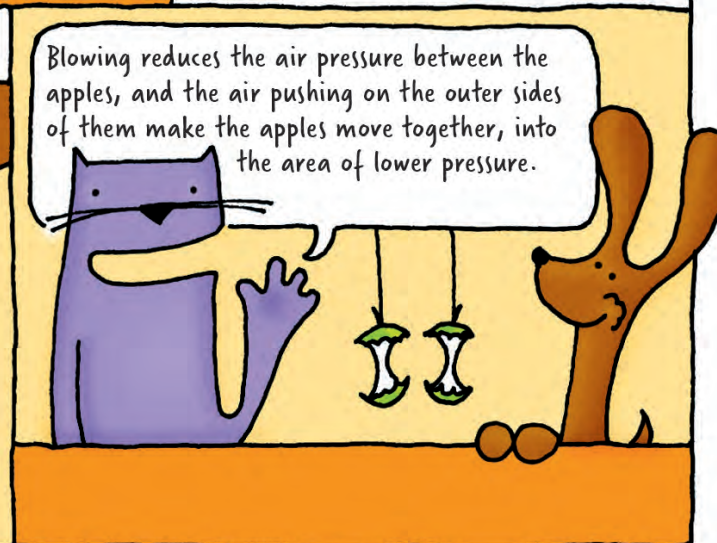
What do you think is going to happen if you blow hard between the apples?



The two apples move together!



Blowing reduces the air pressure between the apples, and the air pushing on the outer sides of them make the apples move together, into the area of lower pressure.



Vic Le Billon

DO TRY THIS AT HOME

issue #27

Featuring: **Marvin and Milo**

What you need: • A paperclip • Water • Two identical wine glasses

I bet you can't make the paperclip move without touching it.

Put equal amounts of water in both glasses and stand them next to each other but not touching.

Straighten out the paperclip, bend it slightly and then balance it on the rim of one of the glasses.

With a wet finger, rub the rim of the other glass until it "sings".

The paperclip moves!

Rubbing the glass makes it vibrate at its natural frequency. As the other glass is identical it has the same natural frequency, and the sound waves from the first glass make it vibrate as well - so the paperclip moves.

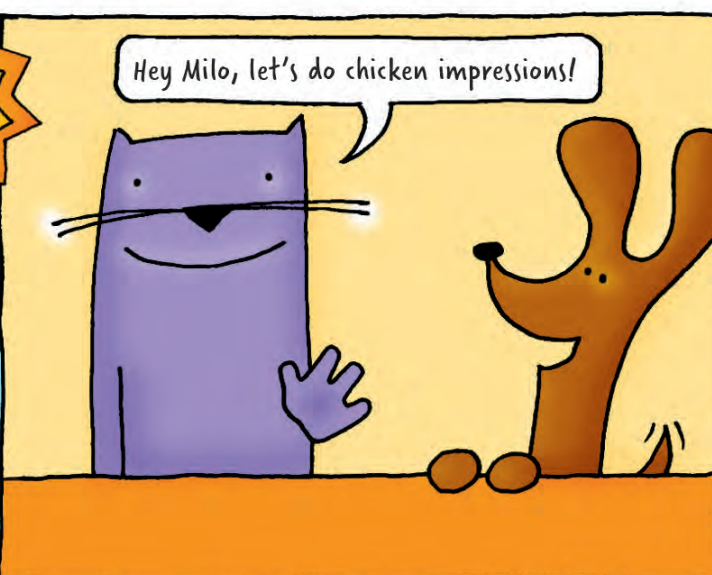
Vic Le Billon

DO TRY THIS AT HOME

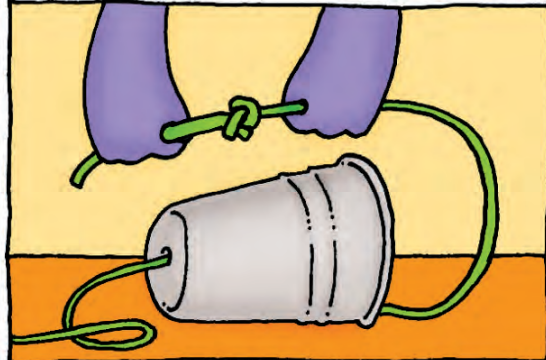
Featuring: Marvin and Milo

issue #28

What you need: • A plastic cup or yoghurt pot
• A damp cloth • Smooth string



Cut a length of string, thread it through the hole, and tie a knot in the end inside the cup to stop it from slipping back through the hole.



Vic Le Billon

DO ~~NOT~~ TRY THIS AT HOME

Issue
#29

Featuring:
Marvin
and
Milo

What you need: • 2 litre plastic bottle • Blue Tac
• A bowl of water • A ketchup sachet

Today we are going deep sea diving with this ketchup sachet.

Put the ketchup sachet into a bowl of water to see if it floats upright - if not then add a little Blue Tac to its bottom.

Fill a 2 litre bottle with water right to the very top.

Push your ketchup diver through the neck.

Put the lid on tightly, squeeze the bottle hard and watch your diver dive.

Squeezing the bottle squeezes everything inside it, including the air bubbles in the ketchup sachet. As the air molecules squash together, the sachet gets more dense than the water and it sinks. What happens when you stop squeezing?

Vic Le Billon

DO ~~NOT~~ TRY THIS AT HOME

issue #30

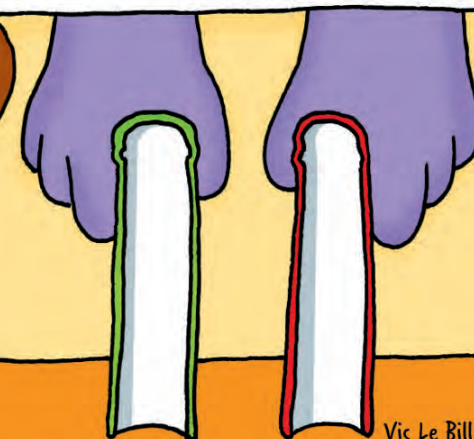
Featuring: **Marvin and Milo**

What you need: • Two very similar sized books with at least 100 pages each

I can join these two books together so well that you won't be able to pull them apart – and I won't use glue or staples or sticky tape.



My books are about the same size and have about the same number of pages.



Vic Le Billon

Carfully and evenly, interweave the pages of the books so that they overlap to about the middle of the page.



Hold the books by the spines and pull! The books don't separate, no matter how hard you pull, because of the friction between the pages.



Friction is the force that acts against the motion of two surfaces in contact. The friction between just two pages is tiny but with lots of pages in the books, the force becomes very noticeable!





What you need:

- Some water
- An empty fizzy drink can

Tip it slightly to one side and balance it so that the two parts of the bottom rim are touching the table.



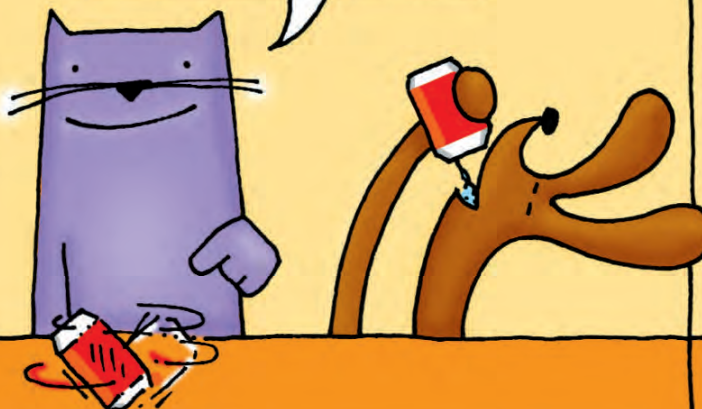
Today I'm going to show you how to make a pop can pirouette!



Pour about 100ml of water into an empty fizzy pop can.



once the can is stable, give it a gentle push and it will pirouette.



For something to balance, its centre of mass has to be above its point of support. Water can flow which means that as the can pirouettes, the water moves and the centre of mass always stays above where the rim touches the table.



Download more Marvin and Milo activities at iop.org/marvinandmilo



BURP!

Vic Le Billon

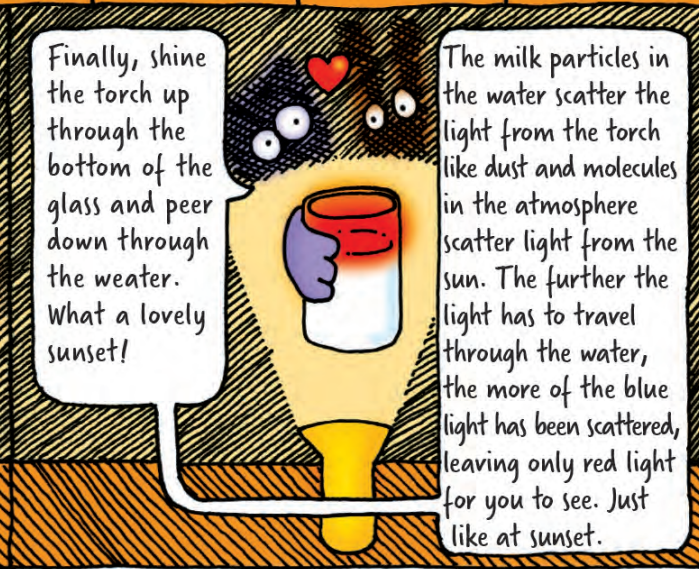
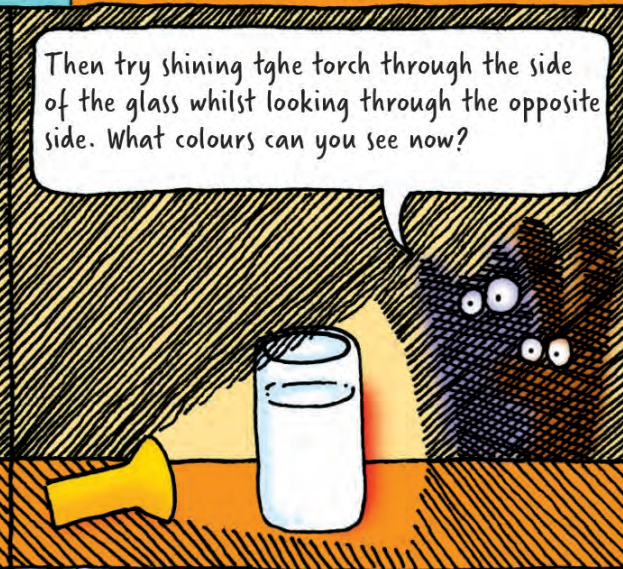
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DO TRY THIS AT HOME

issue #32

Featuring: Marvin and Milo

What you need: • A large clear, straight-sided glass
• Water • Milk • Teaspoon • Torch • Darkened room



DO TRY THIS AT HOME

Featuring: Marvin and Milo

What you need:

- Uncooked rice
- A pencil
- A large empty jar with a narrow neck

issue #33

Today I'm going to show you how to lift this jar up using just a pencil and some rice!

Fill the jar up to the brim with uncooked rice.

(Make sure you have a jar which narrows towards the top.)

Push the pencil right into the rice.

Then, alternating between shallow and deep stabs, stab the rice repeatedly. It could take about 40 stabs, but you'll start to feel the pencil gripping the rice.

When you feel a firm grip, carefully lift up the jar by the pencil.

As you push it in, the pencil forces the grains sideways but they fall back into the gap as you pull it out. The rice becomes more and more tightly packed until the friction between the rice and the pencil is so great you can lift the jar.

DO TRY THIS AT HOME

issue #34

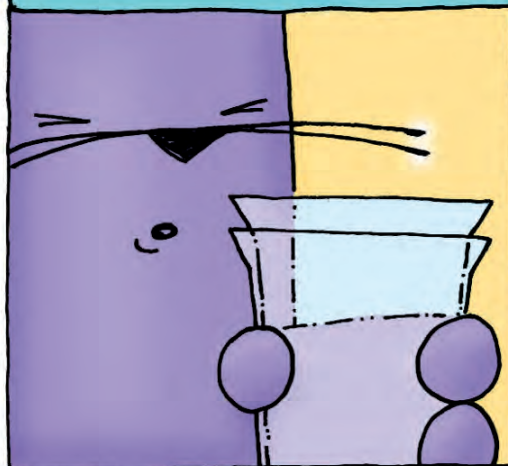
Featuring: **Marvin and Milo**

What you need: • Two identical cups

I've got a great new party trick that will liven up this party.

PARP...

Take two, empty, plastic cups and put one inside the other.



Hold them quite close to your mouth and blow between the rims of the cups.

If you blow softly, the inner cup rises up slowly. But if you blow hard...

The moving air gets in to the gap between the cups and forces the top cup up, out and across the room.

... the top cup launches itself across the room!

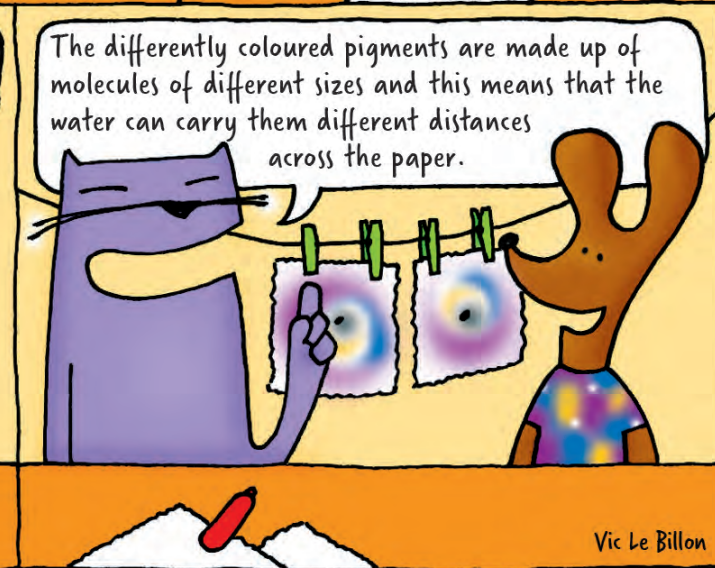
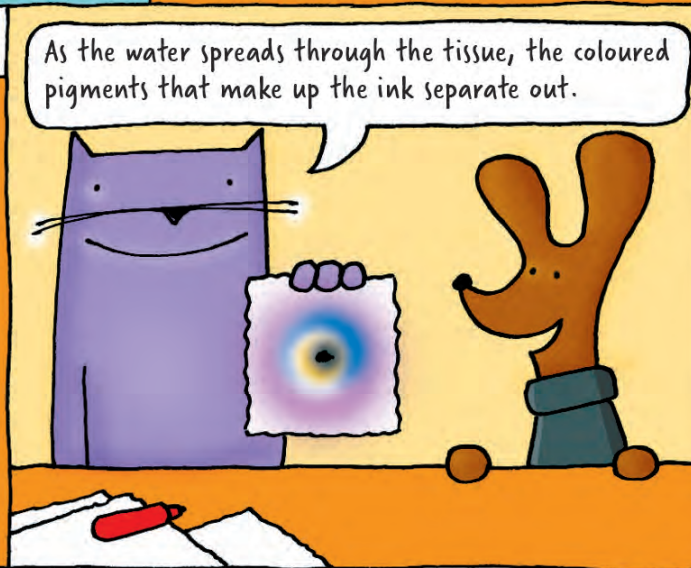
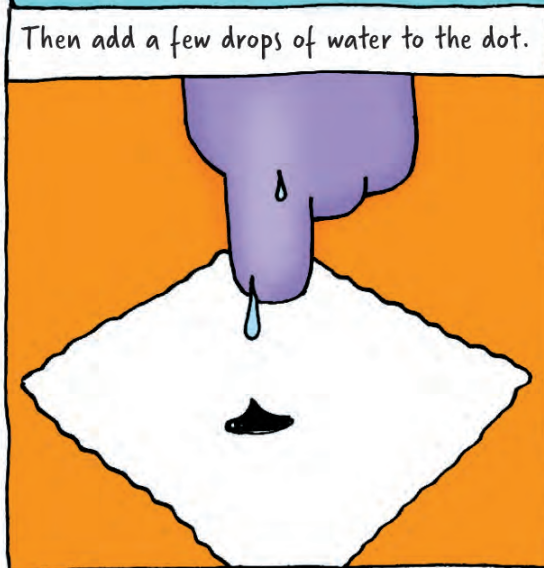
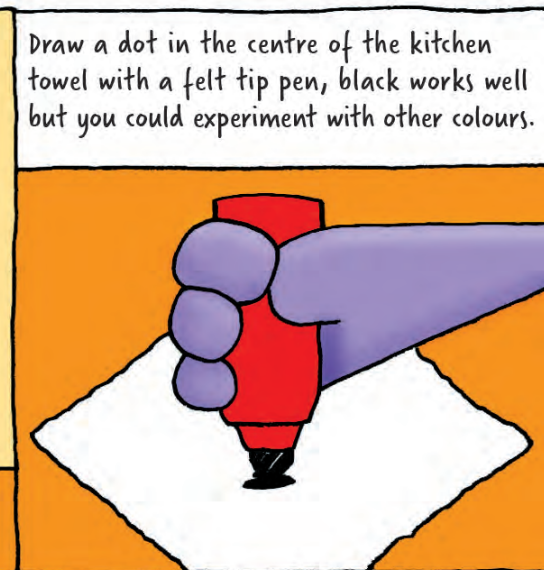
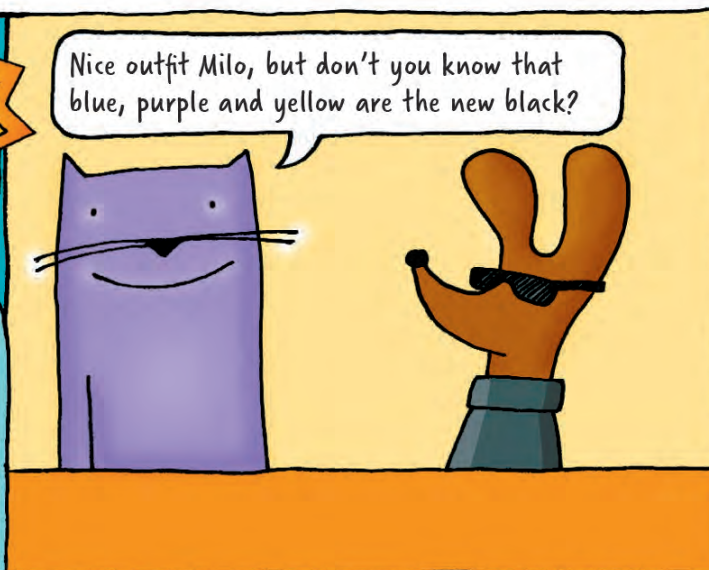
Vic Le Billon

DO TRY THIS AT HOME

issue #35

Featuring: **Marvin and Milo**

What you need: • Kitchen towels • Water
• Non permanent coloured felt tip pens



Vic Le Billon

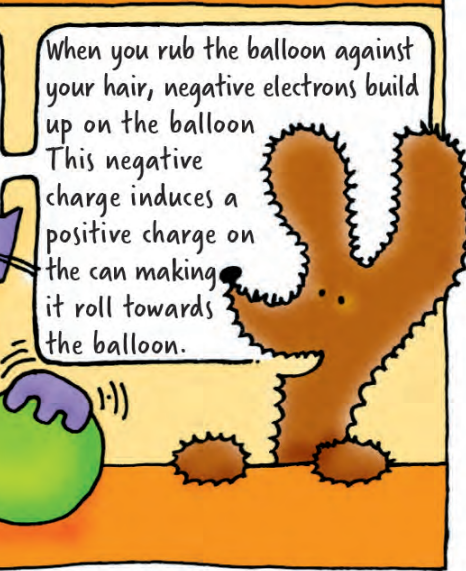
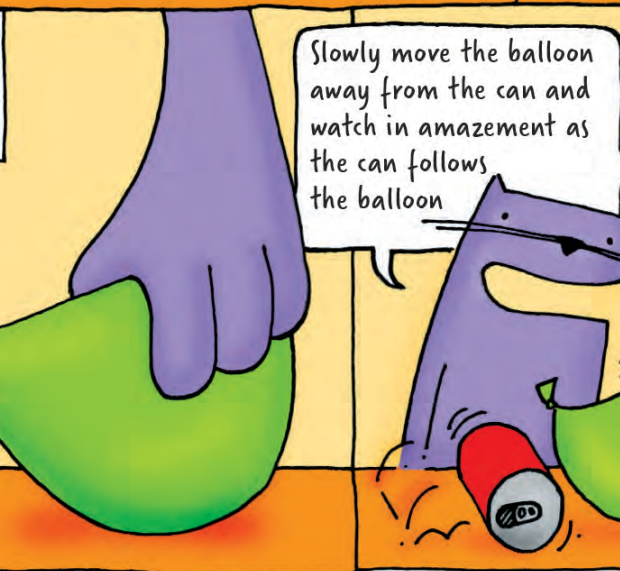
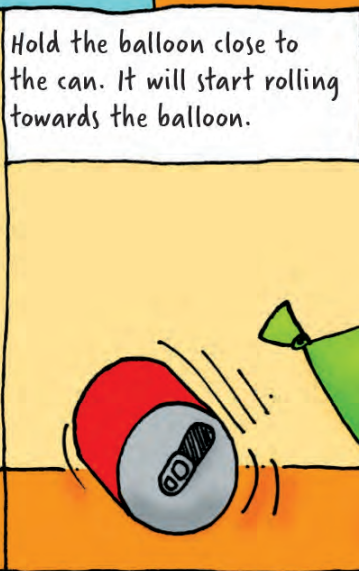
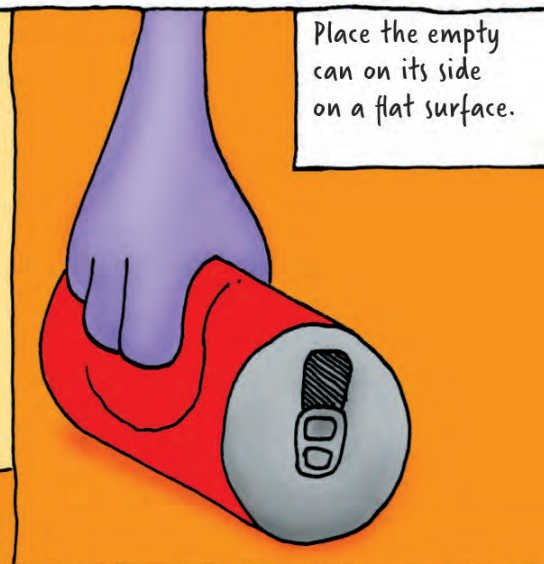
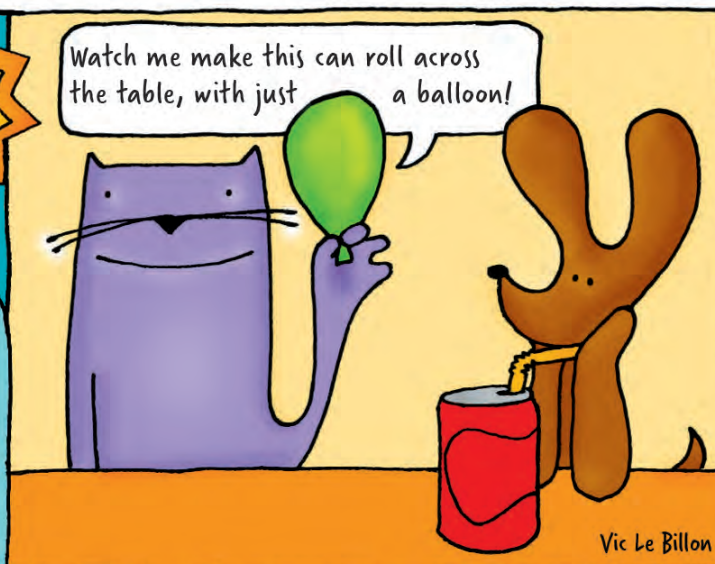
DO TRY THIS AT HOME

issue #36

Featuring: **Marvin and Milo**

What you need:

- A balloon
- An empty pop can (aluminium cans are best)



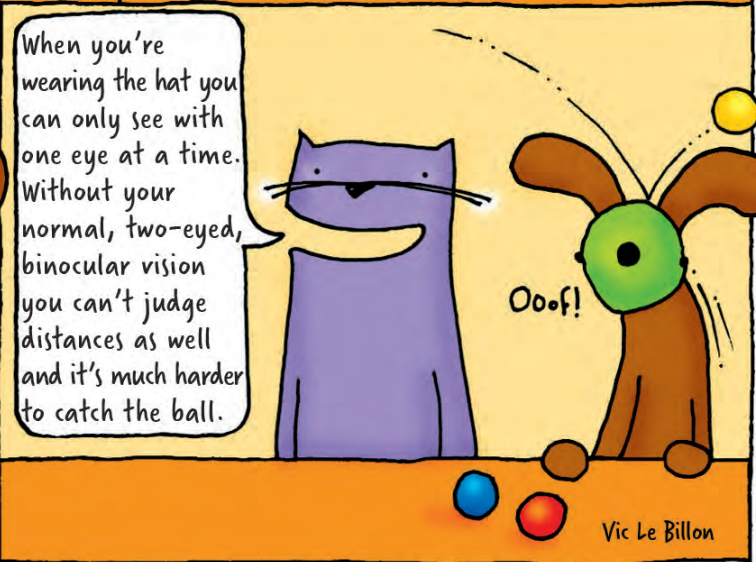
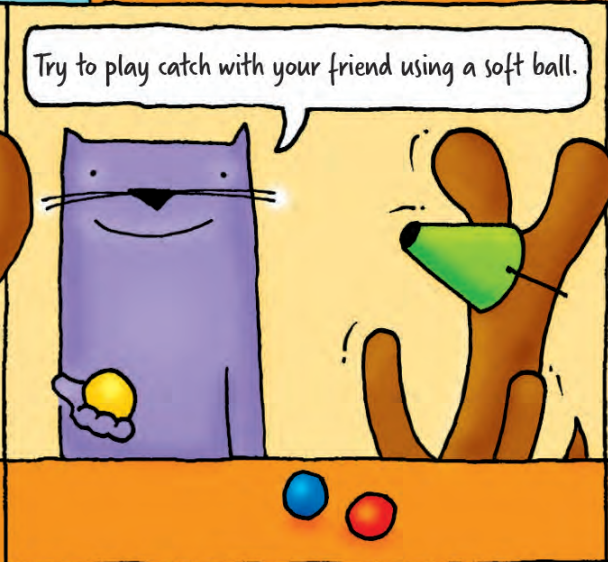
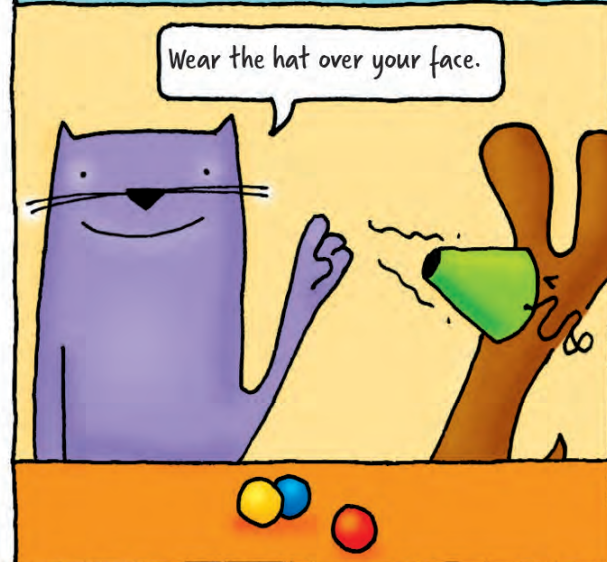
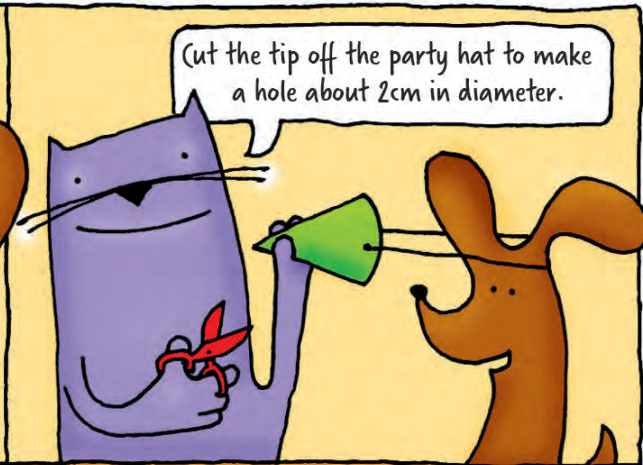
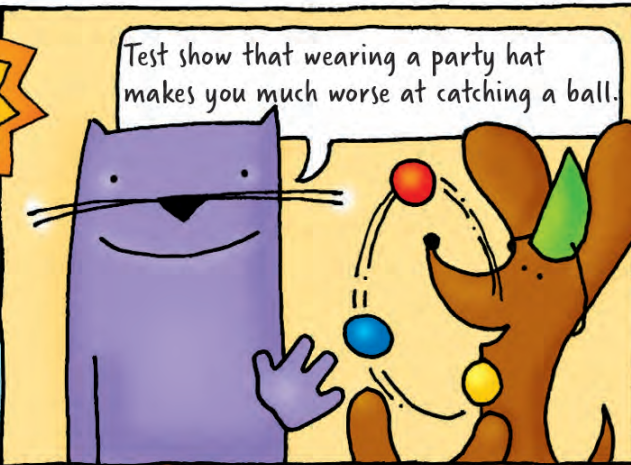
DO ~~NOT~~ TRY THIS AT HOME

issue #37

Featuring: Marvin and Milo

What you need:

- A cone shaped party hat
- Scissors
- A soft ball
- A friend



DO TRY THIS AT HOME

Issue #38

Featuring: Marvin and Milo

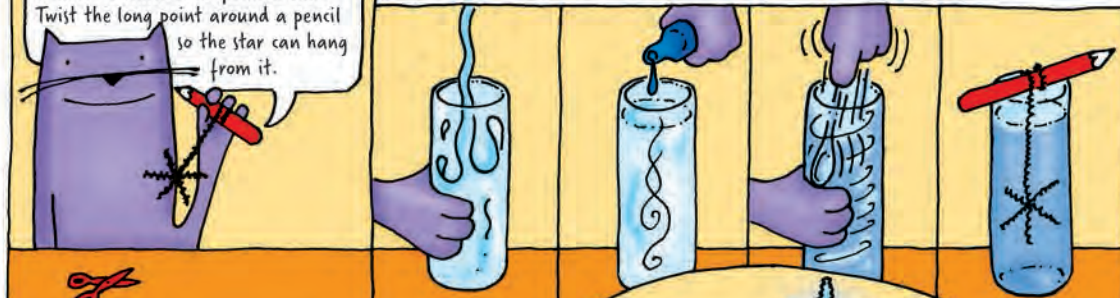
Well Milo, that's the Christmas decorating done... but there's something missing... Ahh, I know!

What you need: • Large glass of hot water • Pencil • Two pipe cleaners • Epsom salts • Blue food colouring • Spoon

Vic Le Billon

Cut one pipe cleaner in half. Twist the two halves around the second pipe cleaner to make a six pointed star. Twist the long point around a pencil so the star can hang from it.

Fill a glass with enough hot water so that the star will be completely covered when it's hanging from the pencil. Add some colouring to the water. Stirring, add Epsom salts to the water until no more will dissolve...



... and wait overnight.

The rough surfaces of the pipe cleaners act as a nucleation site, encouraging the salt molecules to come out of solution and form crystals. They grow over time as more and more salt molecules attach to the crystal surfaces.



Festive greetings to everybody from the Institute of Physics!

Download more Marvin and Milo activities at iop.org/marvinandmilo

DO ~~NOT~~ TRY THIS AT HOME

Featuring: Marvin and Milo

issue #39

What you need: • Two polystyrene cups
• Two large elastic bands • Sticky tape

Chocs away Milo! It's time to make these ordinary cups loop the loop!

Tape the two polystyrene cups together at the base.

Then tie the two elastic bands together.

Hold one end of the elastic where the cups join and wind it around a few times until the other end of the elastic is at the bottom and pointing away from you.

Hold the cups in one hand and stretch the elastic with the other. Fire the cups like a catapult. With a bit of practice the cups will soon be looping in the air.

The elastic makes the cups spin backwards as well as move forward through the air. This back spin creates lift, forcing the cups upwards. But air resistance soon slows the cups down and they fall towards the ground, completing the loop.

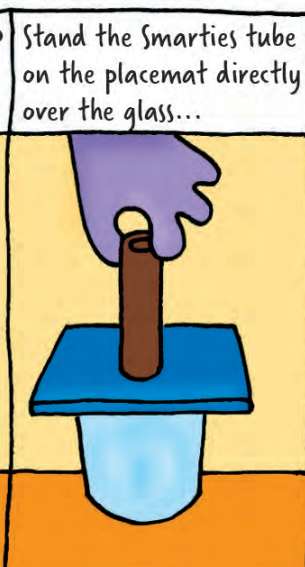
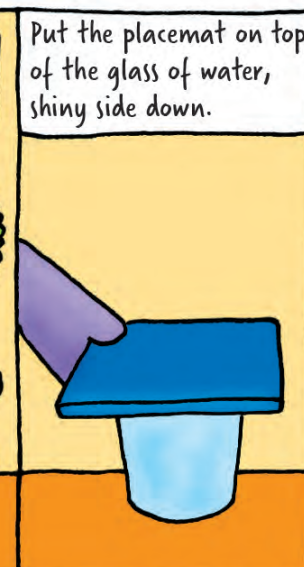
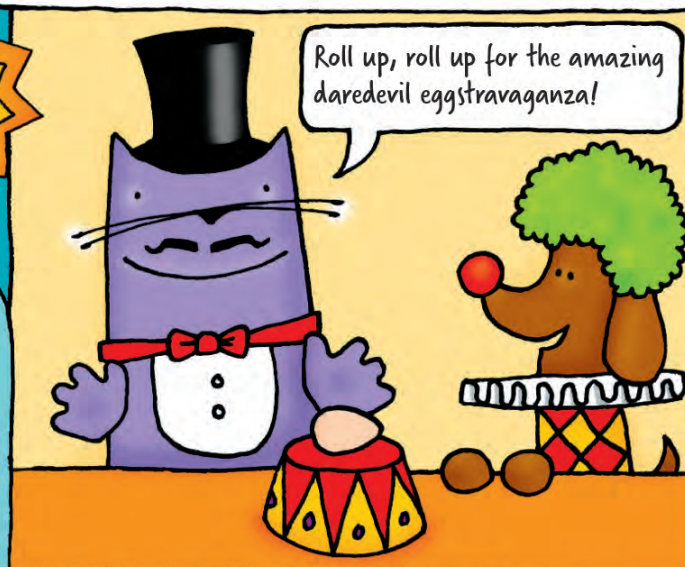
Vic Le Billon

DO TRY THIS AT HOME

issue #40

Featuring: **Marvin and Milo**

What you need: • An egg • A glass of water • An empty Smarties tube • A placemat



...and balance the small pointy end of the egg on the top of the tube.



Vic Le Billon

DO TRY THIS AT HOME

Featuring: Marvin and Milo

issue #41

What you need: • Pencil with a rubber on the end
• Drawing pin • Drinking straw • Sticky tape

I hope you've got lots of puff Milo, you're going to demonstrate Newton's third law!

Insert the long end of the straw into the balloon...

... and tape it in place.

Push the drawing pin through any part of the long end of the straw to attach it to the pencil's rubber.

Bend the short end.

Blow up the balloon using the straw, release, and watch it spin!

Try changing the position of the drawing pin and the angle of the short end to make it spin faster. The air rushes along the straw and around the bend. As the straw pushes on the air to force it round the corner, the air pushes back on the straw - making it move.

Vic Le Billon

DO TRY THIS AT HOME

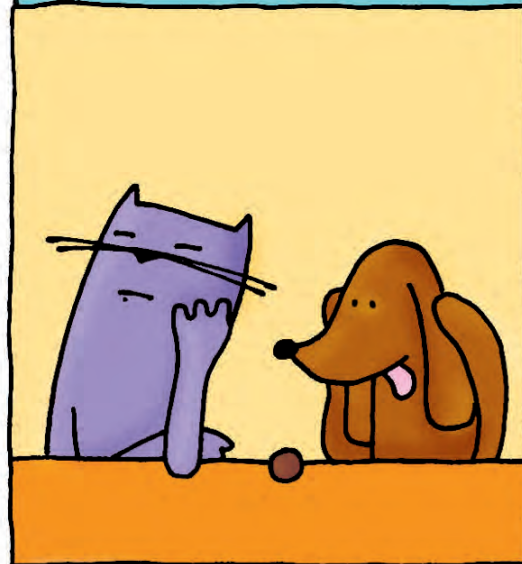
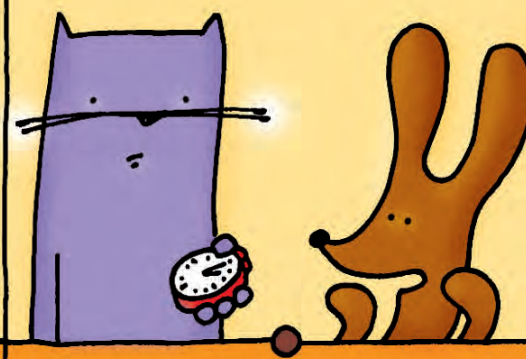
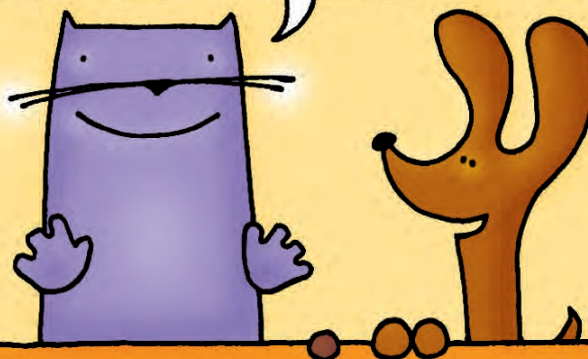
Featuring: Marvin and Milo

What you need:

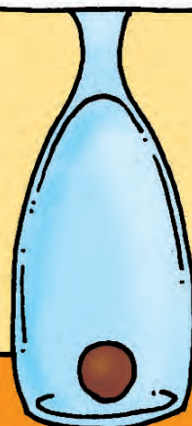
- A Malteser
- A wine glass (narrower towards the top)

Issue #42

I bet you can't lift the Malteser off the table without touching it!



Put the Malteser on the table and place the glass over it.



Wiggle the glass quickly with a circular motion and the Malteser will climb the sides of the glass.



Keeping wiggling, lift the glass off the table and the Malteser will stay inside!



The glass pushes inwards on the Malteser, forcing it to move in a circle rather than a straight line. But the angle of the glass means that it also pushes upwards on the Malteser, supporting its weight.



Vic Le Billon

DO TRY THIS AT HOME

Issue #43

Featuring: **Marvin and Milo**

What you need: • 2 lolly sticks • A wide elastic band • 2 smaller, narrower elastic bands • A straw • Scissors

I know what we can do with these lolly sticks!

Wrap the wide elastic band lengthwise around one of the sticks.

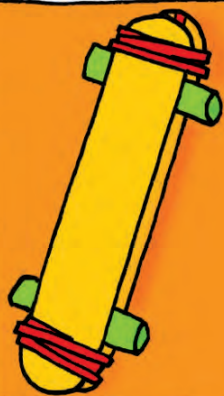
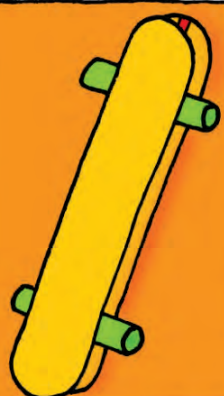
Cut two short pieces of straw and place them in between the stick and elastic band.



About 3cm from the end of the stick.

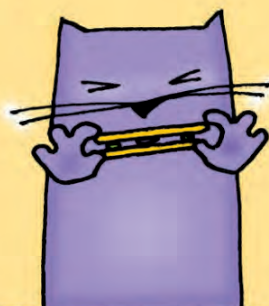
Place the other stick on top of the pieces of straw.

Hold the ends of both sticks together with the smaller elastic bands.

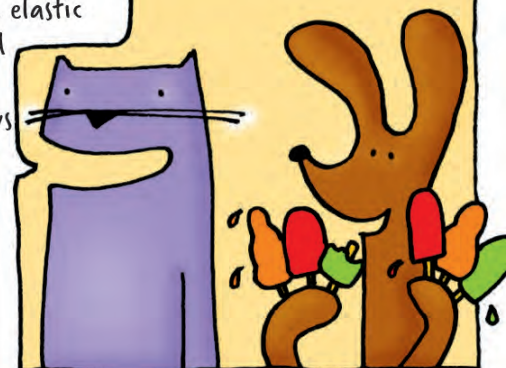


Then blow!

What happens if you move the straws closer together?



Blowing through the Loud Lollies makes the elastic band vibrate and create a sound. Moving the straws closer together shortens the section of the elastic band that can vibrate, raising the pitch of the sound produced.



Vic Le Billon

DO ~~NOT~~ TRY THIS AT HOME

Featuring: Marvin and Milo

What you need: • An old CD • Blue Tack • A sports cap from a drinks bottle • A balloon

issue #44

I know a much better use for that old Barry Manilow cd.



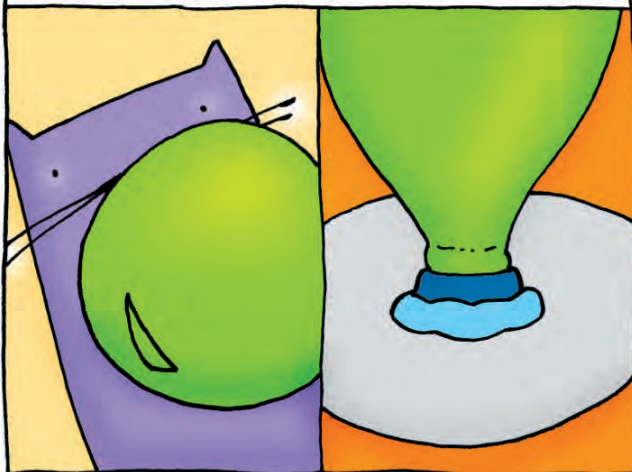
Place the sports cap over the hole in the cd...



... and fix in place with some Blue Tack.



Blow up the balloon and, making sure the sports cap is closed, pull the open end of the balloon over the cap.



Place your hovercraft on a flat surface and open the sports cap.



Give it a quick tap and watch your hovercraft go!

The air rushes out of the balloon and through the cap, lifting the cd up on a cushion of air. The air reduces the friction between the cd and surface it's on so the hovercraft can travel a surprising distance before stopping.

Vic Le Billon



DO TRY THIS AT HOME

issue #45

Featuring: Marvin and Milo

What you need:

- A ramp or slope
- A lump of plasticine
- A round biscuit tin (or similar container)

Watch me defy gravity and make this biscuit tin roll up hill.

Attach a large-fist-sized lump of plasticine to the inside of the wall of the tin at the seam...

...and put the lid on.

With the seam facing upwards but towards the top of the slope, put the tin on its side at the bottom of the slope and hold it in place.

Let go and, ta da! The tin rolls up the slope.

The weight of the plasticine creates a turning force on the tin that levers it up the hill when you let go, and makes it look as though you're defying gravity.

DO TRY THIS AT HOME

issue #46

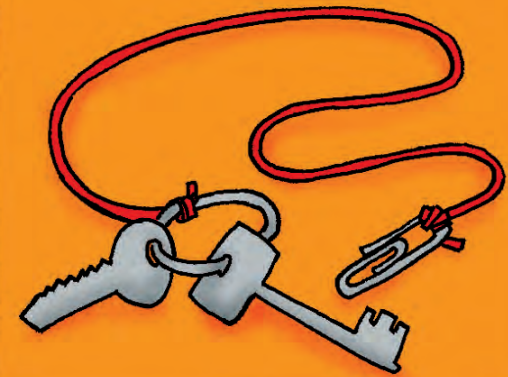
Featuring: Marvin and Milo

What you need: • A bunch of about 9 keys • A pencil • A large paperclip or washer • 1m of string

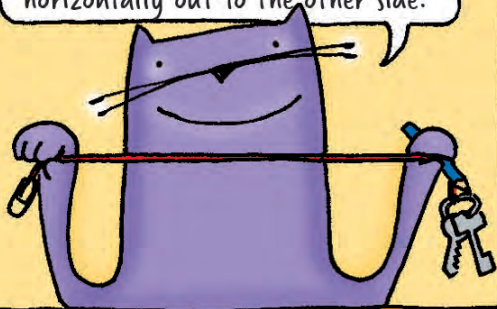
Want to see how I can catch these keys with no hands?



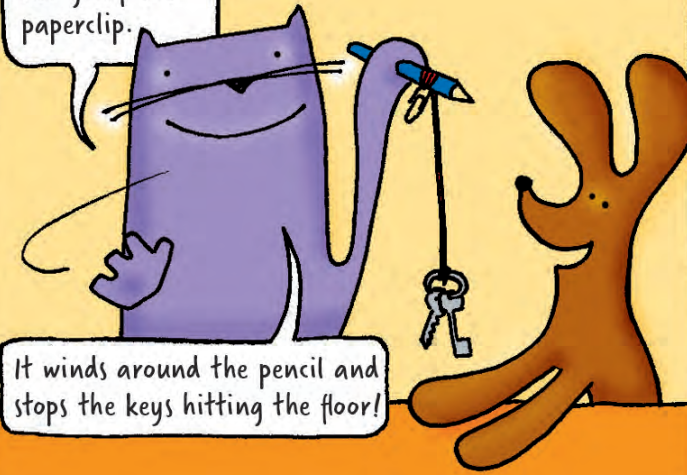
Tie a bunch of keys to one end of the string and the paperclip to the other.



Place the string over the pencil so that the keys hang down a couple of centimetres. Hold the paperclip horizontally out to the other side.

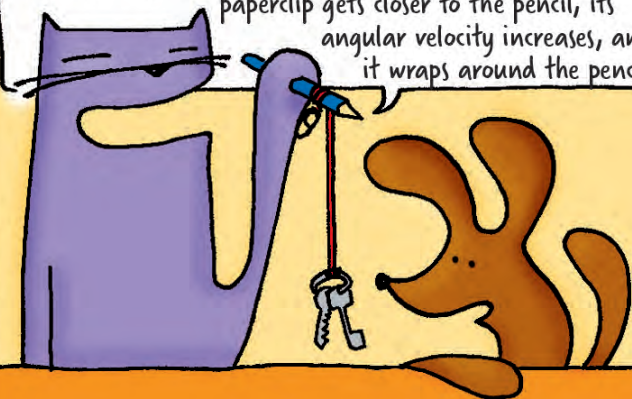


Let go of the paperclip.



It winds around the pencil and stops the keys hitting the floor!

The keys pull the paperclip towards the pencil, but gravity is also pulling it downwards so it moves in a circle. As the paperclip gets closer to the pencil, its angular velocity increases, and it wraps around the pencil.



Vic Le Billon

DO TRY THIS AT HOME

issue #47

Featuring: **Marvin and Milo**

What you need: • A bowl • A glass • Water • A tissue

Hey Milo, this trick will make your cold feel better. Check out my submarine!

Fill the bowl with enough water to completely cover the glass.

Scrunch up the tissue and push it into the bottom of the glass.

Turn the glass upside down and submerge it in the water.

Pull the glass out and the tissue is...Dry!

Ahhhh chooooo!

The air trapped inside the glass is at atmospheric pressure and this keeps the water out of the glass and away from the tissue.

Vic Le Billon

DO TRY THIS AT HOME

issue #48

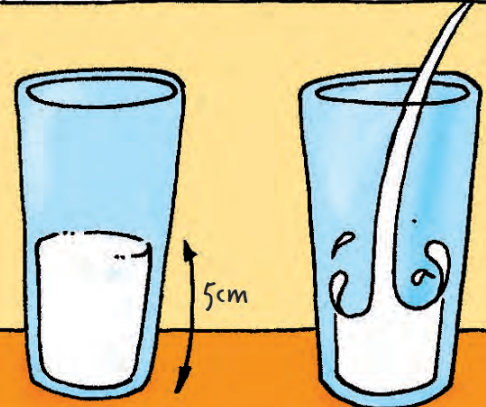
Featuring: **Marvin and Milo**

What you need: • Two glasses • Skimmed milk • Whole milk • Two straws • A friend

Let's see which milk will make better froth for my cappuccino!



Fill one glass about five centimetres deep with whole milk and pour the same amount of skimmed milk into the other glass.



Both starting at the same time, blow through the straws and into the milk.



The skimmed milk froths up much faster than the whole milk, and the bubbles last longer too!



Bubbles can form in milk because the milk proteins form a strong skin. But the fat in whole milk interacts with these proteins, weakening this skin and popping the bubbles.



Vic Le Billon

DO TRY THIS AT HOME

issue #49

Featuring: Marvin and Milo

What you need:

- A metal clothes hanger
- Plasticine • (An adult to help)

Fab deely boppers Milo, but try out my Head Hanger.

Straighten out the clothes hanger...

... and then bend it into an 'M' shape with long 'legs'.

Make two equal-sized Plasticine balls...

...and stick them on to the legs of the 'M'.

Balance the hanger on your head with the Plasticine balls well away from your ears. This may take some practise.

As you turn, the hanger remains almost stationary! The friction between your head and the wire is very low so the hanger doesn't move with you.

Spin round quickly.*

*Be careful of the ends of the hanger and your face.

Vic Le Billon

DO TRY THIS AT HOME

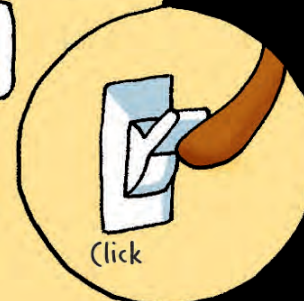
issue #50

Featuring: **Marvin and Milo**

What you need:

- A dark room
- An envelope
- Roll of sticky tape
- A Polo mint or similar sugary sweet
- A friend or mirror

Milo, you're going to love this one! I can make these everyday objects glow.



Wait about five minutes in a dark room so that your eyes become dark adapted and you can make out some objects.

Rip open the seal of the envelope - you will see a blueish glow.

Try crunching a sweet with your mouth open or ripping a piece of sticky tape off of the roll.

Cracking sugar or ripping apart glued surfaces separates positive and negative electrical charges. When they recombine the surrounding air is excited, producing a flash of blueish light.

Click

Vic Le Billon

DO TRY THIS AT HOME

issue #51

Featuring: **Marvin and Milo**

What you need: • A plastic cup • A pair of scissors
• Some water

This is a great trick to do at a picnic, Milo. Do you think I can get water to stay in a cup with a hole in it?

Cut a hole in the bottom of the plastic cup about 1cm in diameter, making sure that your finger can cover it.

Ask an adult to help with this.

Cover the hole with your finger and fill the cup with water. Make sure you're somewhere that can get wet.

Drop the cup, removing your finger from the hole as quickly as possible.

The water stays inside the cup despite the huge hole! The cup and the water are falling at the same rate due to gravity so they hit the ground at the same time.

Vic Le Billon

DO TRY THIS AT HOME

issue #52

Featuring: **Marvin and Milo**

What you need: • An empty plastic bottle • A balloon • A pair of scissors • Sticky tape • A target

Hey Milo, check out my bottle blaster.

KEOW

Carefully cut the bottom of the bottle off.*

*Ask an adult to help

Cut the neck off the balloon.

Stretch the balloon over the bottom of the bottle.

Don't pull it tight. Tape the balloon in place around the bottle.

Take aim at your target, pull back the centre of the balloon, hold the bottle steady and release the balloon!

KEOW

A vortex of air is pushed out of the bottle by the balloon, ruffling everything it passes. How far will your vortex travel?

Vic Le Billon

DO TRY THIS AT HOME

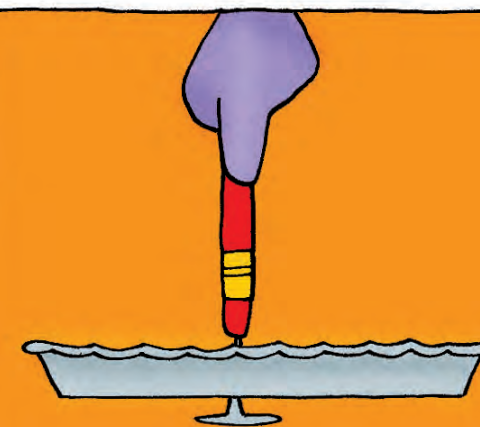
Featuring: Marvin and Milo

issue #53

What you need:

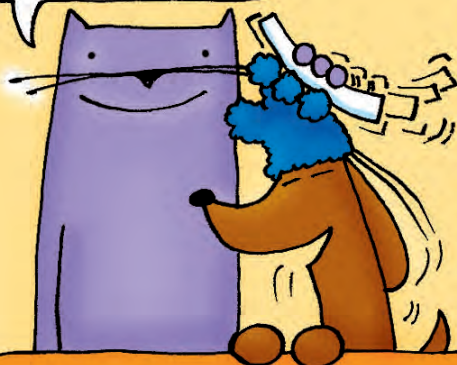
- A piece of polystyrene
- Drawing pin
- Clean foil quiche tin
- Pencil with a rubber end
- Woollen glove

Hey Milo, here's a chance to show what a bright spark you are.

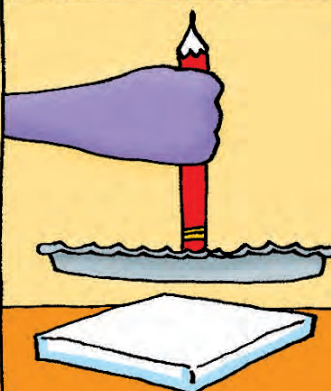


Push the drawing pin through the centre of the foil tin and push the rubber end of the pencil on to it to form a handle.

Rub the polystyrene quickly with the glove.



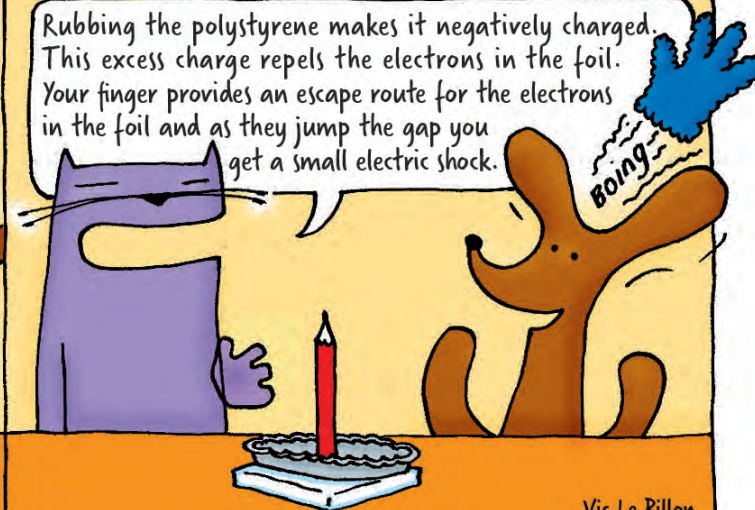
Using the pencil handle, put the foil tin on top of the polystyrene. Don't touch the foil or the polystyrene.



Bring an outstretched finger close to the tin and you'll hear, feel and maybe even see a tiny spark!



Rubbing the polystyrene makes it negatively charged. This excess charge repels the electrons in the foil. Your finger provides an escape route for the electrons in the foil and as they jump the gap you get a small electric shock.



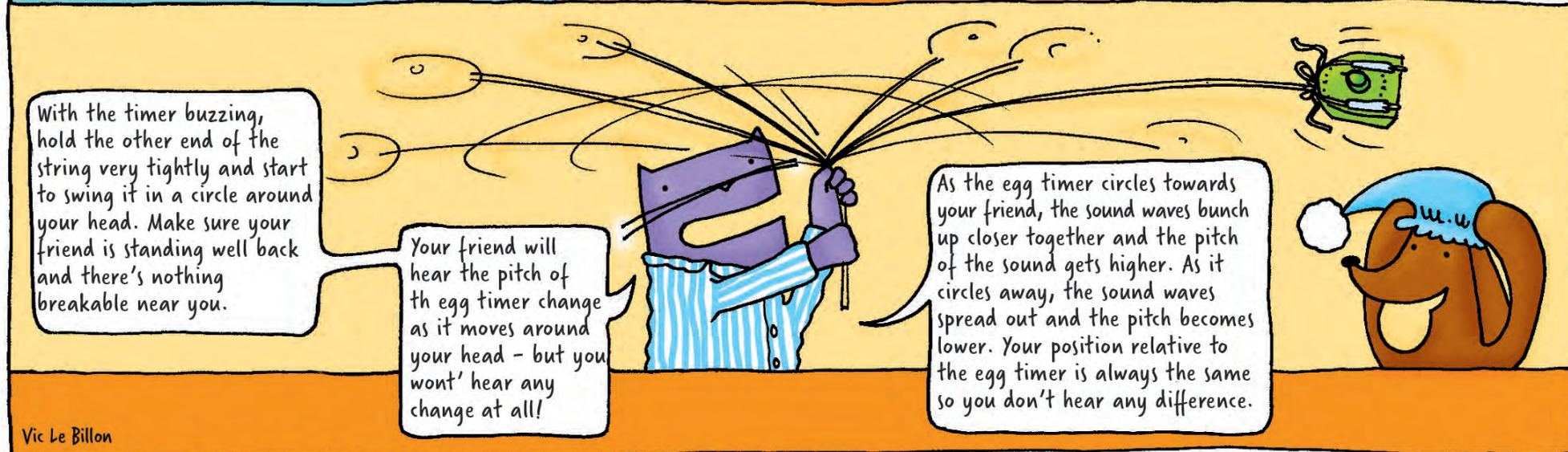
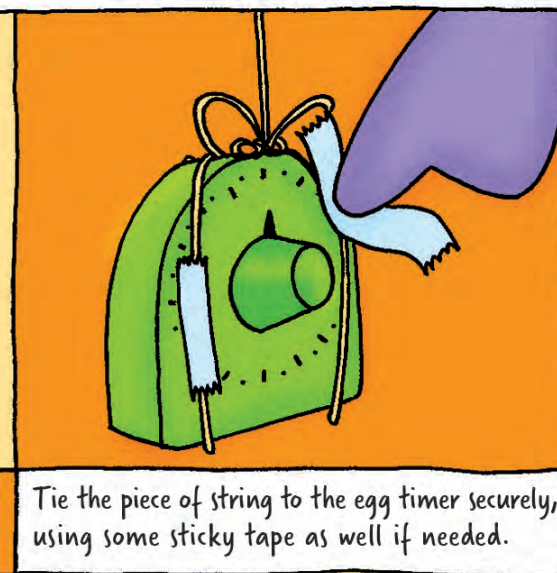
Vic Le Billon

DO TRY THIS AT HOME

Featuring: Marvin and Milo

issue #54

What you need: • A buzzing egg timer • Sticky tape
• A piece of string about 1 metre long • A friend



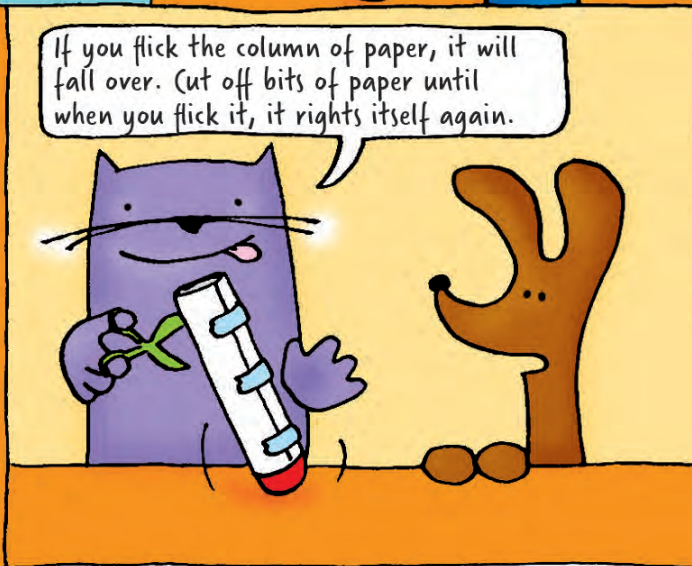
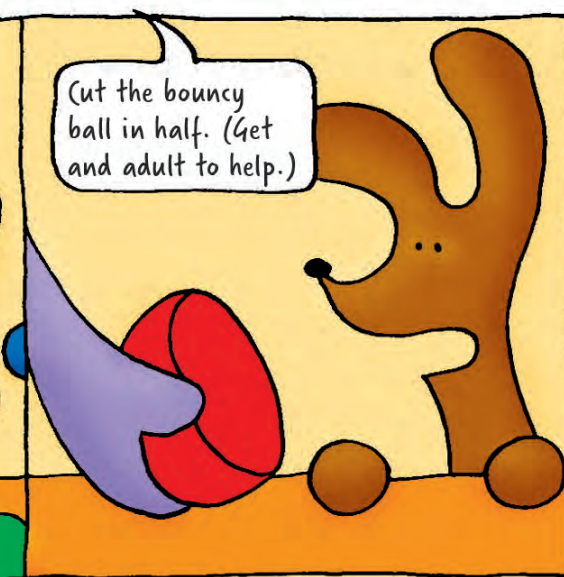
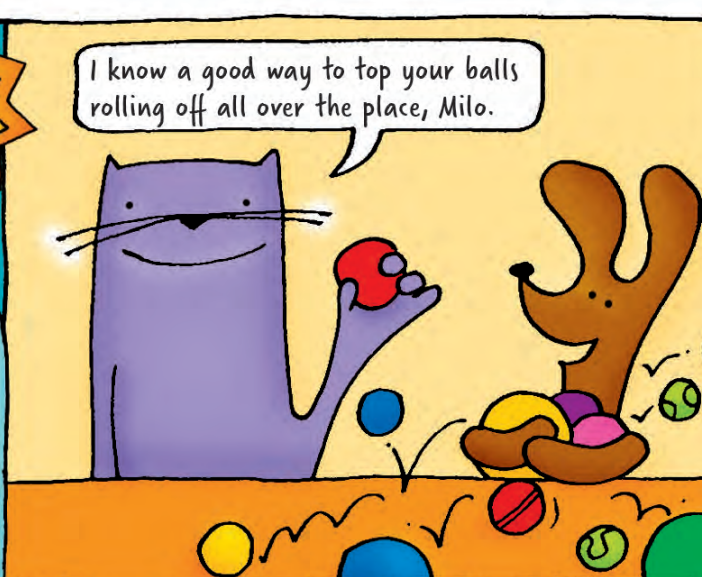
Vic Le Billon

DO TRY THIS AT HOME

Issue #55

Featuring: Marvin and Milo

What you need: • Bouncy ball or ball or Plasticine
• Piece of paper • Sticky tape • Scissors



Vic Le Billon

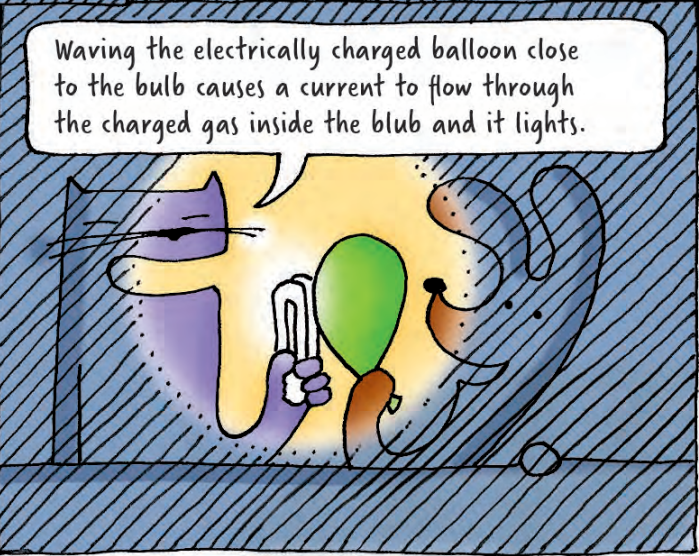
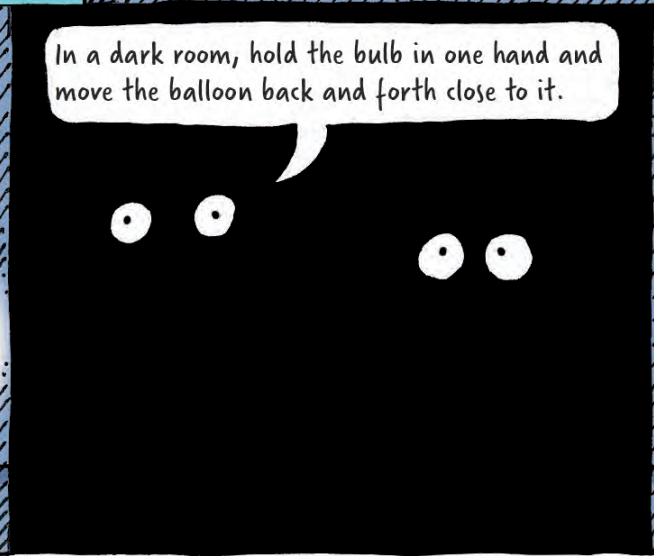
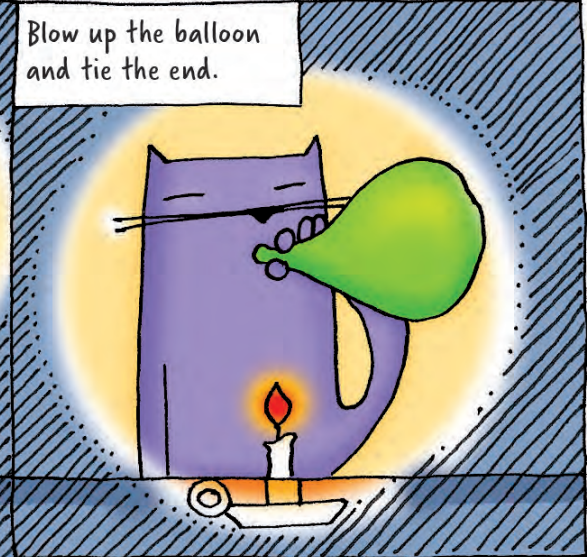
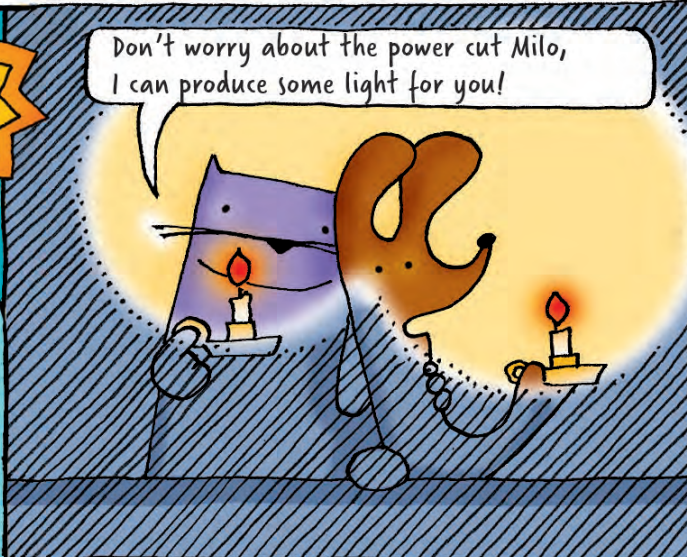
DO TRY THIS AT HOME

Issue #56

Featuring: Marvin and Milo

What you need:

- Party balloon
- Energy saving light bulb

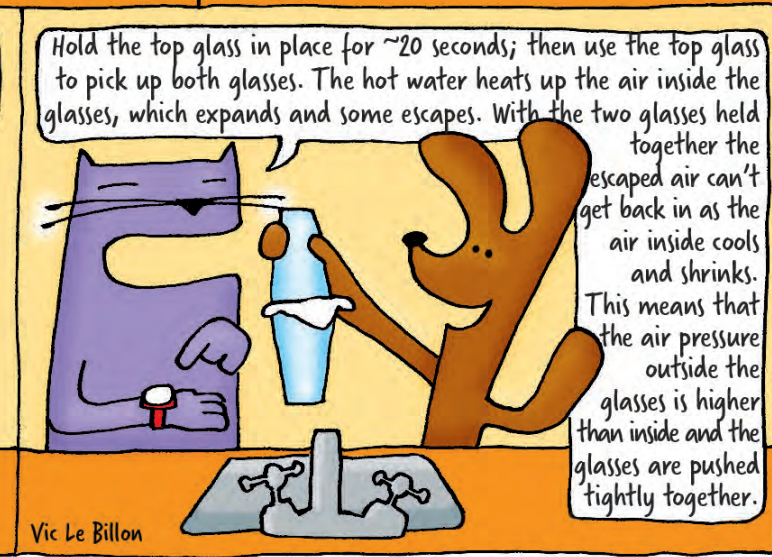
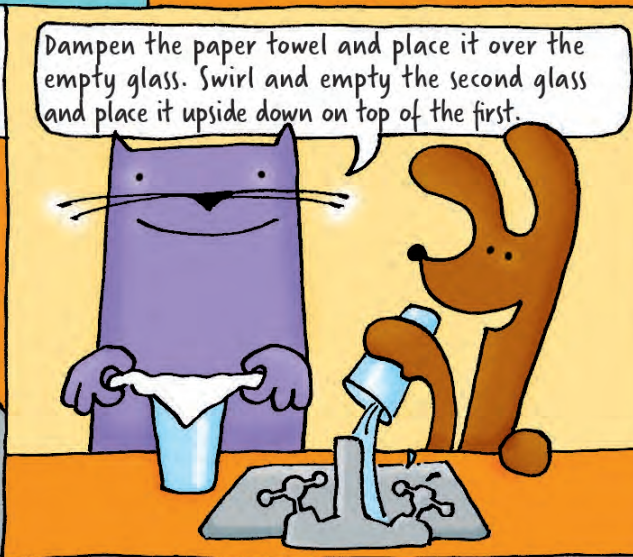


DO TRY THIS AT HOME

issue #57

Featuring: Marvin and Milo

What you need: • Two plastic glasses • Paper towel • Hot water • Sink • Adult help

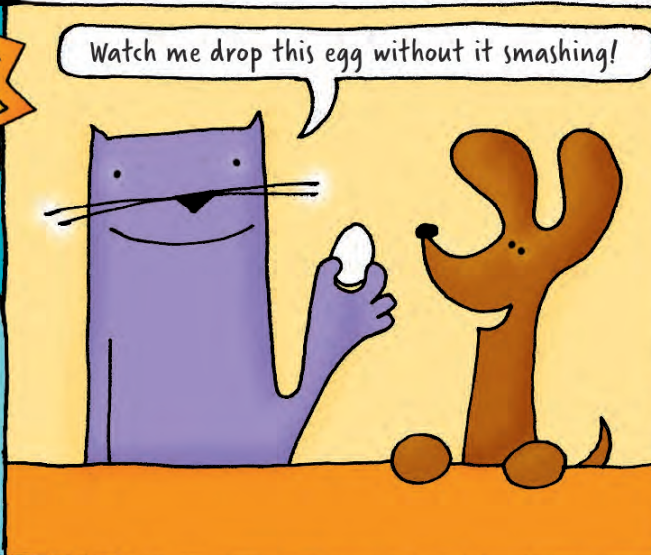


DO TRY THIS AT HOME

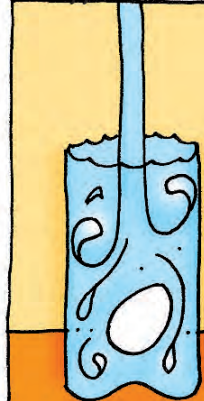
Issue #58

Featuring: Marvin and Milo

What you need: • Raw egg • Large pop bottle • Salt • Scissors • Sticky tape • Water



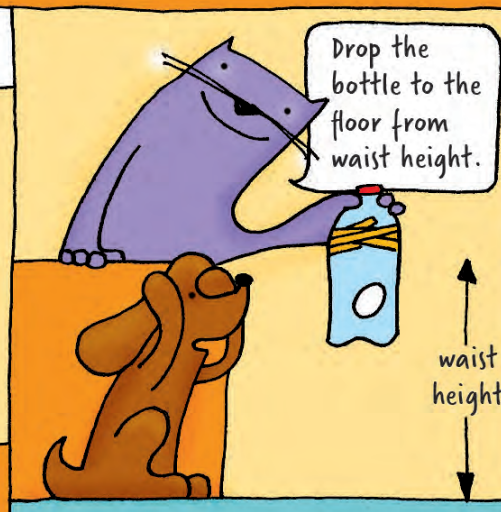
Fill the bottle with enough water so that the egg is well covered.



Add salt to the water, stirring, until the egg floats.



Tape the top of the bottle back on.



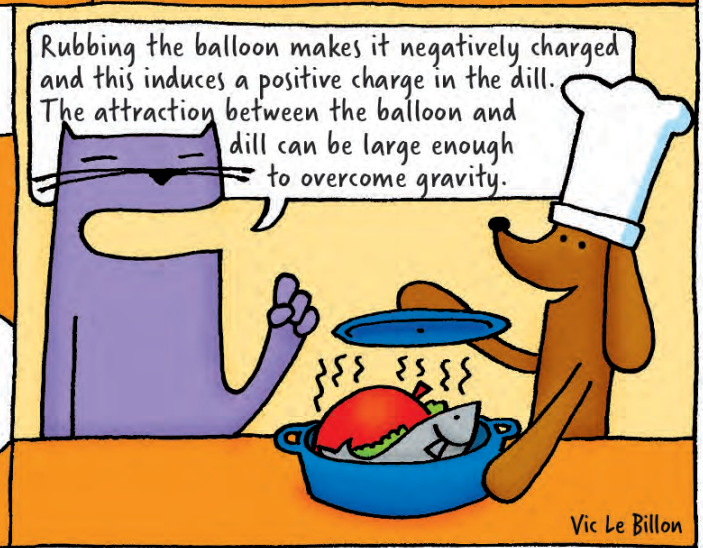
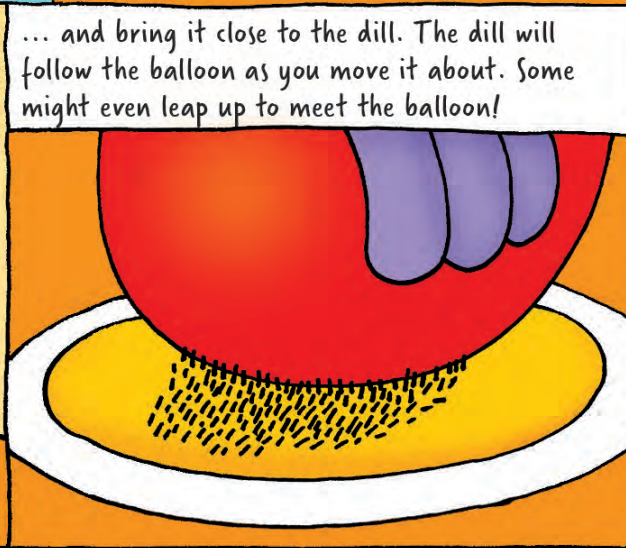
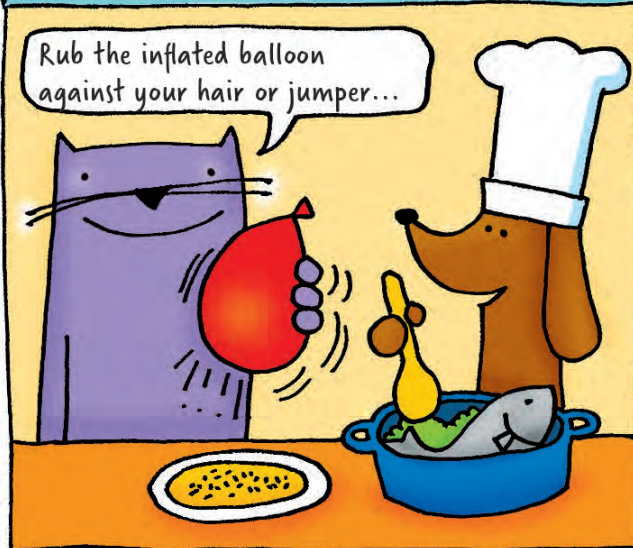
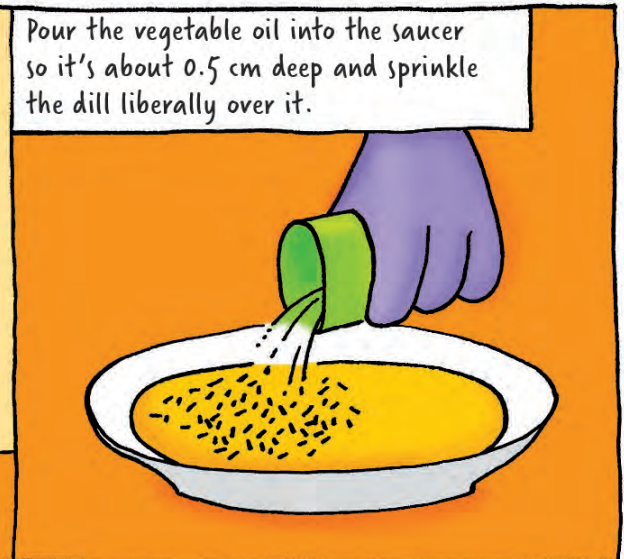
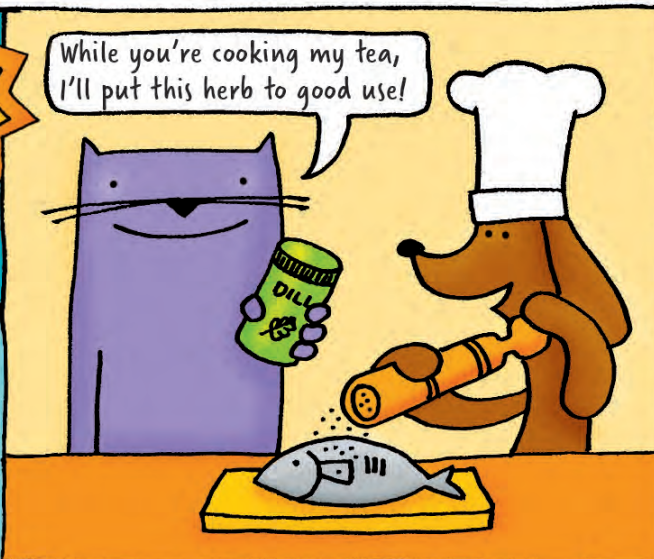
Vic Le Billon

DO TRY THIS AT HOME

Featuring: Marvin and Milo

What you need: • A saucer • Vegetable oil • Dried dill • Balloon

Issue #59



Vic Le Billon

DO TRY THIS AT HOME

issue #60

Featuring: Marvin and Milo

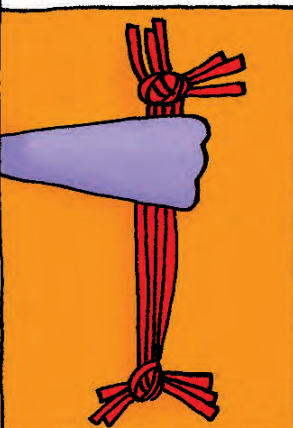
What you need:

- Balloon
- Very thin strands of tinsel, about 15cm long

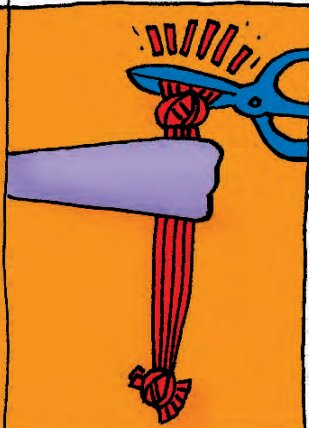
Milo, here's your chance to see a "real" UFO!





Tie six strands of tinsel together with a knot at each end...



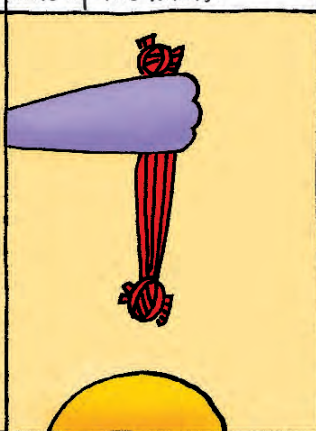
... and cut any loose ends off close to the knot.



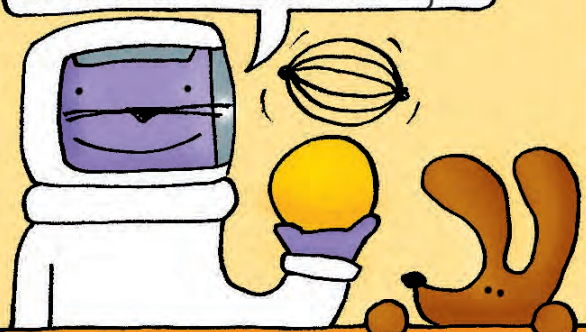
Rub the inflated balloon against your hair or jumper...



... and hold the tinsel above the balloon by one of the knots.




Drop the tinsel. The tinsel will touch the balloon, be repelled and start floating! Use the balloon to direct where it goes.



(If your UFO won't fly, try again with thinner tinsel or on a very dry day.)

Rubbing the balloon makes it negatively charged and the tinsel is attracted to it. When the tinsel hits the balloon, it picks up some of the negative charge and is repelled away.



Vic Le Billon

DO TRY THIS AT HOME

issue #61


Featuring: Marvin and Milo

What you need: • A drinking straw
• Plastic bottle cap • A Jumper • Your hands

Hey Milo, I bet you can't make this straw spin without touching it!



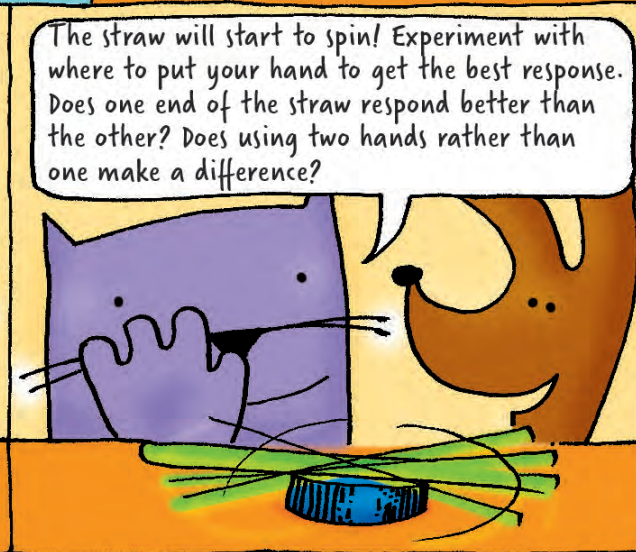
Place the plastic bottle cap on a table. Rub the straw with a jumper several times in the same direction....



...and then carefully balance the straw on the cap. Bring one hand close to the straw, but don't touch it.



The straw will start to spin! Experiment with where to put your hand to get the best response. Does one end of the straw respond better than the other? Does using two hands rather than one make a difference?



Rubbing the straw makes it negatively charged and this induces a positive charge in your hand. The attraction between the straw and your hand makes the straw follow your hand as you move it.



Vic Le Billon

DO ~~IT~~ TRY THIS AT HOME

Featuring: Marvin and Milo

issue #62

What you need: • Two clear glasses
• Tap water • Tonic water • Dark paper

Hey Milo, I've got a cool trick for a sunny day!

Fill one glass with tap water...

... and the other with tonic water...

... and put them both in direct sunlight.

Vic Le Billon

Holding the dark paper behind them, but not blocking the light, look across the surfaces of the water. The tonic water will be giving off an eerie blue glow!

Tonic water contains quinine. The quinine absorbs ultraviolet light from the Sun and re-emits it as visible blue light.

DO ~~NOT~~ TRY THIS AT HOME

Issue #63

Featuring: **Marvin and Milo**

What you need:

- Freezer
- Bottled or distilled water (not tap water)

Check this out Milo - I can make this bottle of water freeze just by tapping it!

Put the bottle of water in to the freezer.

Leave it alone for two to three hours. You'll need to experiment with the exact timing as all freezers are different. Check regularly that the water is still liquid - but don't move the bottle!

While the water is still liquid, take the bottle out of the freezer carefully, then tap it suddenly on the edge of a table. The water will freeze!

TAP!

Water can stay liquid for several degrees below 0°C if there are no impurities or disturbances to start ice crystals forming. Tapping the bottle disturbs the 'supercooled' water and kicks off freezing.

Vic Le Billon

DO TRY THIS AT HOME

Issue #64

Featuring: **Marvin and Milo**

What you need: • Shallow bowl • Milk • Food colouring • Washing up liquid



Add a couple of drops of food colouring at even spaces around the edge of the bowl.



Add a drop of washing up liquid to the centre of the bowl and watch the colours start to mix and churn!



The washing up liquid reduces the surface tension of the milk causing swirls and eddies as the detergent spreads through the liquid. What happens if you use skimmed or full fat milk? Does warming the milk first make any difference?



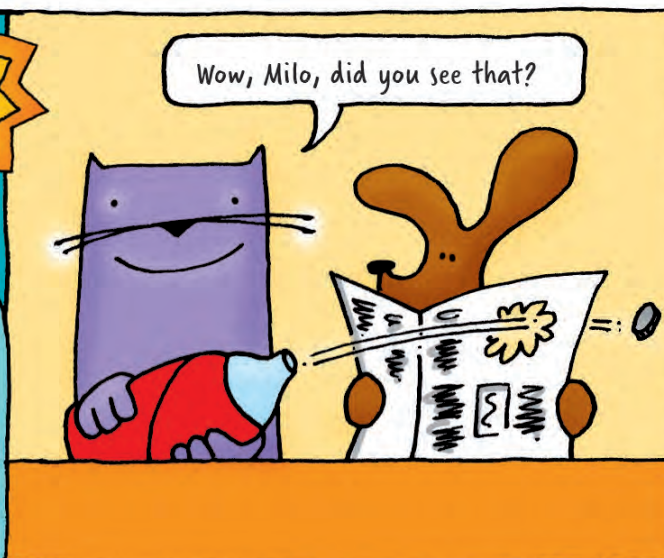
Vic Le Billon

DO TRY THIS AT HOME

issue #65

Featuring: **Marvin and Milo**

What you need: • A penny or other small coin
• Empty bottle with narrow neck • Some water • A freezer



...and quickly put the coin over the mouth, making sure there are no air gaps.

Put the bottle back in the freezer for another hour.



Take the bottle out of the freezer and, using a cloth, grasp the bottle with both hands*. Wait.



Your hands warm the cold air inside the bottle, making it expand and force the coin off the bottle and into the air!

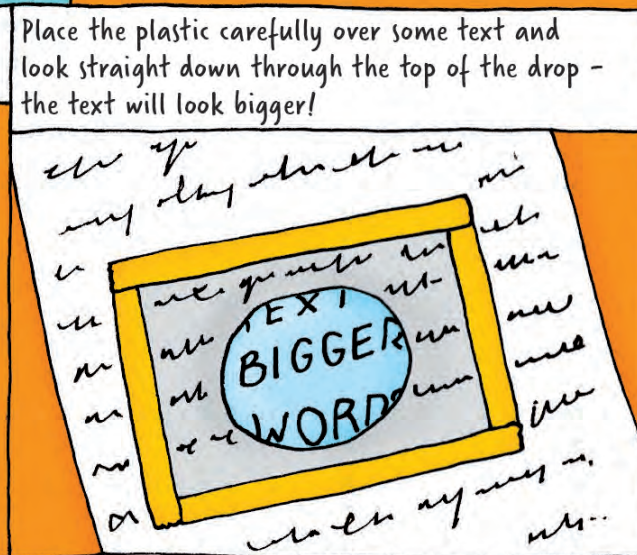
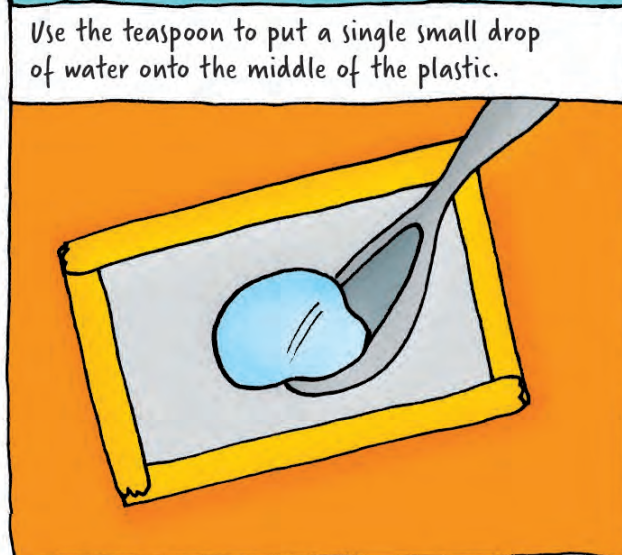


DO TRY THIS AT HOME

issue #66

Featuring: Marvin and Milo

What you need: • Sticky tape • Water • Teaspoon
• Clear plastic, e.g. from a pop bottle



DO TRY THIS AT HOME

Featuring: Marvin and Milo

What you need: • Sticky tape • Marshmallows • Piece of thin card (~A4 size)

Issue #67

Hey Milo, I bet I can get my marshmallow to fly further than yours!

Roll the piece of card lengthways into a tube that is just wide enough to be a snug fit for a marshmallow. Put tape along the whole length of the tube to hold it together and seal the join.

Put a marshmallow in one end of the tube, hold the tube horizontal, and blow from the opposite end. * Note how far it flies.

*If the marshmallow doesn't move, adjust the diameter of the tube.

Try again with a new marshmallow but this time blow from the end with the marshmallow. Keep blowing until the marshmallow leaves the tube.

By blowing as the marshmallow travels along the whole length of the tube, you're applying a force for longer. This means the marshmallow accelerates for longer, emerges from the tube at a greater speed and flies further.

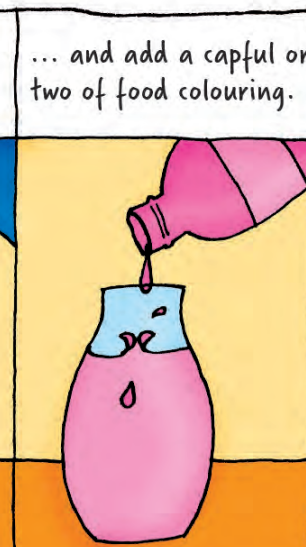
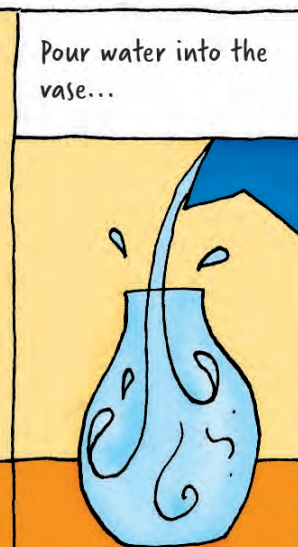
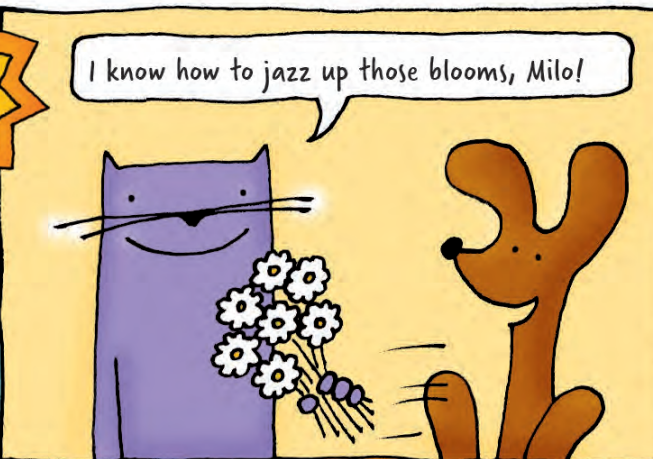
Vic Le Billon

DO TRY THIS AT HOME

issue #68

Featuring: **Marvin and Milo**

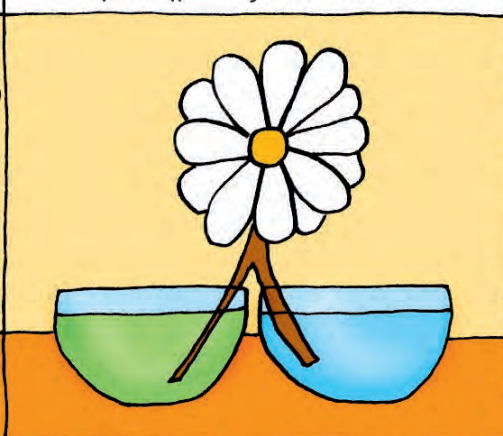
What you need: • White carnation or similar
• Vase • Water • Food colouring • Scissors



Cut the end of the stem and place the flower in the coloured water.



With another flower, try cutting carefully halfway up the middle of the stem and putting each half in differently coloured water.



Vic Le Billon

DO TRY THIS AT HOME

issue #69

Featuring: **Marvin and Milo**

What you need: • A small mirror
• A blank wall • A friend

Hey Milo, I can make you disappear!

Sit opposite your friend and next to a pale, blank wall.

With the wall to your right, hold the mirror in your left hand and put it next to your nose.

Angle the mirror so that your right eye sees only a reflection of the wall.

With your left eye looking at your friend, wave your right hand so your right eye can see it reflected in the mirror.

Watch bits of your friends's face disappear! Don't give up if it doesn't work straight away - try switching eyes, holding your head very still and making sure your friend doesn't fidget.

Each eye is seeing something very different and as your brain tries to make a sensible single image, it combines bits from both eyes. But your brain is sensitive to movement so it focuses on your moving hand and your friend disappears.

Vic Le Billon

DO TRY THIS AT HOME

issue #70

Featuring: Marvin and Milo

What you need: • A teacup or mug
• A teaspoon • Good ears

That's strange, did you hear that Milo?

If you tap the rim of the teacup by the handle, opposite the handle or at the two points half way round the rim, then you hear a low pitched sound.

But if you tap the rim of the teacup halfway between those points, you hear a sound that is higher in pitch.

Tapping the rim causes vibrations around the cup, but at the handle the movement is always at a minimum.

So tapping at the specific points on the rim sets up vibrations with different wavelengths and you hear notes of different pitches, or frequencies.

'chink'
'chink'

'clunk' 'chink'
'chink' 'clunk' 'plink'

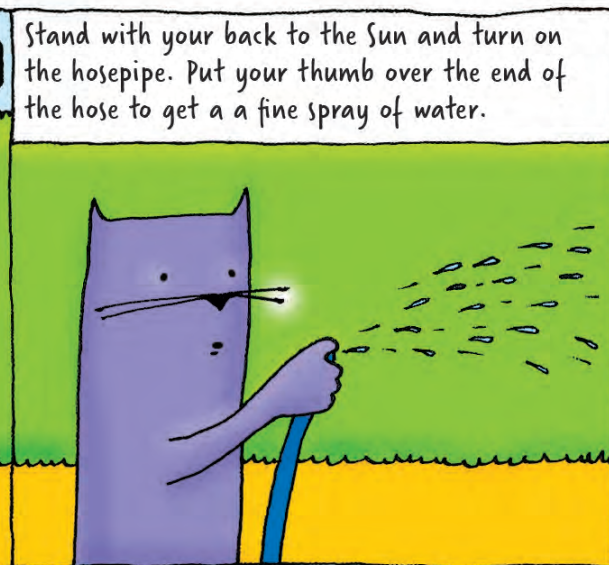
Vic Le Billon

DO ~~NOT~~ TRY THIS AT HOME

Featuring: Marvin and Milo

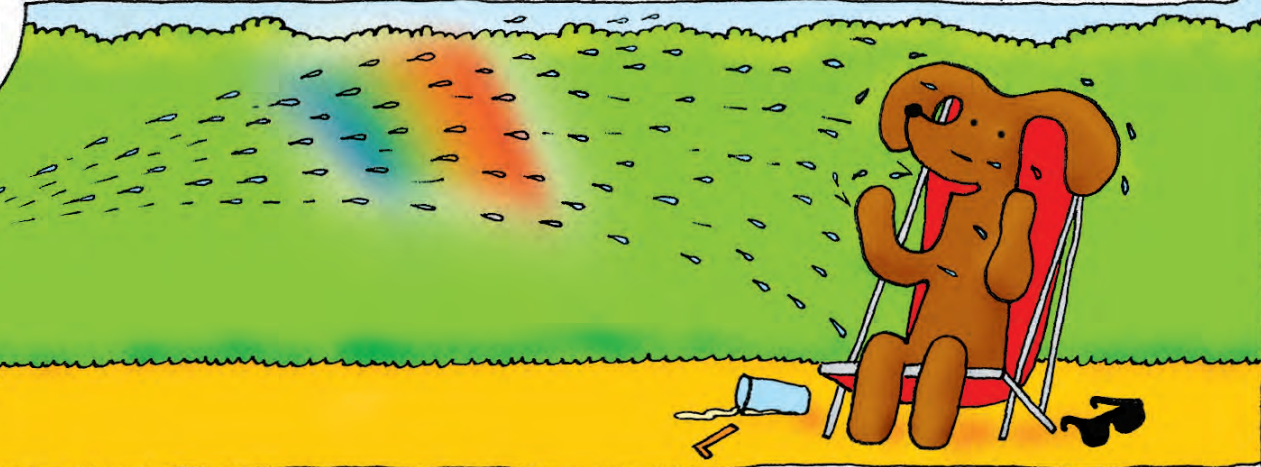
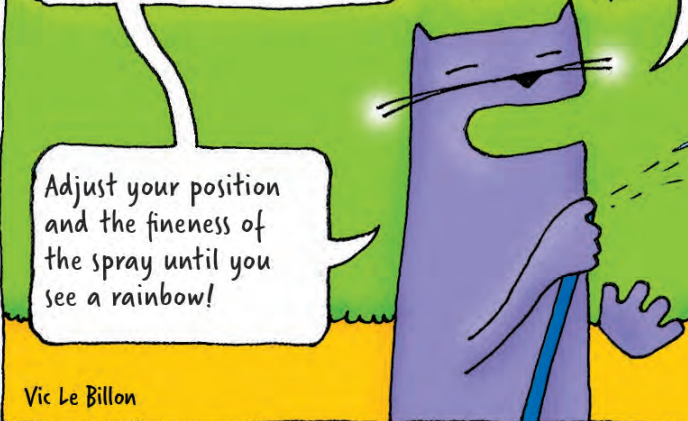
What you need: • A hosepipe • A garden • A sunny day

Issue #71



Look at the spray against a dark background such as a wall, hedge or grass.

White light from the Sun is made up of light of different wavelengths, or colours. The different wavelengths of light are bent by different amounts as they pass through the water, splitting the white light into all the colours of the rainbow.



Vic Le Billon

DO TRY THIS AT HOME

Featuring: Marvin and Milo

What you need:

- A piece of paper smaller than a book
- A book

Issue #72

Phew Milo, now we've signed all those copies of our new book, we can get back to experimenting.

Take a copy of our new book and a piece of paper, smaller than the book. Hold them horizontally and drop them both at the same time. Notice which one hits the ground first.

RIP

Now put the piece of paper flat against the bottom side of the book and drop them together. What happens?

Drop them again, but this time with the paper on top of the book. What happens?

Air resistance means that when dropped separately, the book and paper hit the ground at different times. But when they are dropped together, the larger book sweeps the air out of the way and the two fall at the same rate.

WINNER
Dog Booker Prize
£50,000

Vic Le Billon

Download more Marvin and Milo activities at iop.org/marvinandmilo

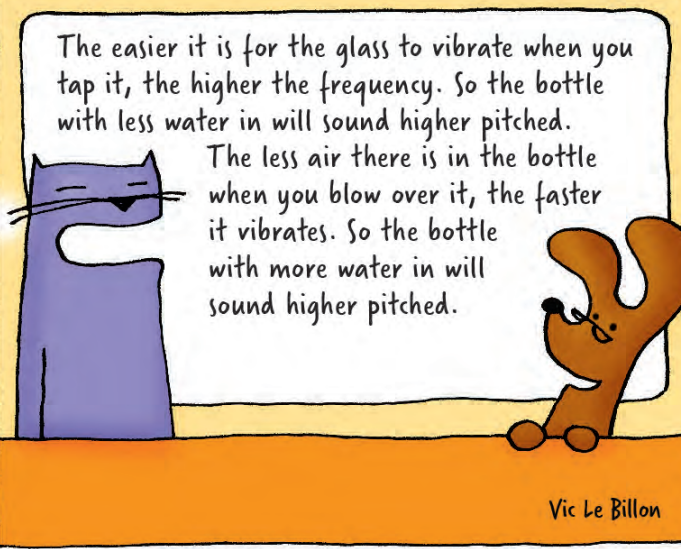
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DO TRY THIS AT HOME

issue #73

Featuring: **Marvin and Milo**

What you need: • Two glass bottles • A wooden spoon • A jug of water • Good ears



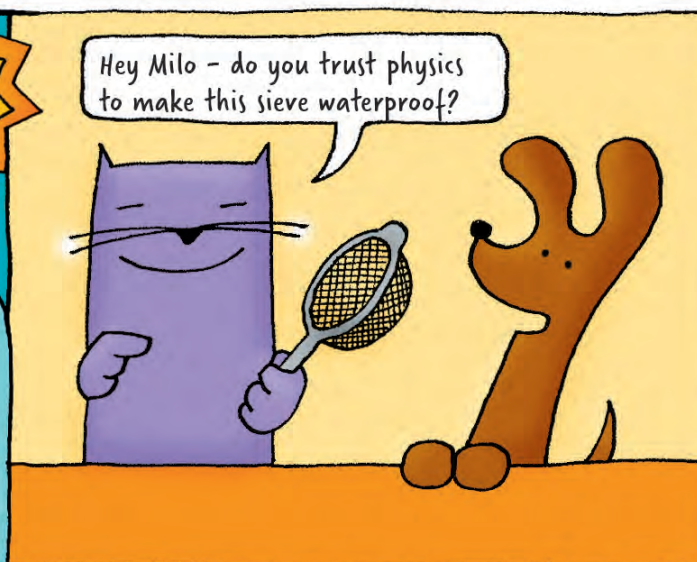
Vic Le Billon

DO TRY THIS AT HOME

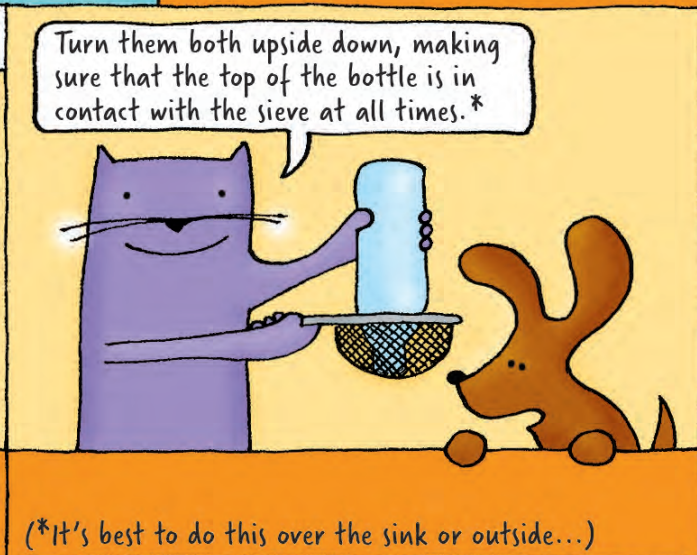
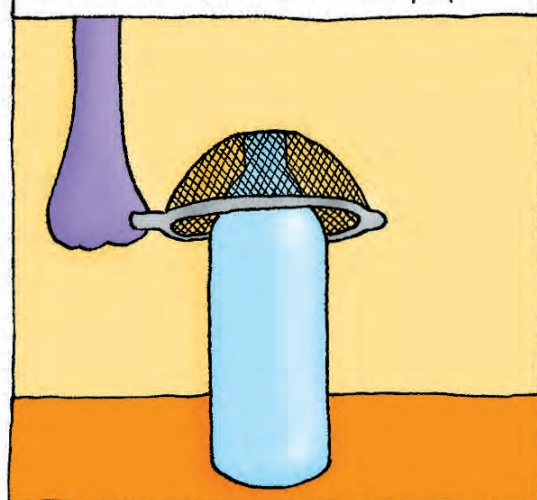
issue #74

Featuring: Marvin and Milo

What you need: • A glass bottle • A sieve • Water



...and hold the sieve over the top of it.



DO TRY THIS AT HOME

issue #75

Featuring: Marvin and Milo

What you need: • A small glass bottle • Water
• An effervescent indigestion tablet

Before you take that tablet Milo, I have an experiment which will make you feel better!

Pour about 2cm of water into the bottle.

Blow across the top of the bottle and listen carefully to the sound it makes.

Break the tablet in two, and put both halves into the bottle.

Wash your hands while you wait for it to stop fizzing.

Blow across the top of the bottle again and listen to the sound it makes now.

You hear a lower pitched note because sound travels more slowly through carbon dioxide (the gas given off by the fizzing tablet) than through air.

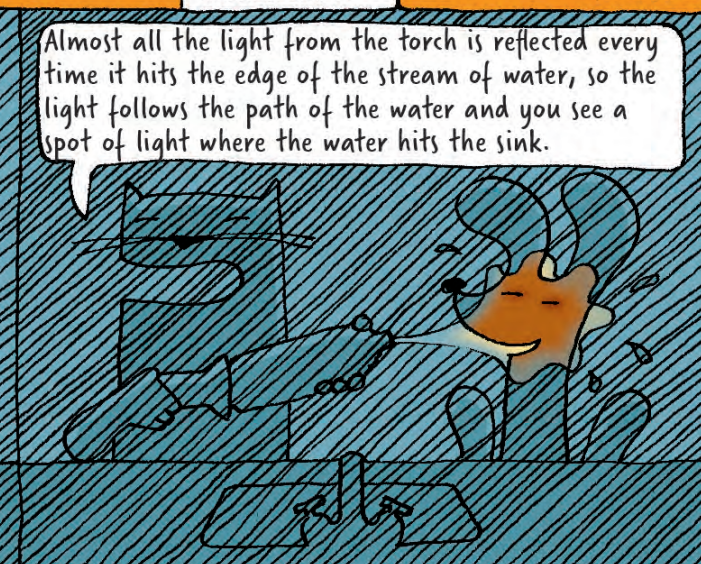
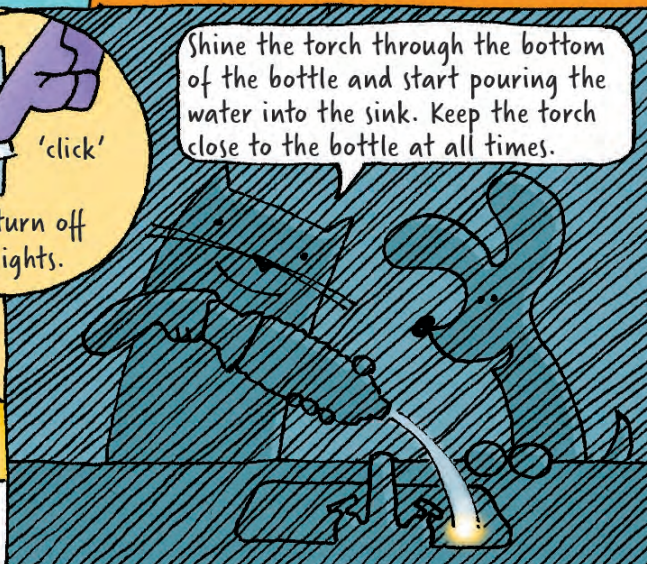
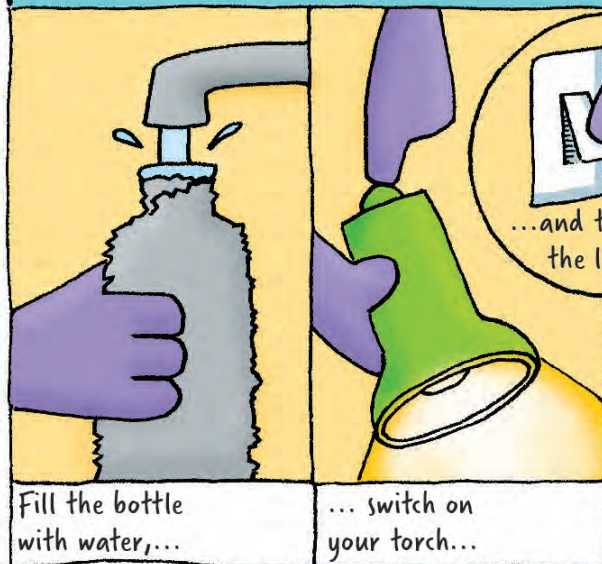
Vic Le Billon

DO TRY THIS AT HOME

issue #76

Featuring: **Marvin and Milo**

What you need: • A clear plastic bottle • A torch
• Kitchen foil • Sticky tape • A dark room with a sink





What you need: • Two flat, rectangular fridge magnets*

*If you only have circular magnets, you'll need to do some experimenting to feel this effect!

That's a great collection Milo. Can I borrow two?

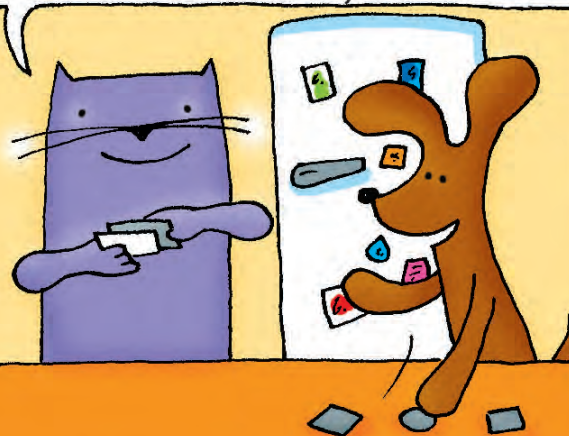


Place the magnets side by side on a table: one face up and one face down.



Put one magnet on top of the other so that the two magnetic sides are touching. Try to slide them apart along the longest side. How easily do they slide?

Try sliding them apart again, but this time along the shortest side. How well do the magnets slide now?



Fridge magnets are made from thin strips of magnets with alternating north and south poles. As you try to slide the magnets across each other, the thin strips are being attracted and then repelled, making the magnets judder.



Vic Le Billon

DO TRY THIS AT HOME

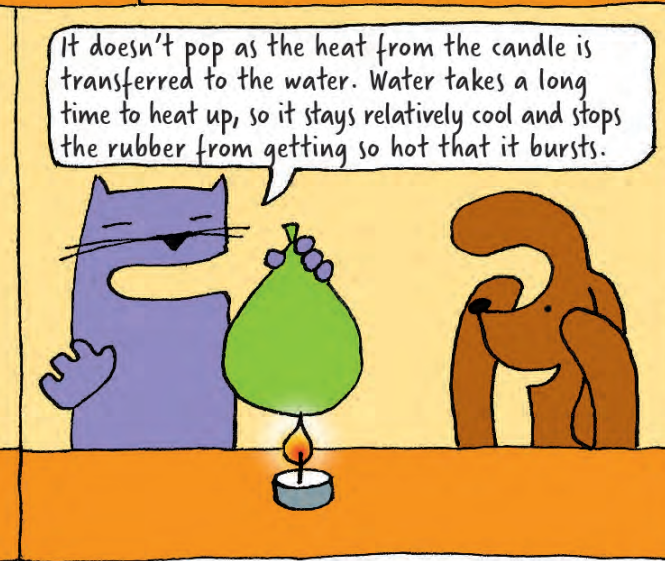
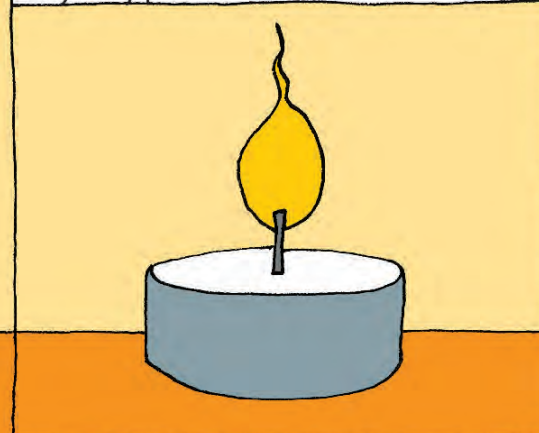
Featuring: Marvin and Milo

What you need: • An adult* • Two balloons • Some water • A tea light • Matches *Only do this experiment with a responsible adult and only hold the balloon over the flame for a short time.

Issue #78



Place the tea light on a flat surface * and light it. *Make sure it is away from anything flammable or electrical.



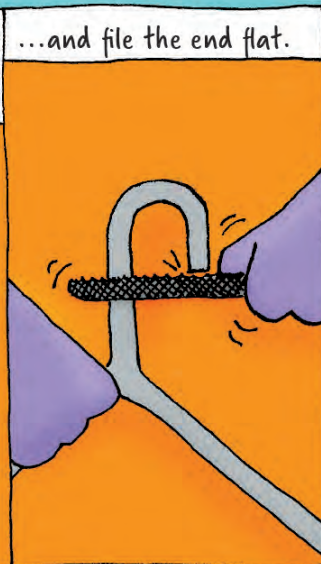
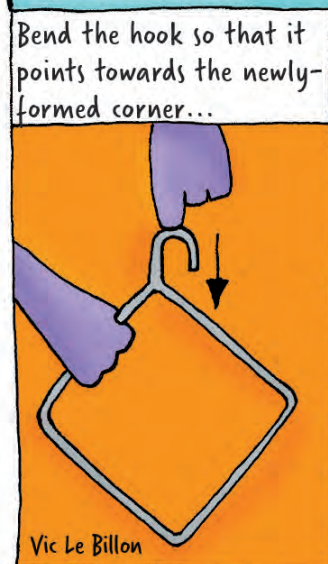
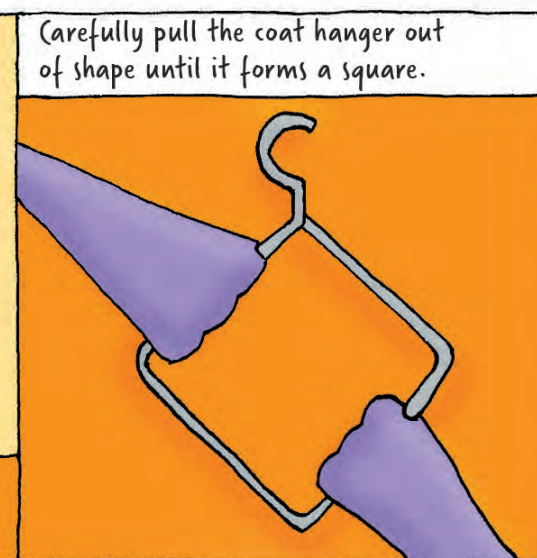
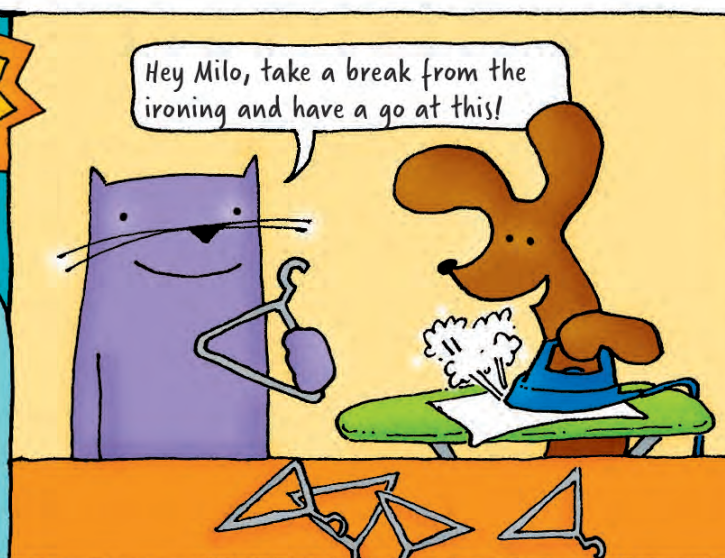
Vic Le Billon

DO ~~NOT~~ TRY THIS AT HOME

issue #79

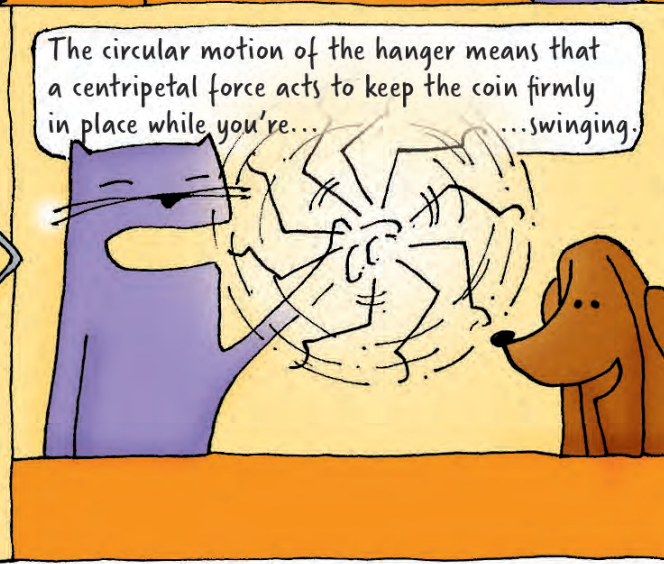
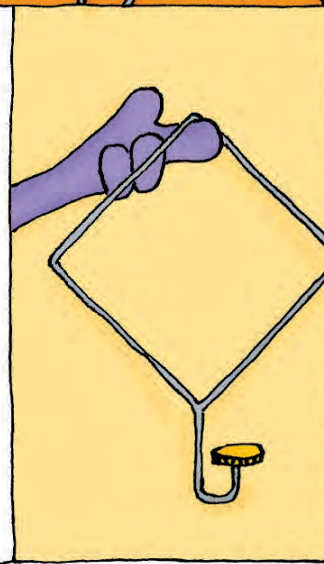
Featuring: **Marvin and Milo**

What you need: • A metal coat hanger
• A pound coin • A file



With the coat hanger on one finger, balance the coin on the hook. This might take some patience!

once the coin is in place, start swinging the hanger back and forth. Can you get the hanger to swing in a complete circle without the coin falling off?



DO TRY THIS AT HOME

issue #80

Featuring: **Marvin and Milo**

What you need: • A plastic drinks bottle • Water

Hey Milo, do you want to see how bubbles act in space?

Fill the bottle with water so it is very nearly full.

Put the lid on tightly...

...and throw the bottle in the air.

Watch it carefully on the way up and down. The air inside the bottle will form a spherical bubble as it's falling!

When the bottle is in free fall, surface tension forces the air into a bubble with the least possible surface area - a sphere. In space, the same effect can be seen with liquid drops in air.

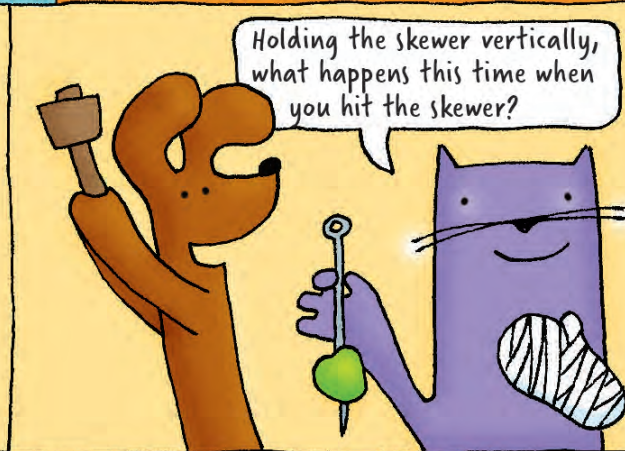
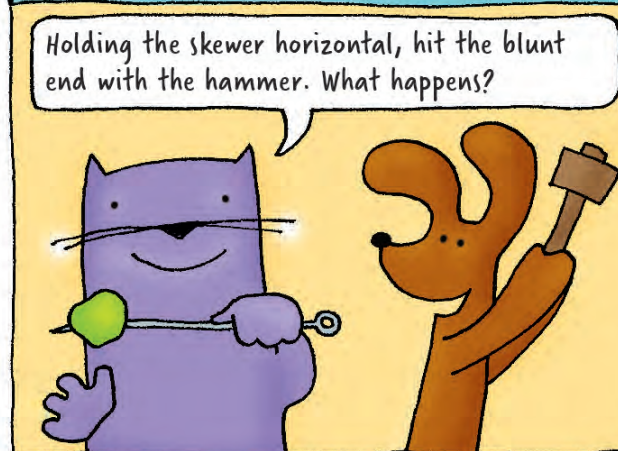
Vic Le Billon

DO TRY THIS AT HOME

Issue #81

Featuring: **Marvin and Milo**

What you need: • A metal skewer (or knitting needle)
• An apple • A hammer • An adult*



Vic Le Billon

DO ~~NOT~~ TRY THIS AT HOME

Issue #82

Featuring: Marvin and Milo

What you need: • Two plastic drinks bottles • Cold water • Hot water • Sink • Piece of card • Red food colouring

Phew Milo, I needed that drink in this heat but before you recycle that bottle let me show you an experiment.

Fill one bottle with cold water.

Fill the other with hot water from the tap.

Add some red food colouring to the hot water.

Hold the card firmly over the top of the cold water bottle, turn it upside down and balance it on top of the hot water bottle.

Align the bottles and carefully remove the card. Do this in the sink just in case!

Hot water is less dense than cold water so it rises into the top bottle while the cold water sinks into the bottom bottle. This convection continues until the water is the same temperature throughout both bottles.

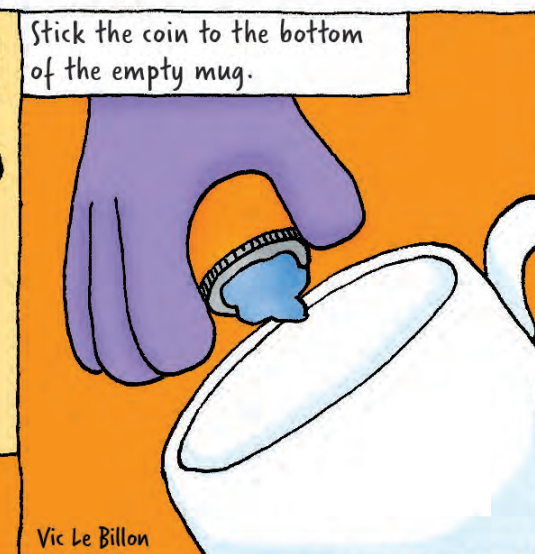
Vic Le Billon

DO TRY THIS AT HOME

issue #83

Featuring: Marvin and Milo

What you need: • Coin • Mug
• Jug of water • Blu Tack • A friend



Step back, or move your head...



...until you can no longer see the coin in the mug.



While you stay in position, get your friend to slowly pour water into the mug.



The coin reappears because the water bends, or refracts, the light travelling from the coin so that it can now reach your eye.

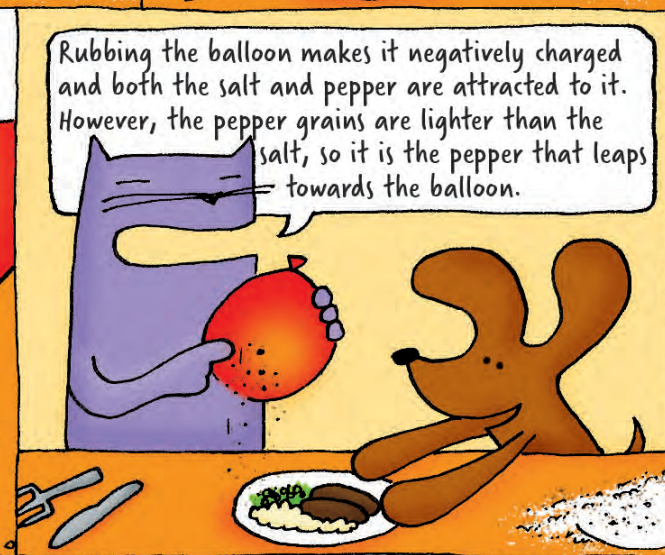
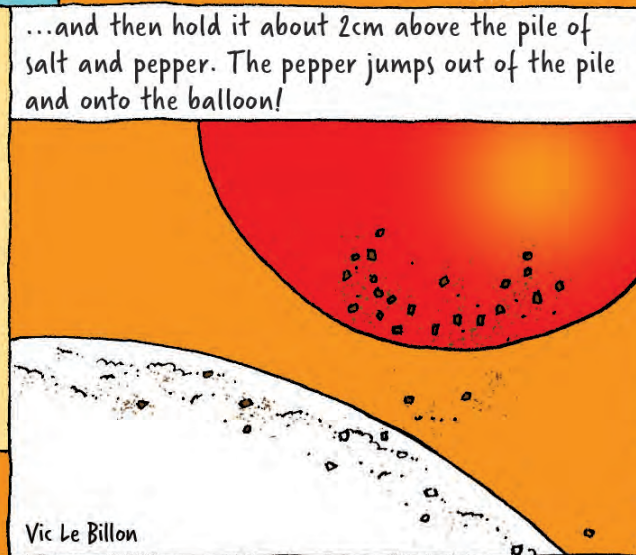


DO TRY THIS AT HOME

issue #84

Featuring: **Marvin and Milo**

What you need: • Ground pepper
• Ground salt • Balloon

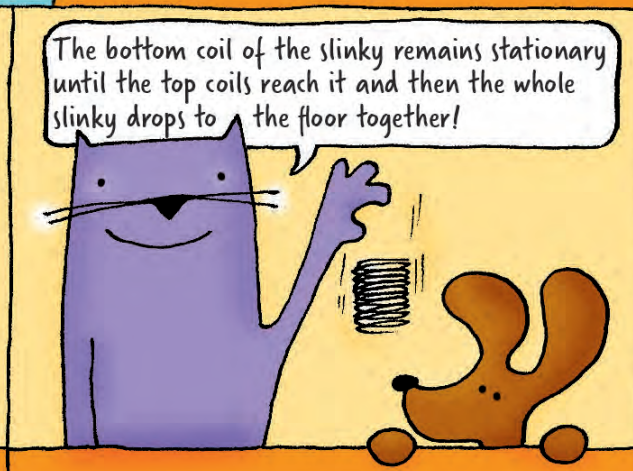
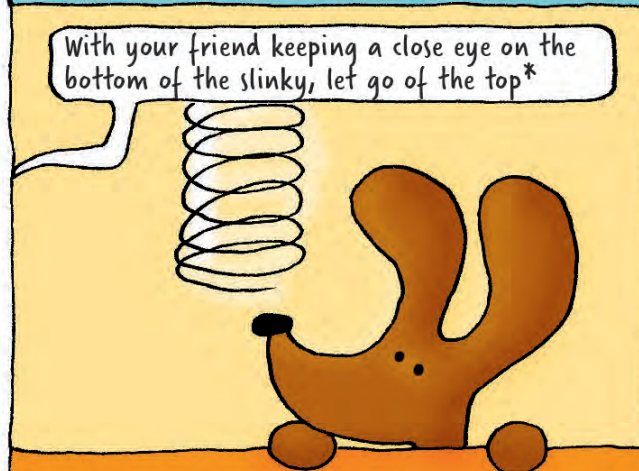
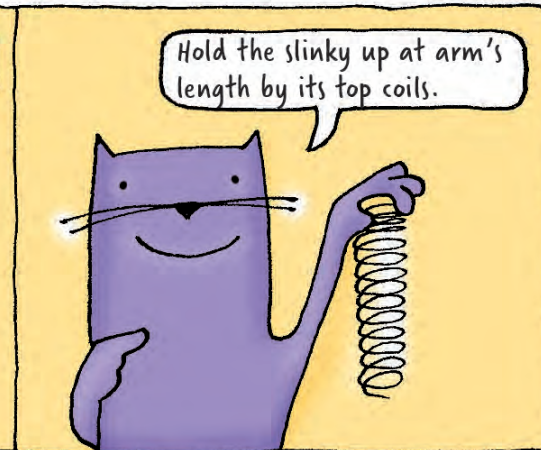
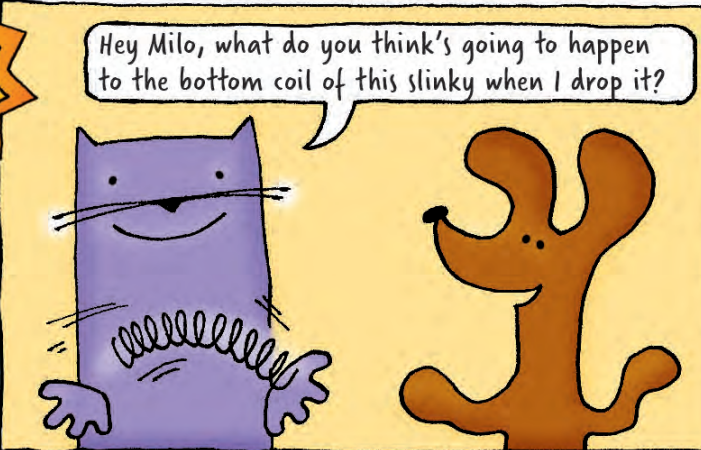


DO TRY THIS AT HOME

issue #85

Featuring: **Marvin and Milo**

What you need: • A slinky • A friend



*You may need to do this several times to see what's happening.

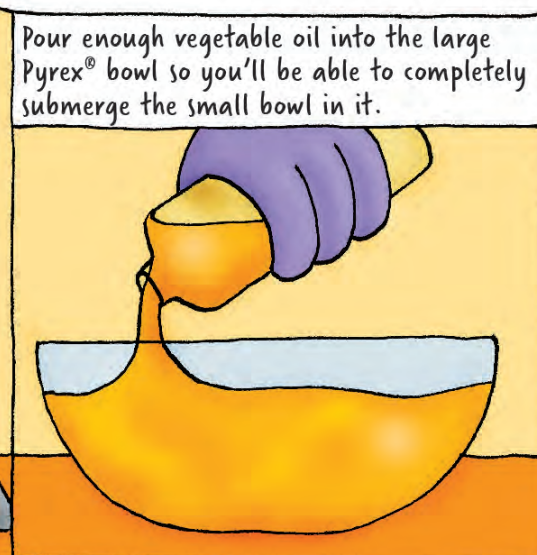
Vic Le Billon

DO TRY THIS AT HOME

issue #86

Featuring: **Marvin and Milo**

What you need: • A large Pyrex® bowl
• A small Pyrex® bowl • Vegetable oil



Carefully lower the small bowl into the vegetable oil.



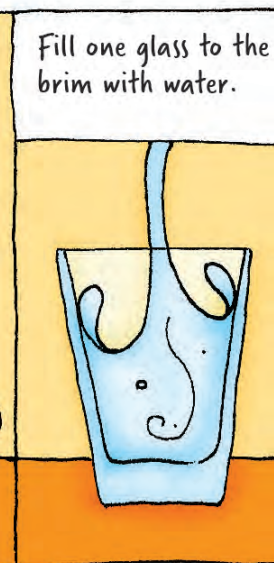
Vic Le Billon

DO TRY THIS AT HOME

issue #87

Featuring: Marvin and Milo

What you need: • Two small shot glasses
• Apple juice • Water • A small piece of card



Vic Le Billon

DO TRY THIS AT HOME

Issue #88



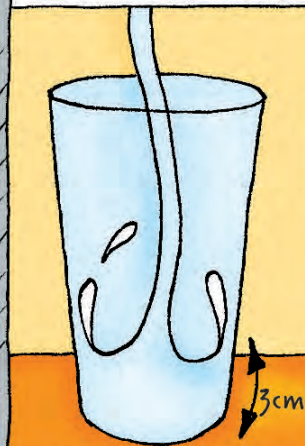
Featuring: Marvin and Milo

What you need: • Pint glass • Small bowl
• Hot water • Ice • Aerosol spray (e.g. deodorant)

I've got some clouds that will cheer you up, Milo.



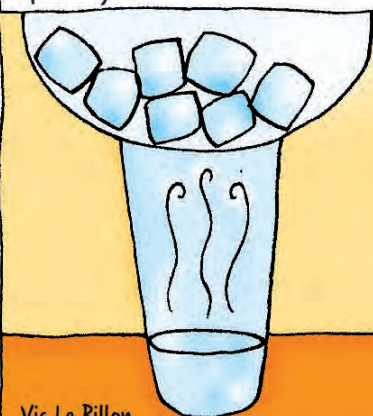
Pour about 3cm of hot water into the glass...



...and carefully swirl it about to warm the glass.



Put the ice in the small bowl and balance the bowl on top of the glass.



Lift the bowl and spray some deodorant into the glass, replacing the bowl quickly afterwards.



Wisps of cloud form in the glass!



Clouds form when warm, moist air cools and the water condenses into droplets. But droplets need a surface on which to form. In the atmosphere this is dust particles and in this experiment it is the aerosol particles.



Vic Le Billon

DO TRY THIS AT HOME

issue #89

Featuring: Marvin and Milo

What you need: • Two small plastic bottles • Kitchen paper • Sticky tape • Drinking water at room temperature • A breezy day*



Vic Le Billon

*on a still day, you'll just have to wait a bit longer

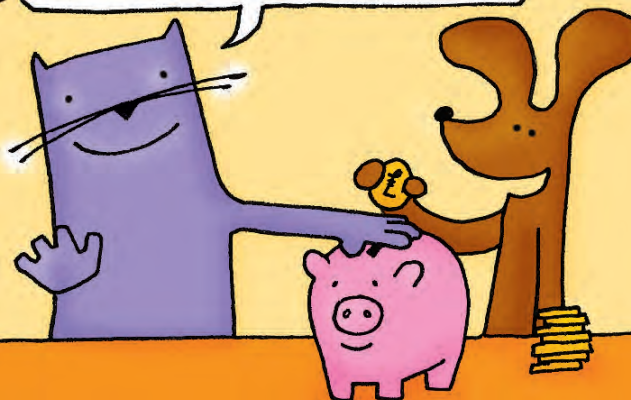
DO TRY THIS AT HOME

Featuring: Marvin and Milo

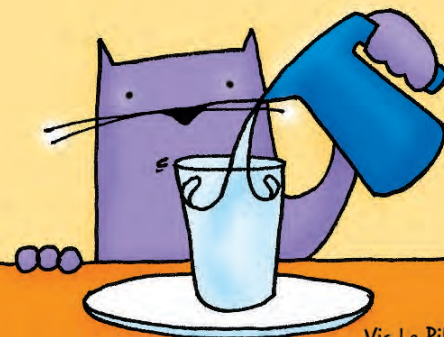
What you need: • Some washing up liquid • A glass of water • A pile of coins • A saucer

Issue #90

Wait Milo, let's put your pocket money to good use in this experiment!

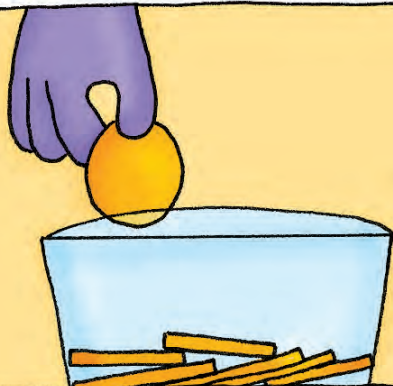


Fill the glass to the very brim with water and place on top of the saucer.



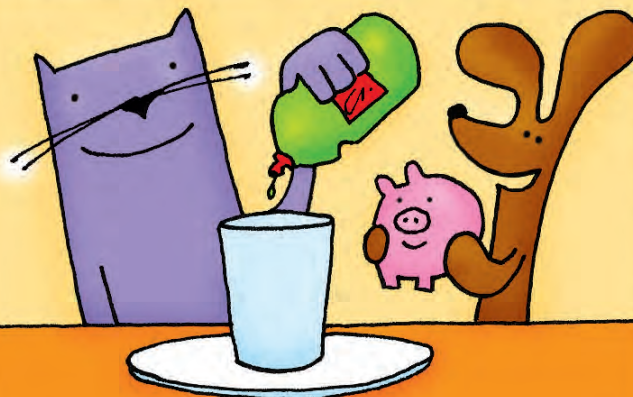
Vic Le Billon

Carefully drop a coin into the water, edge first.



Slowly and carefully drop more coins into the water - how many can you add before the glass overflows?

Try again, but this time add a few drops of washing up liquid to the water before you start adding the coins.



Water molecules are strongly attracted to each other, creating a surface tension that allows the water to bulge over the top of the glass as you add the coins. But washing up liquid reduces the surface tension so the glass overflows sooner.

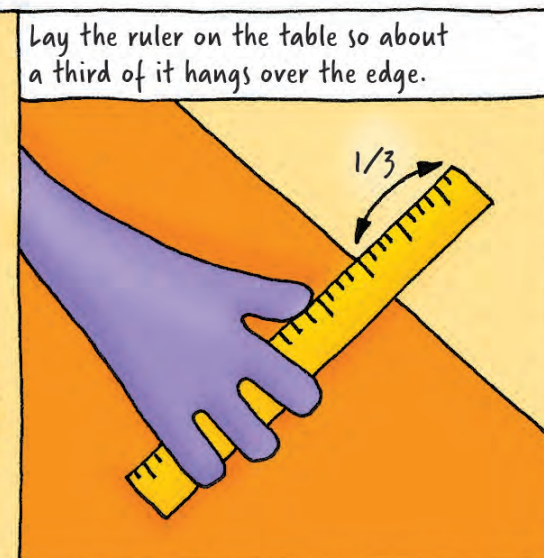
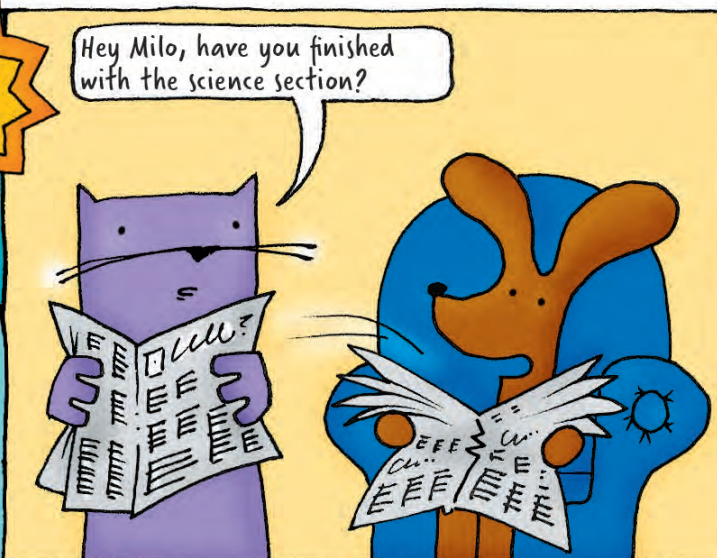


DO TRY THIS AT HOME

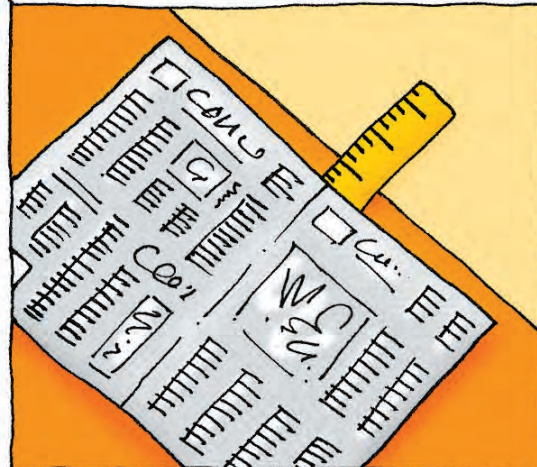
Featuring: Marvin and Milo

What you need: • A table • A ruler • A newspaper

Issue #91

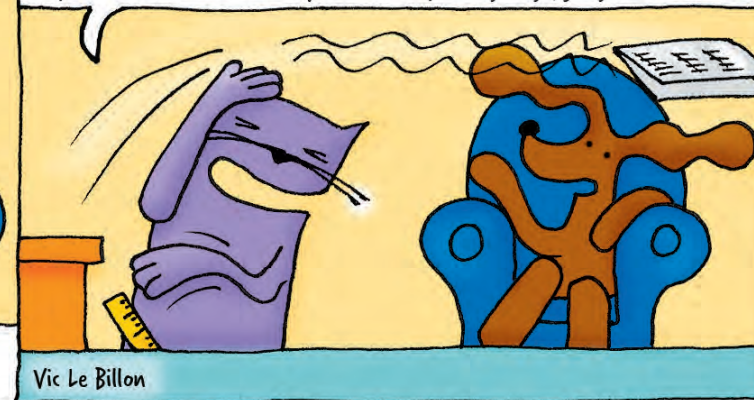


Carefully lay a single sheet of newspaper flat on the table and over ruler.



What happens if you try again, but this time with the sheet of newspaper folding up?

The flat sheet of newspaper has a large enough area so that the downward force of the atmosphere counters the upward force from the ruler. But the folded-up newspaper has a much smaller surface area, so doesn't stop the ruler from going flying when it's hit.



DO ~~THIS~~ TRY THIS AT HOME

Issue #92

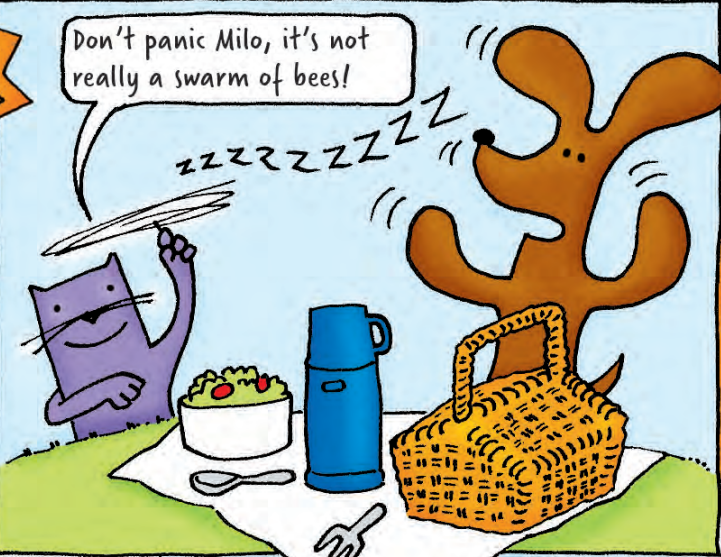


Featuring:
**Marvin
and
Milo**

What you need: • An ice lolly stick • Blu Tack • String
• A thick rubber band • Sticky tape • Thin card • Scissors

Don't panic Milo, it's not really a swarm of bees!

zzzzzzzzzz



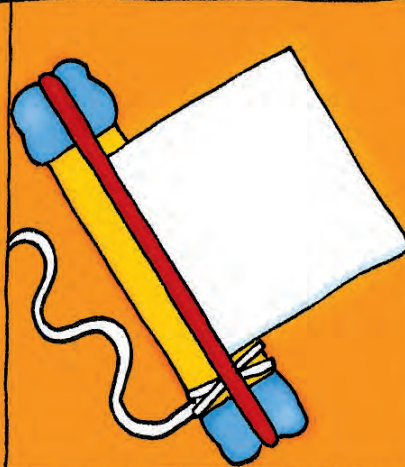
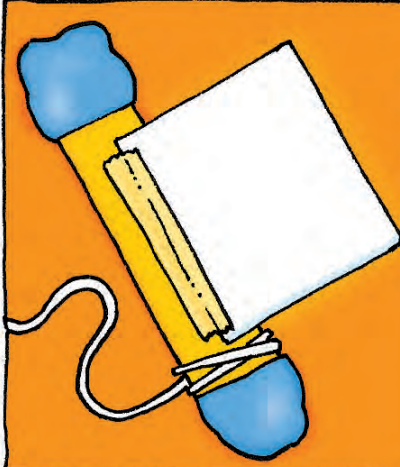
Put a blob of Blue Tack at both ends of the lolly stick.



Cut a piece of thin card so it fits between the blobs, then tape it to the stick.

Tie a piece of string securely next to one of the blobs of Blu Tack.

Then stretch the rubber band around the lolly stick.



Find a clear space and swing your bee swinger about your head.

Try cutting the card into different shapes - can you hear a difference?

As the bee swinger moves through the air, the rubber band starts to vibrate. The card amplifies the sound so that you can hear it.

zzzzzzzzzz



Vic Le Billon

DO TRY THIS AT HOME

Issue #93

Featuring: **Marvin and Milo**

What you need:

- Two identical glass bottles
- A friend



Standing quite close to your friend, blow across the mouth of your bottle and in the direction of your friend, so that you make a clear note.



Your friend will hear a similar note in their bottle!

The two identical bottles vibrate at the same natural frequency. So when one vibrates and produces a note, this makes the other vibrate and produce a similar note.



DO TRY THIS AT HOME

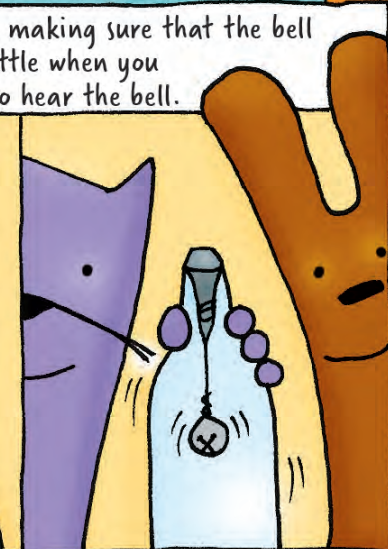
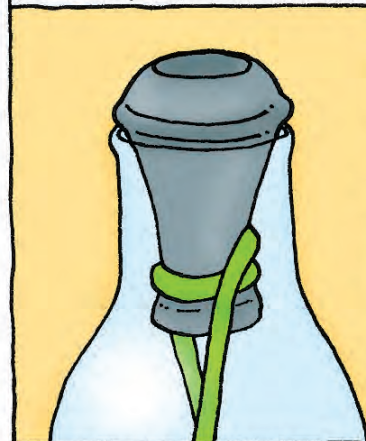
issue #94

Featuring: **Marvin and Milo**

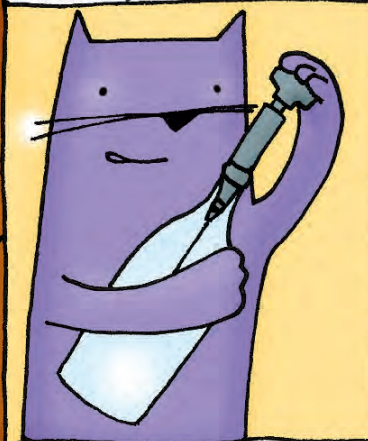
What you need: • Glass bottle • Pipe cleaner • Small bell • Wine saver pump and stopper

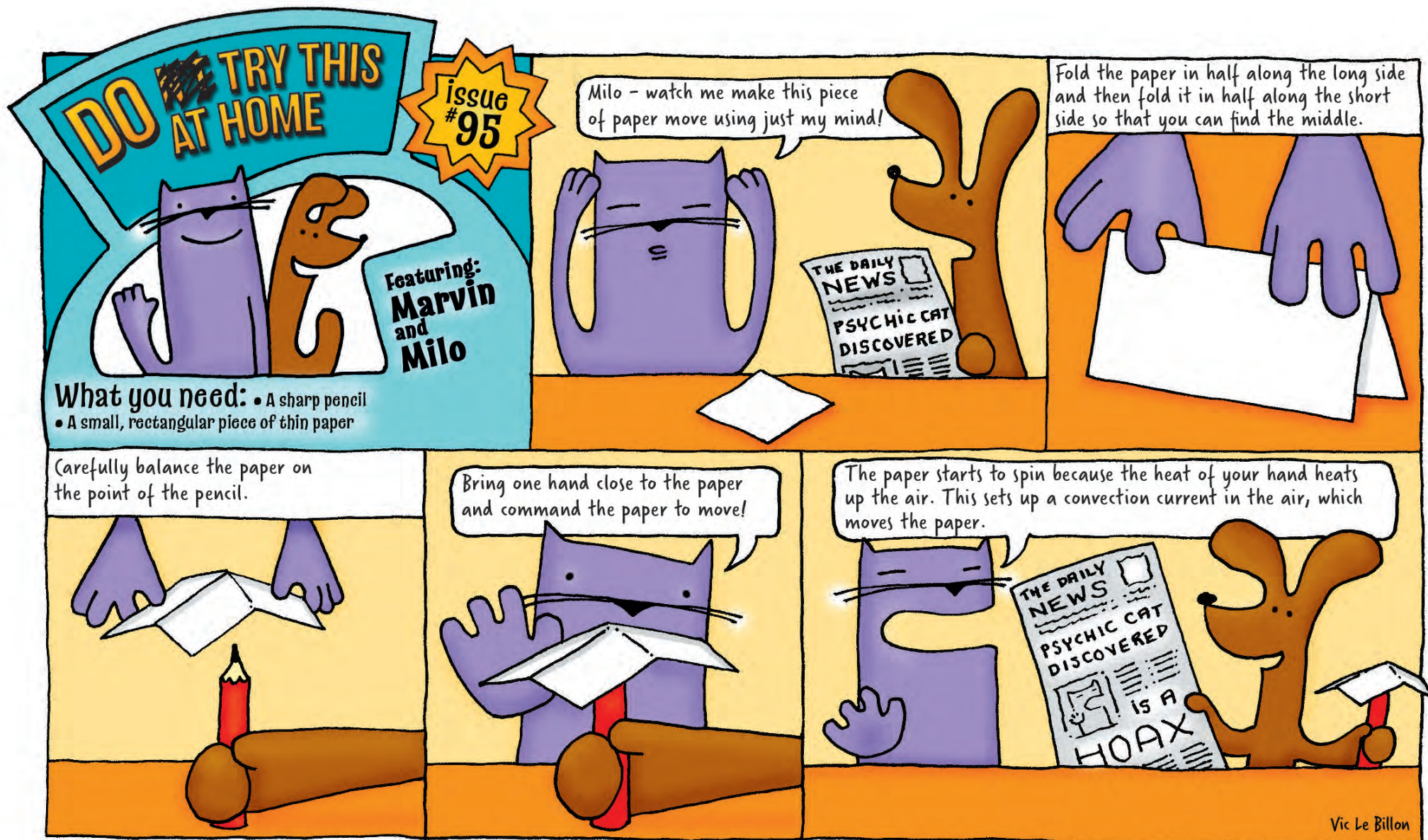


Put the stopper in the bottle, making sure that the bell doesn't hit the side of the bottle when you shake it. You should be able to hear the bell.



Use the wine saver pump to take as much air out of the bottle as you can.





DO TRY THIS AT HOME

issue #96

Featuring: Marvin and Milo

What you need: • Two small cups • Tea or coffee • Two straws • Salt • A friend

Milo, let's have a competition! Who can pick up the most fluid with their straw?

Pour equal amounts of tea or coffee into two small cups, with the help of a friend if you need it.

Look Milo, Einstein! (Whispers) Add enough salt to one cup so that no more salt can dissolve.

Place a straw into each cup, put a finger over the end of each straw and lift the straws out.

The liquid should be lower in the straw from the salty tea or coffee. The salt increases the density of the liquid, which means less of it is picked up when the straws are lifted.

Vic Le Billon

DO TRY THIS AT HOME

Featuring: Marvin and Milo

What you need: • Salt • Fresh water • A raw egg • Glass of water

issue #97

Milo, follow me and I will show you how to make this egg magically float.

Fill up a glass with water until it's about half full. Then add four tablespoons of salt and stir until dissolved.

Put the egg in the glass. The egg should float.

Gently pour fresh water into the glass. The egg should start to sink.

Add just enough water so the egg is floating in the middle of the glass.

Adding fresh water dilutes the salt water and reduces the amount the water lifts the egg.

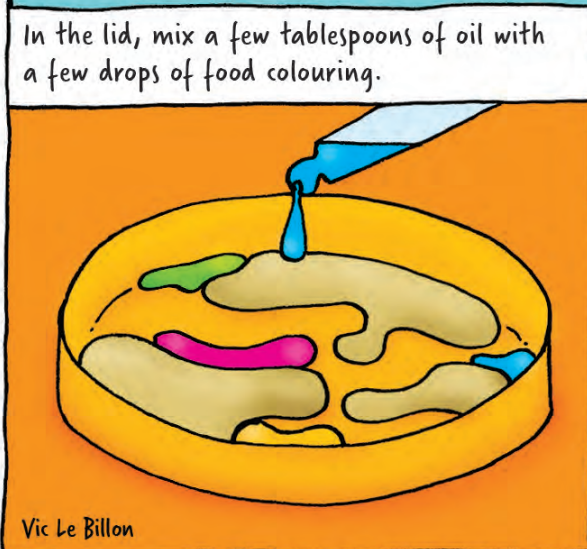
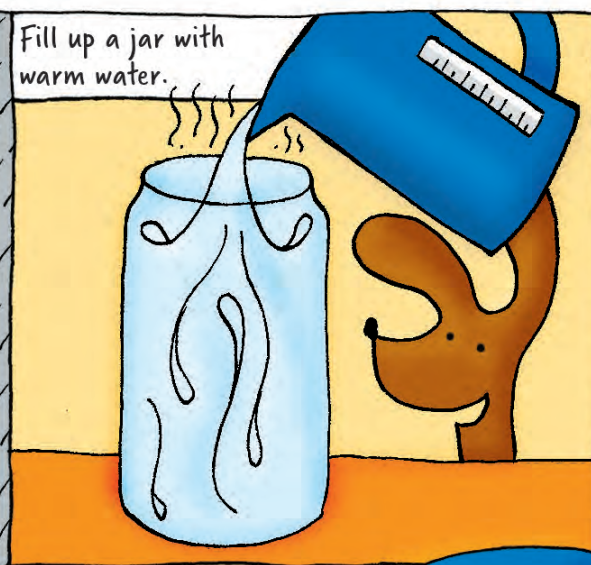
Vic Le Billon

DO TRY THIS AT HOME

Featuring: Marvin and Milo

issue #98

What you need: • Empty glass jar • Oil • Water • Food colourings in different colours



Vic Le Billon

DO TRY THIS AT HOME

Featuring: Marvin and Milo

What you need: • Plastic box • Sand • Water • Rubber mallet • Smooth brick or other heavy object

Issue #99

Impressive tower Milo, but let me show you what happens if you build on quicksand.



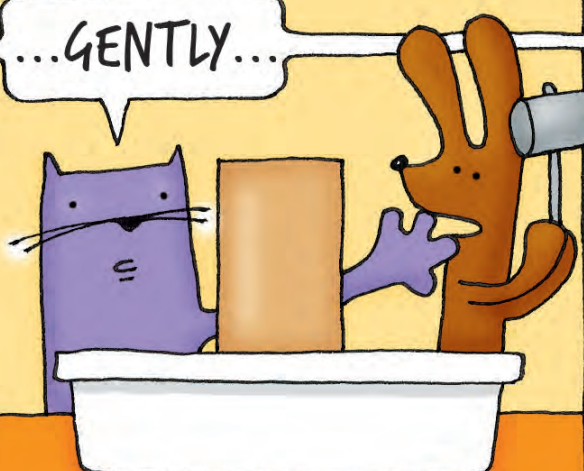
Fill half a plastic box with sand and add water until it fills up to just below the level of the sand.



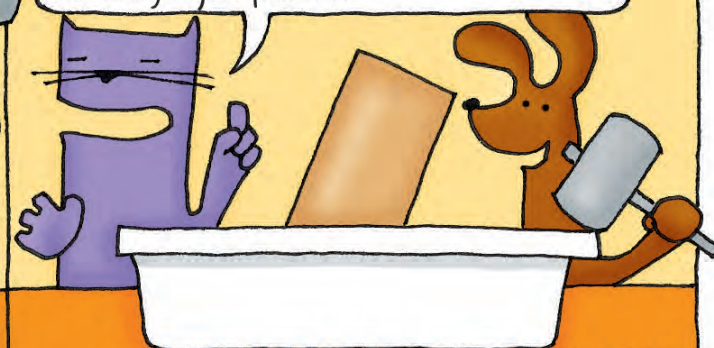
Place a heavy object upright in the sand. Tap the side of the box with the mallet...



...GENTLY...



...and you'll notice the object will begin to fall over. Tapping the side of the box makes the sand particles move over each other, making the heavy object fall over.



Vic Le Billon

DO TRY THIS AT HOME

Featuring: Marvin and Milo

issue #100

What you need: • A thin latex glove • A straw • Tape
• A cardboard tube with open ends

Milo, what tune would you like me to play on my gloveaphone?

Cut a small hole in one of the fingers of the glove. Feed the straw a small way through the hole into the glove.

Vic Le Billon

Seal off with tape.

Put the end of the glove over the cardboard tube and tape down the glove to the tube, making sure there are no gaps.

Pull the rest of the fingers of the glove down against the side of the tube so a tight skin is made at the end of the tube. Blow into the straw until a sound is made. [The glove should inflate.]

paaaaaaaarp!

The latex glove vibrates as air flows down the tube. This creates a standing wave in the air along the length of the tube, which we hear as sound.

DO ~~NOT~~ TRY THIS AT HOME

issue #101

Featuring: **Marvin and Milo**

What you need:

- An empty wine bottle
- Piece of paper

Milo, here's a challenge for you. Try and blow this paper into this bottle.

Scrunch up a piece of paper small enough to fit into the neck of the bottle.

Hold the bottle horizontally and place the piece of paper just inside the neck of the bottle.

Try to blow the piece of paper into the bottle.

The paper will fly out instead. The bottle is already full of air, so it's very hard to blow more air into it. When you do blow into the bottle the air comes back out, pushing the piece of paper out.

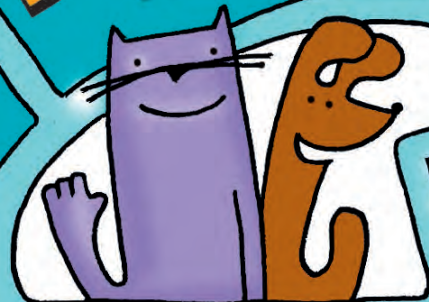
Vic Le Billon

Download more Marvin and Milo activities at iop.org/marvinandmilo

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DO ~~IT~~ TRY THIS AT HOME

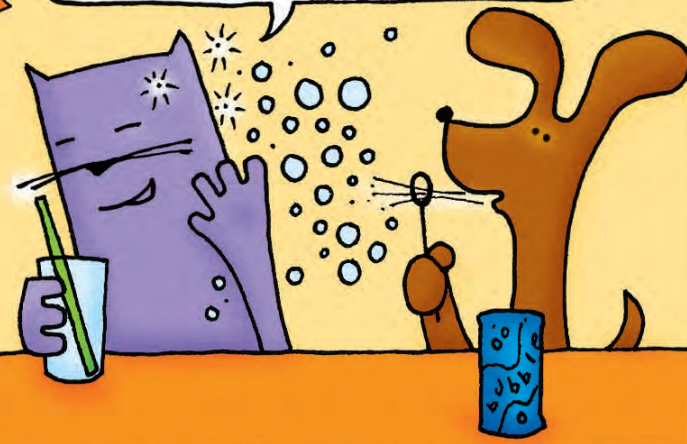
issue #102



Featuring:
**Marvin
and
Milo**

What you need: • A straw • Soap • Scissors • Water

Stop Milo, those bubbles are too small, check out my big bubble maker!

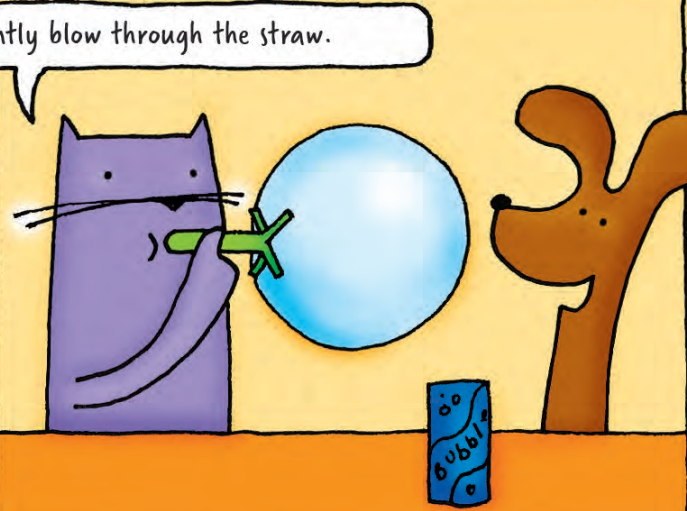
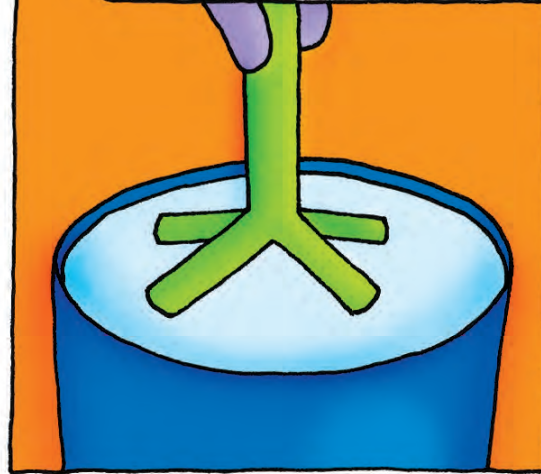


Get a straw and carefully cut the end into four.

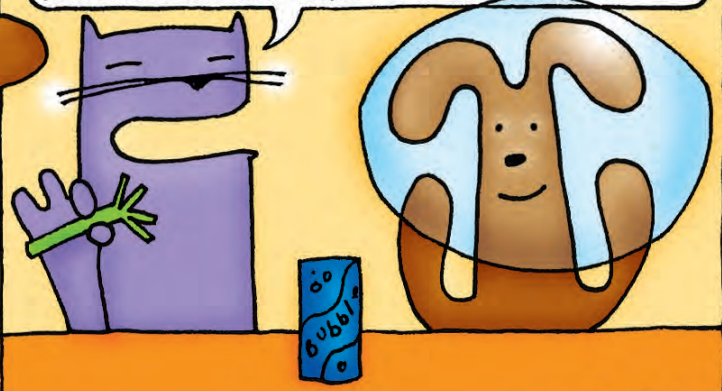


Push the ends out so they look like a flower with four petals.

Dip the flower in soapy water and gently blow through the straw.



The petals help the bubble to become big by holding the soapy water in the petals so the bubble doesn't stretch too thin and burst.



Vic Le Billon

DO TRY THIS AT HOME

issue #103

Featuring: **Marvin and Milo**

What you need: • Plastic cup • Bendy straw
• Scissors • Glue or Blu Tack



Push the straw through the hole so the bendy bit is inside the cup.



Glue or use some Blue-Tack to seal the hole and hold the straw in place.



Vic Le Billon

DO TRY THIS AT HOME

Issue #104

Featuring: Marvin and Milo

What you need: • Cardboard box • Pencil • String • Wet cloth

**Featuring:
Marvin
and
Milo**

What you need: • Cardboard box • Pencil • String
• Wet cloth

Then tied some string
round a pencil...



...and fed the string through the hole with the pencil staying inside the box.

I then used a wet cloth to pull on the string.

The box amplifies the vibrations from the string as the cloth is pulled along it, making a sound that our ears can hear.

Beware of my wild animal Milo,
it's got a loud growl!

[illegible]

What Milo doesn't know is that I just made a hole in a cardboard box.

Grrrrrrr!

Vic Le Billon

DO TRY THIS AT HOME

Issue #105

Featuring: **Marvin and Milo**

What you need: • Paper • Scissors

Let's wake Milo with just this piece of paper.

Fold a small piece of paper three times so that you have a concertina.

Cut two slits into the middle ridge.

Vic Le Billon

Hold the paper up to your mouth and blow.

The high-pitched sound you hear is created by the paper vibrating.

DO TRY THIS AT HOME

issue #106

Featuring: **Marvin and Milo**

What you need: • Glass bottle • Plate • Hot water • Room temperature water

Sorry Milo, but you're not the only thirsty one around here.

Pour some water onto a plate.

Fill the bottle with hot water. The water and the bottle will be hot so you might need to ask a friend to help.

Carefully pour the water away and quickly place the bottle upside down on the plate of water.

The hot bottle heats the air inside it. Once the air cools it takes up less space. The air pressure inside the bottle becomes less than outside, forcing the water up.

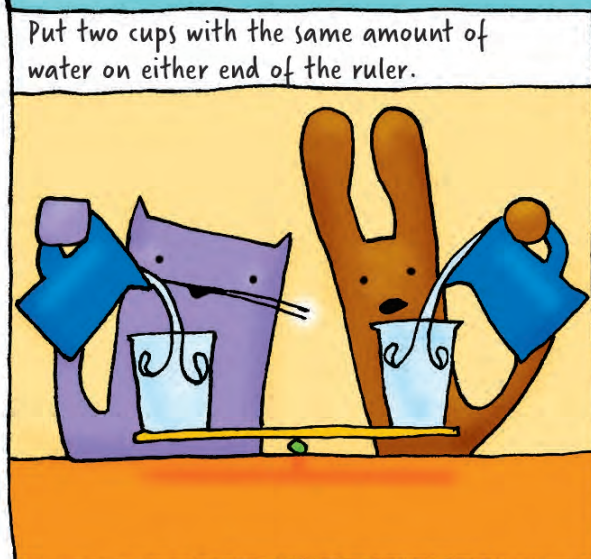
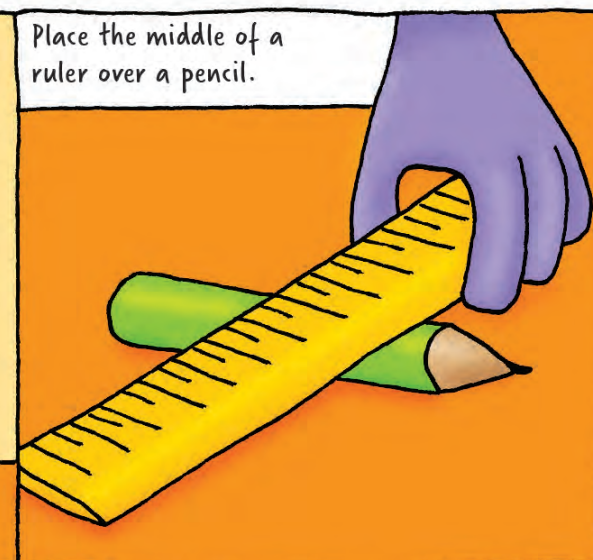
Vic Le Billon

DO ~~NOT~~ TRY THIS AT HOME

Featuring: Marvin and Milo

Issue #107

What you need: • Ruler • Pencil • Two cups • Water




Vic Le Billon

DO TRY THIS AT HOME

Issue #108

Featuring: **Marvin and Milo**

What you need: • Bucket • Tin foil • Water





Milo, I can make these similar pieces of foil sink or float!




Fill up a bucket with water.



Scrunch one up in the air and put it in the bucket.





Scrunch the other one underwater.



I predict that one shall float and the other shall sink...
...Ta Dah!

The piece of foil scrunched above the water traps some of the air, which helps it to float.



Vic Le Billon

DO

TRY THIS

AT HOME

Featuring:

Marvin

and

Milo

What you need:

- Tall glass
- Toothpick
- Two identical forks

Issue

#109

Wait Milo, before you tuck into your dinner, I have to show you this balancing act.

Push the prongs of the two forks together.

Push the toothpick in between the prongs to hold the forks together.

Balance the end of the toothpick on the side of the glass.

The forks can hang off the side because all the forces are balanced.

Vic Le Billon

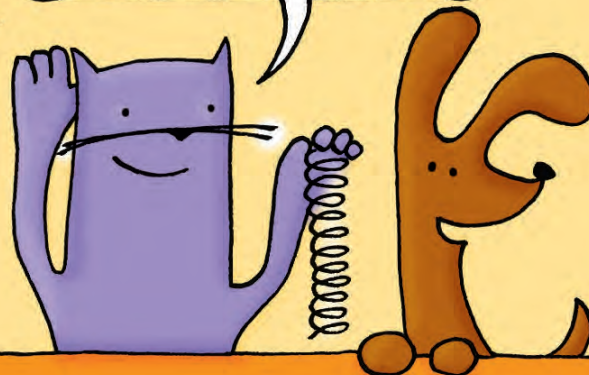
DO TRY THIS AT HOME

Featuring: Marvin and Milo

What you need: • Metal slinky • Disposable cup • Sticky tape • Scissors

Issue #110

Can you hear my slinky Milo?
No? Let me make this slinky loud!

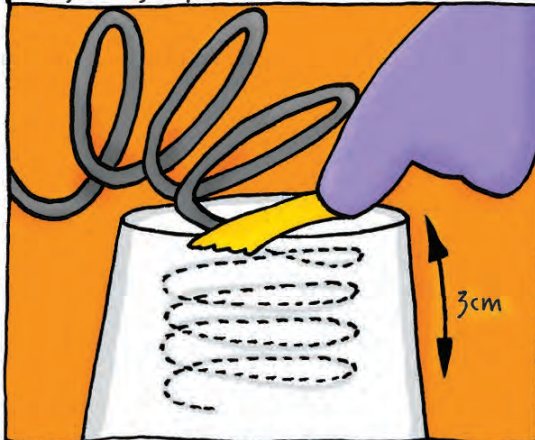


Turn the cup upside down so that the base is facing you.



Carefully use the scissors to make a small hole in it. Ask a friend to help.

Insert about 3cm of the slinky through the hole in the cup and stick it in place using sticky tape.



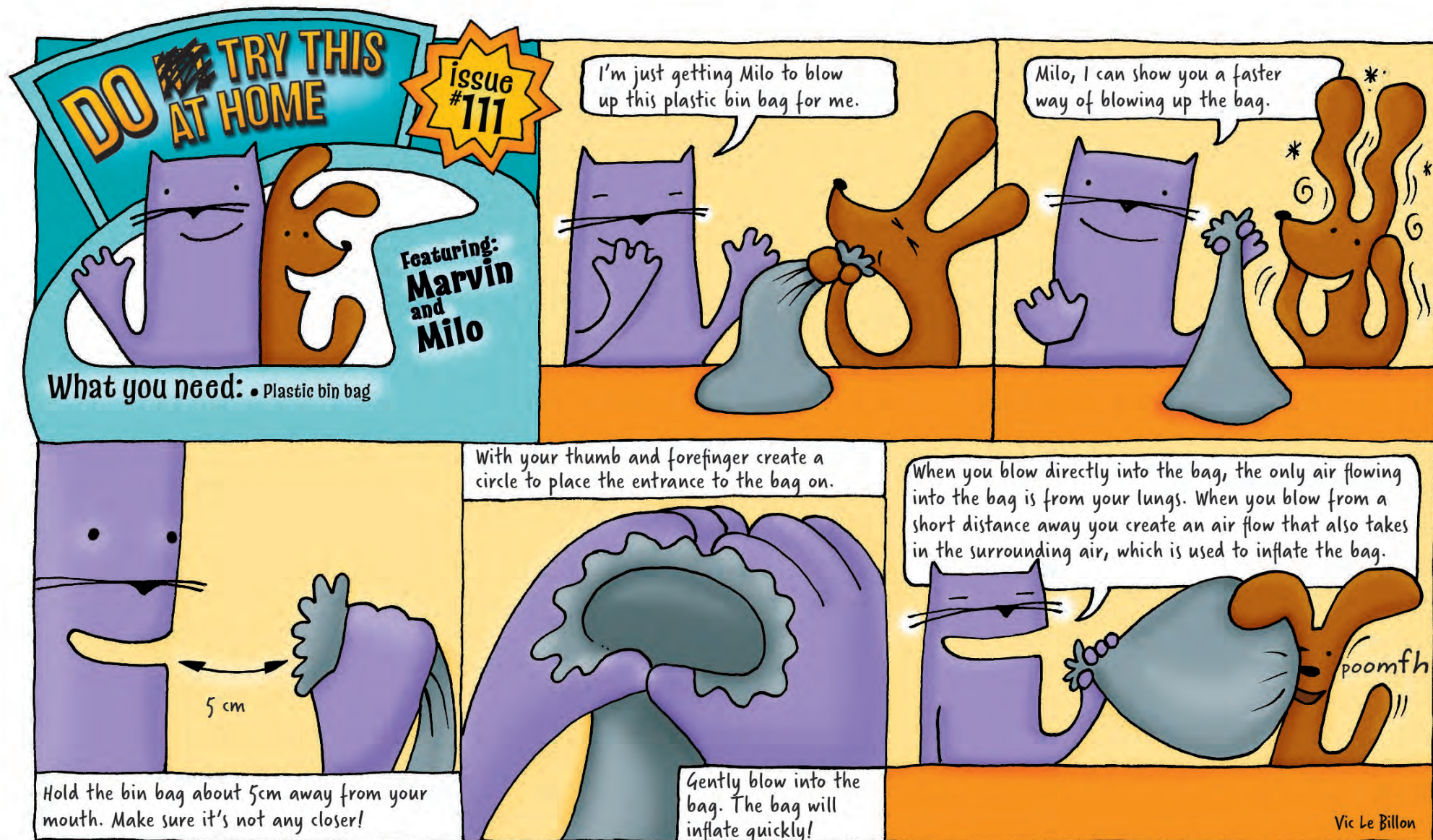
Hold the cup the right way up and let the slinky drop. Tap the bottom of the slinky and it'll make laser noises!



Slinkies make sound because they vibrate when they stretch out, making the air around them vibrate. Both the cup and the air inside it vibrate with the vibrations of the slinky. These build up, and the sound gets louder. This is called amplification.



Vic Le Billon



DO TRY THIS AT HOME

issue #112

Featuring: Marvin and Milo

What you need: • A broom • A glass • Water • An egg • A paper plate • An empty toilet paper roll

Whoa Milo! Before you whip out the tablecloth, let me show you a similar trick.

Fill the glass half-way with water, and set the glass near the edge of a counter or table.

Place the paper plate on top of the glass, with the edge of the plate slightly over the table edge. Stand the toilet paper roll in the middle of the plate, making sure that it's over the centre of the glass. Place the egg on the toilet roll.

Vic Le Billon

Stand with the broom next to the table edge, with the handle in front of the plate. Place one foot on the bristles, bend the broom back slightly.

Then let go! When the broom hits the plate, the plate and toilet roll are knocked away and...

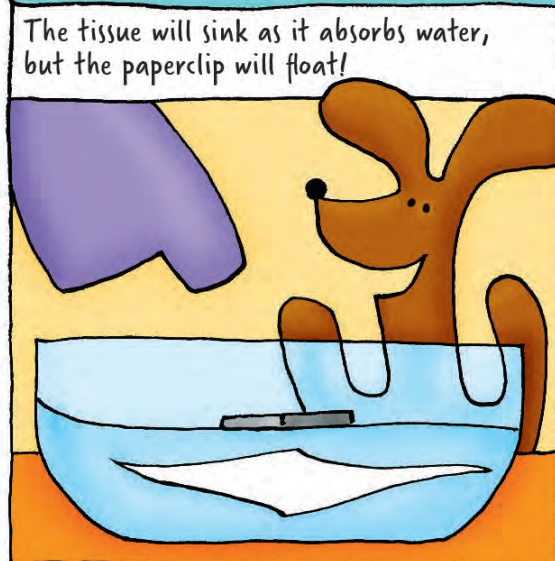
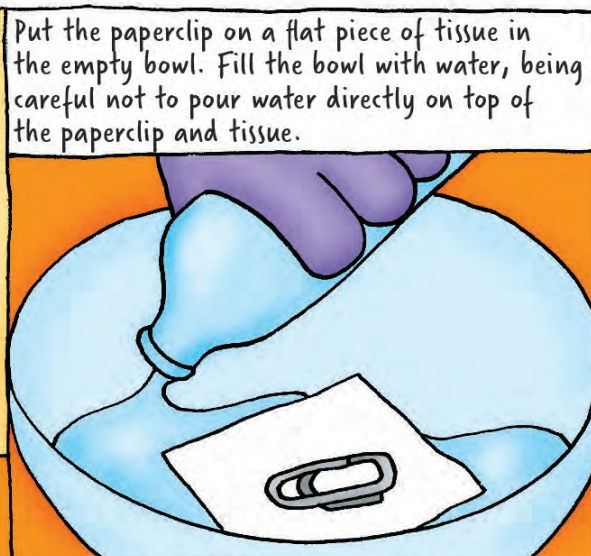
...the egg falls into the glass, because it is not moving sideways as the plate and toilet roll move away. objects do not start to move in a given direction unless acted on by an external force in that direction.

DO ~~NOT~~ TRY THIS AT HOME

Issue #113

Featuring: Marvin and Milo

What you need: • A paperclip • A cereal bowl • Water • Washing-up liquid • A tissue



Vic Le Billon

DO TRY THIS AT HOME

Issue #114

Featuring: Marvin and Milo

What you need: • A swivel chair
• Two heavy food cans • Cushions

Fancy going for a 'spin' Milo?

Sit an adult in the chair and ask them to hold a can in each hand with their arms stretched out at right angles.

Put some cushions on the floor round them, for safety.

Set the chair spinning. When it has reached a steady speed, ask them to quickly pull in their arms tight to their body, still holding the cans. The chair will...

The chair, person and cans together have something called angular momentum, which depends on how fast they're spinning and how far out the cans are held.

As the angular momentum has to stay the same, tucking in your arms means the speed has to go up to compensate - so the chair spins faster.

... spin much faster!

Vic Le Billon

DO TRY THIS AT HOME

Featuring: Marvin and Milo

What you need: • Seven clear plastic cups
• Food colouring • Water • Paper towels • Scissors

Issue #115

Hold that Milo, did you know water can walk?

Line up the cups and fill every odd one with water. Stir various food colouring into the water-filled cups - e.g. red in the 1st and 7th, yellow in the 3rd, blue in the 5th.

Fold some paper towels to make upside-down V-shaped arches. Trim them so that they can link every cup with its neighbour, with the ends touching the bottom of the cups.

Water overcomes gravity and rises up the arches as it is attracted to the cellulose in them and to the water already absorbed. Once the arches are saturated, the water seeps out again and mixes with coloured water from the next arch to make new colours.

Wait for several hours. Water will end up in all of the cups and the colours will be mixed!

Vic Le Billon

DO TRY THIS AT HOME

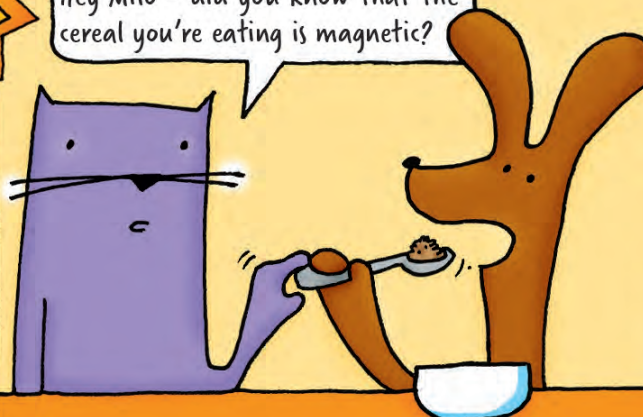
Featuring: Marvin and Milo

What you need:

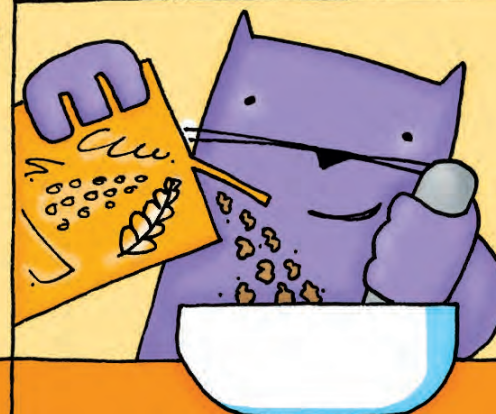
- Cereal fortified with iron
- Magnets
- A bowl
- A pestle or spoon

issue #116

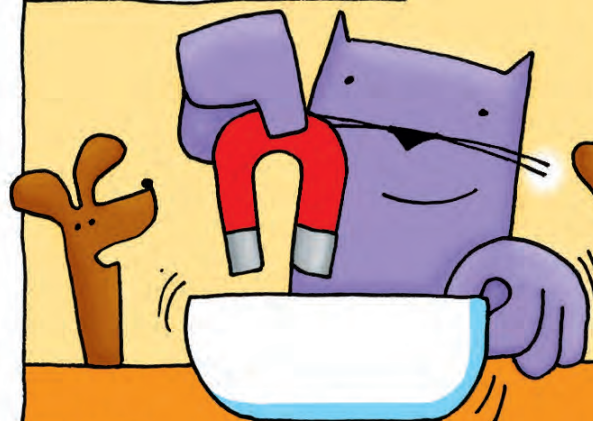
Hey Milo - did you know that the cereal you're eating is magnetic?



Put some of the dry cereal in the bowl and crush it as small as possible with the pestle or spoon.



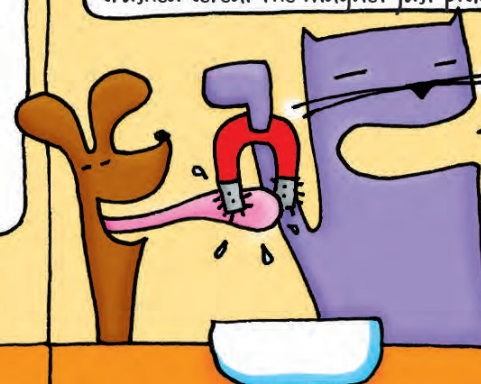
Put a magnet into the cereal and shake the bowl a little.



Lift the magnet out - some cereal should stick to it. If not, try stronger magnets or other cereal brands. It should work with brands where the iron is present as fine metal particles or ferric oxide, as these are magnetic.



The attraction isn't strong enough to lift large flakes, as each contains only a few magnetic particles. In crushed cereal the magnet just picks up pieces containing magnetic particles - in these each particle has less cereal to lift.



Vic Le Billon

Download more Marvin and Milo activities at iop.org/marvinandmilo

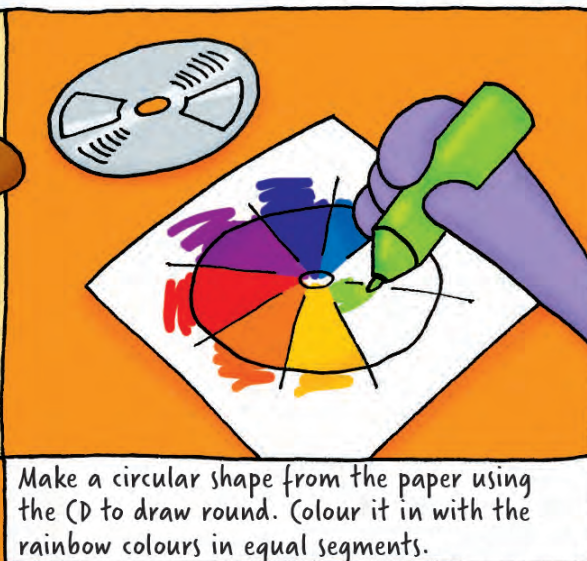
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DO TRY THIS AT HOME

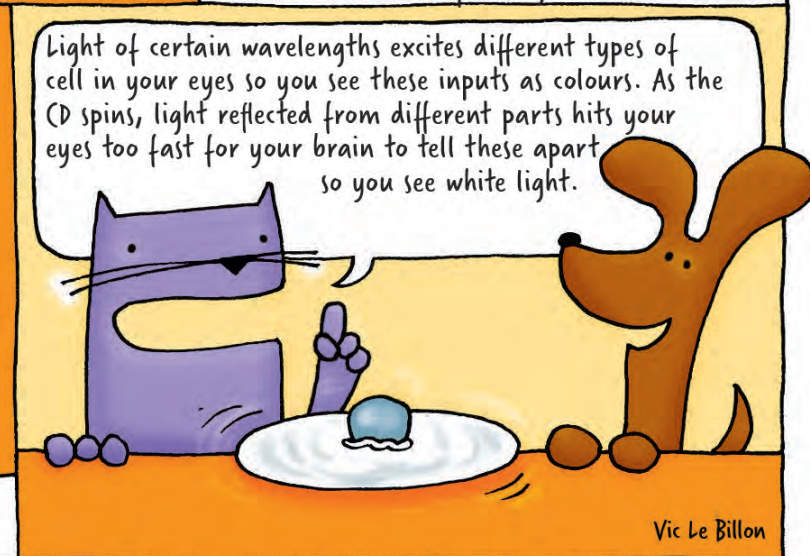
issue #117

Featuring: Marvin and Milo

What you need: • Paper • Scissors • Strong glue • Coloured pens • An old CD • A marble



Make a hole at the centre of the shape, glue it to the CD and stick the marble to the CD through the hole*



DO TRY THIS AT HOME

Issue #118

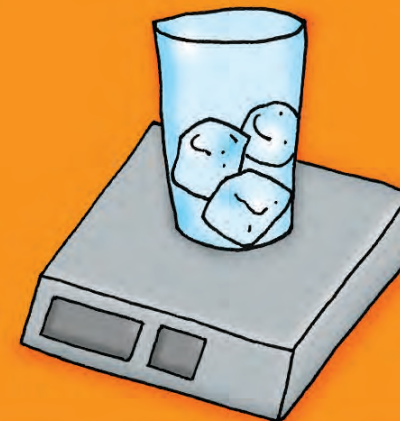
Featuring: Marvin and Milo

What you need: • Ice cubes • Tap water • Scales
• A microwave oven • Identical microwave-safe cups

Brrrrrh! It's autumn Milo - not a time for cocktails, more like hot tea. I bet I can boil water faster then you can melt ice!

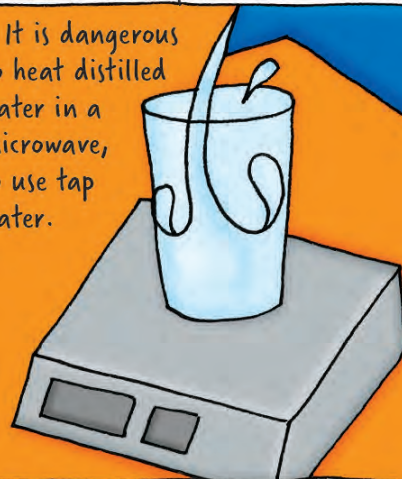


Put a few ice cubes into a dry cup and weigh it.

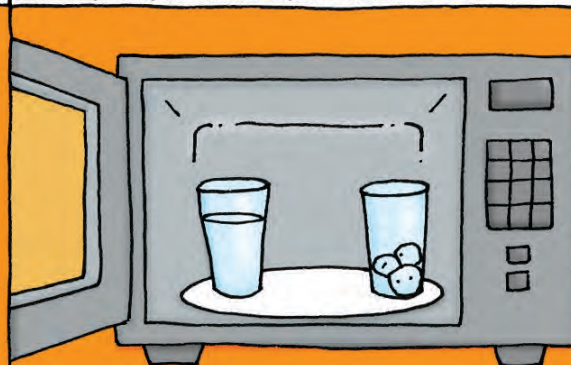


Pour water into another cup until it weighs the same as the first one.*

* It is dangerous to heat distilled water in a microwave, so use tap water.

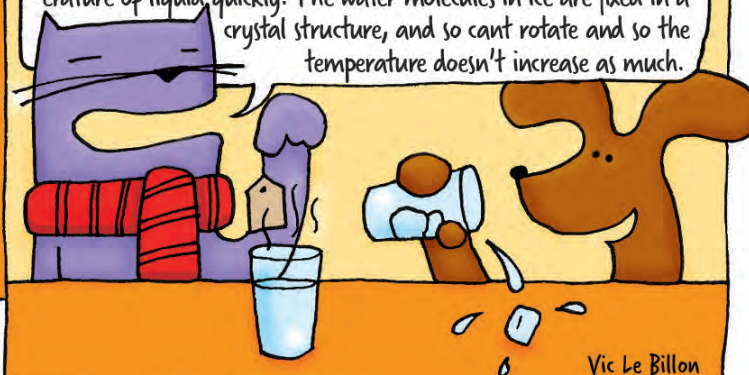


Stand the cups on opposite sides of the oven's turntable and microwave them.*



The water should boil before the ice melts!

Inside the microwave there's a quickly-changing electric field. Water molecules are slightly charged at both ends, and want to align themselves with this electric field. Because the field keeps changing, the molecules in liquid water are spun back and forth, raising the temperature of liquid quickly. The water molecules in ice are fixed in a crystal structure, and so can't rotate and so the temperature doesn't increase as much.



6

Vic Le Billon

DO TRY THIS AT HOME

Issue #119

Featuring: **Marvin and Milo**

What you need: • A plastic bottle • Scissors
• A straw • Putty • Food colouring • A balloon

Hey Milo - who do you think you are, Tim Peake? You don't need a space helmet to breathe through, but I can show you an effect of air pressure on Earth.

Make a small hole about 10cm from the bottom of the bottle, stick the straw through it till half remains outside, pointing upwards.

Seal the hole with putty.

Fill the bottle halfway with water dyed with the food colouring. No water will come out of the straw.

Blow up the balloon, keeping the air inside as you stretch the neck over the top of the bottle, then release. Water spurts from the straw as the balloon deflates!

Air presses down equally on the water in the bottle and in the straw at first, but attaching the inflated balloon increases the air pressure in the bottle. As it deflates, the air presses down on the water, pushing it through the straw.

Vic Le Billon



DO TRY THIS AT HOME

issue #121

Featuring: Marvin and Milo

What you need: • Paper • Scissors
• A coin - preferably a £2 piece

Milo - you love the Moon, so I'll show you an experiment based on one that an astronaut did there!

Cut out a paper disc a bit smaller than the coin.

Hold the coin horizontally in one hand and the paper disc in the other, then let them fall. The coin falls much faster than the paper, as you would expect.

Now place the paper disc on top of the coin, and let them fall together.

The paper falls almost as fast as the coin.

It is air resistance that makes the paper fall slowly, and the coin pushes the air out of the way for both itself and the paper when you drop them together. In a vacuum, all objects fall at the same speed, as astronaut David Scott once showed on the Moon.

Vic Le Billon

DO ~~NOT~~ TRY THIS AT HOME

Issue #122

Featuring: **Marvin and Milo**

What you need:

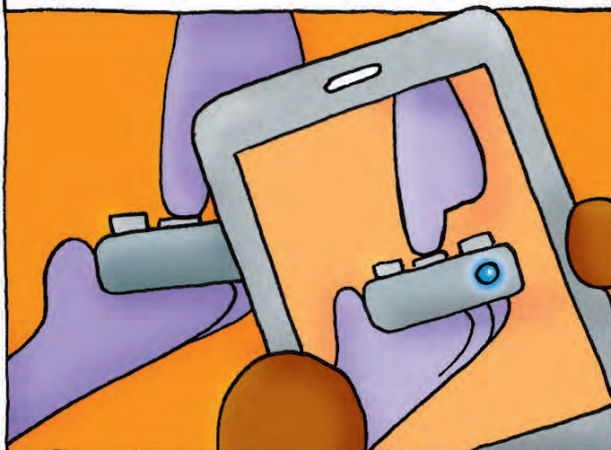
- A remote control
- A digital or phone camera, with a screen

Milo - Stop listening to Back! Now I can't play you the sound of gravitational waves, but I can reveal invisible light!

pop

Look at the end of the remote control while pressing its buttons - you shouldn't see anything happening.

Now switch on the camera, point the remote at the camera screen and press the buttons.



The screen should show a flashing blue or purple light at the end of the remote. (If not, try a friend's camera or remote.) Your remote send signals using waves of infrared light. The light's invisible to you, but not to your camera, which picks it up and converts it to a colour that you can see.

Vic Le Billon



DO TRY THIS AT HOME

Issue #123

Featuring: Marvin and Milo

What you need: • A ping-pong ball
• A plastic cup • Water

Milo: where is it easier to keep a ball still— on top of a hill of water or in the middle of a well?

Fill the cup almost full and float the ping-pong ball on it — it should be impossible to stop it drifting to the rim.

The water's surface tension pulls down on the ball but water is also attracted to it and climbs up its sides overall the pull is diagonally down.

Near the rim, the water between ball and rim flattens, so overall pull is towards the rim. But in a bulging cup, the water's surface is almost vertical at the rim, so the overall force pulls the ball to the centre.

Add more water until the cup almost overflows and the surface is raised. Now you should be able to keep the ball in the centre, though it looks unstable.

Vic Le Billon

DO TRY THIS AT HOME

issue #124

Featuring: Marvin and Milo

What you need:

- A vacuum cleaner
- Sticky tape
- A large, strong, clear plastic bag
- Bathroom scales
- A board about the scales' size

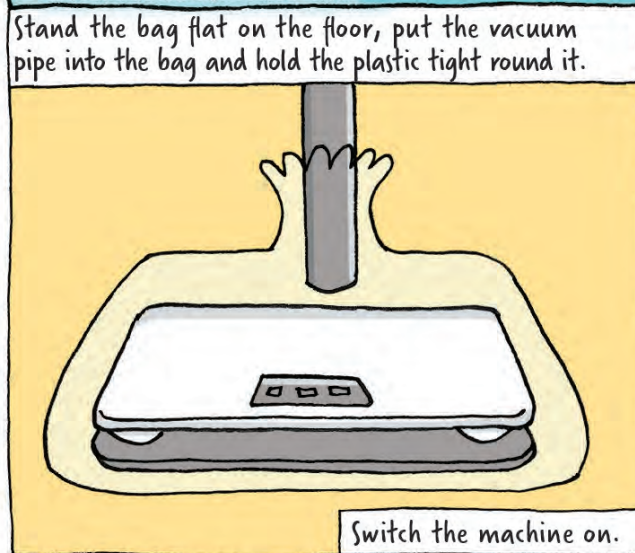
Stop the housework Milo! If you think that vacuum cleaner is heavy, let me show you how weighty the atmosphere is.



Place the board under the scales, put them together into the bag and wrap the plastic round them, fastening with sticky tape.



Stand the bag flat on the floor, put the vacuum pipe into the bag and hold the plastic tight round it.



Switch the machine on.

Once the air has been sucked from the bag, the scales should read about 150kg or more*; with a perfect set-up they'd record about a tonne!



(*You may need to try different scales or reset them for this to work.)

Normally, the air above and below empty scales pushes equally in all directions, so the forces cancel out and they read zero. With a nearly airless bag, the weight of the atmosphere pushes down on the scales but little force pushes up.



Vic Le Billon

DO TRY THIS AT HOME

issue #125

Featuring: Marvin and Milo

What you need: • A large plastic bottle
• Scissors • Some water • An outdoor space

When Tim Peake comes back to Earth he won't be able to make water float in mid-air - but can you make it float in a bottle?

Cut a hole about 1cm across in the side of the bottle and stand it on the ground.

Keep your finger over the hole and fill the bottle with water.

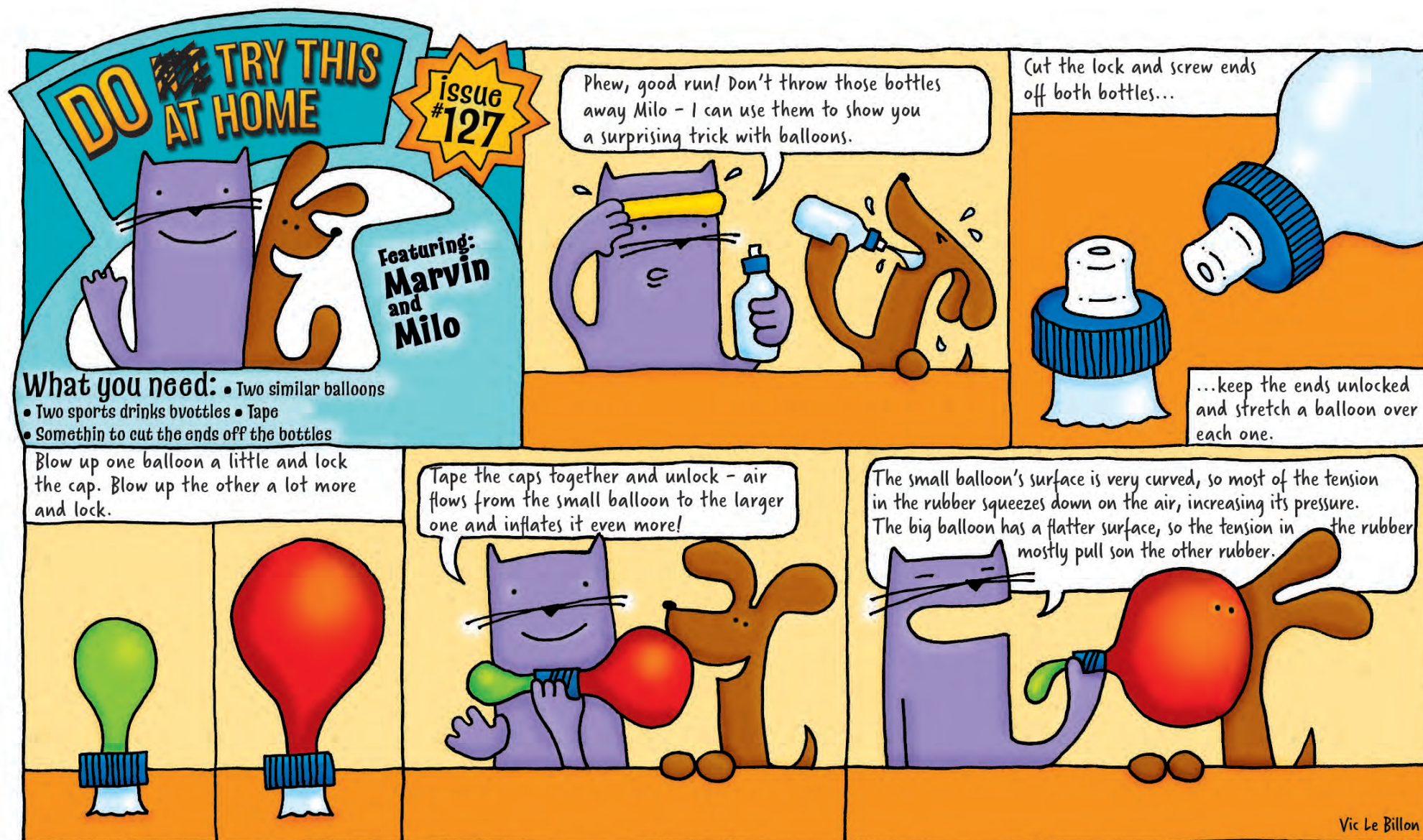
Take your finger away - water should spurt from the hole.

Repeat what you did, but drop the bottle from about shoulder height as you remove your finger. This time, no water pours from the bottle while it falls.

In the standing bottle, gravity pulls on the water so it presses on the bottom and sides and escapes through the hole. When you drop the bottle, both it and the water fall at the same rate so the water doesn't press on anything - it's as if it was floating inside the bottle.

Vic Le Billon





DO TRY THIS AT HOME

Issue #128

Featuring: Marvin and Milo

What you need: • Two "polarisers" - pieces of polarising plastic (or two old sunglass lenses) • A bright lamp • Transparent sticky tape • Piece of clear plastic

Now stick strips of tape on the clear plastic, criss-crossing them. Sandwich the plastic between the two polarisers.

Look at the lamp through the "sandwich". Rotate the polariser closest to you - you should see a kaleidoscope of coloured patterns.

Light travels in one direction but vibrates at right-angles to this - sideways and up and down. Polariser let only the horizontal or vertical part through, so you can combine them to block light. In the "sandwich" the stretched tape slows down and rotates the polarised light, shifting the different wavelengths (ie colours) of light by different angles. As these hit the second polariser, different wavelengths get through as you rotate it, making coloured patterns.

Milo, sorry but I need your sunglasses. I want to use them for a trick with light.

View the lamp through two polarisers at once. Rotate one of them until you can block the light.

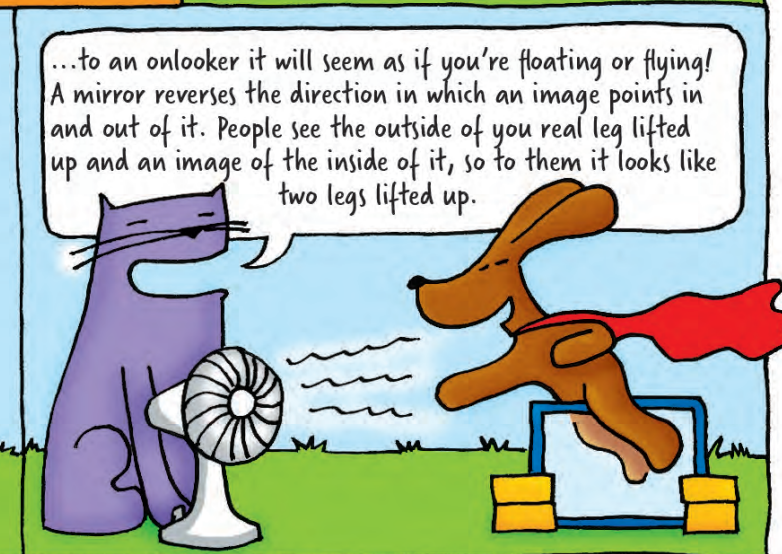
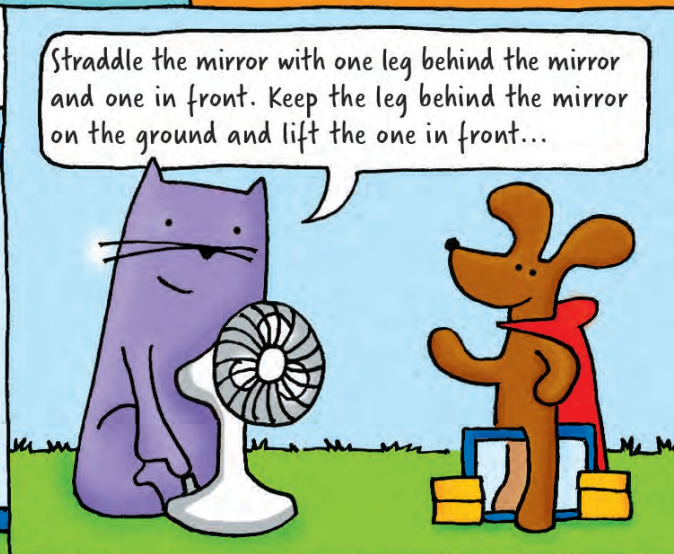
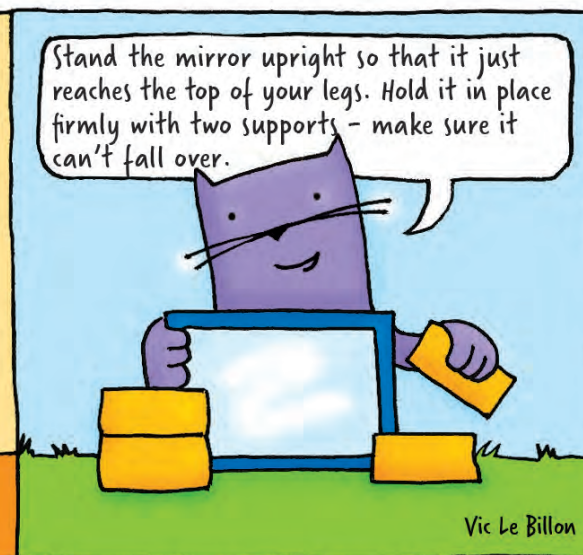
Vic Le Billon

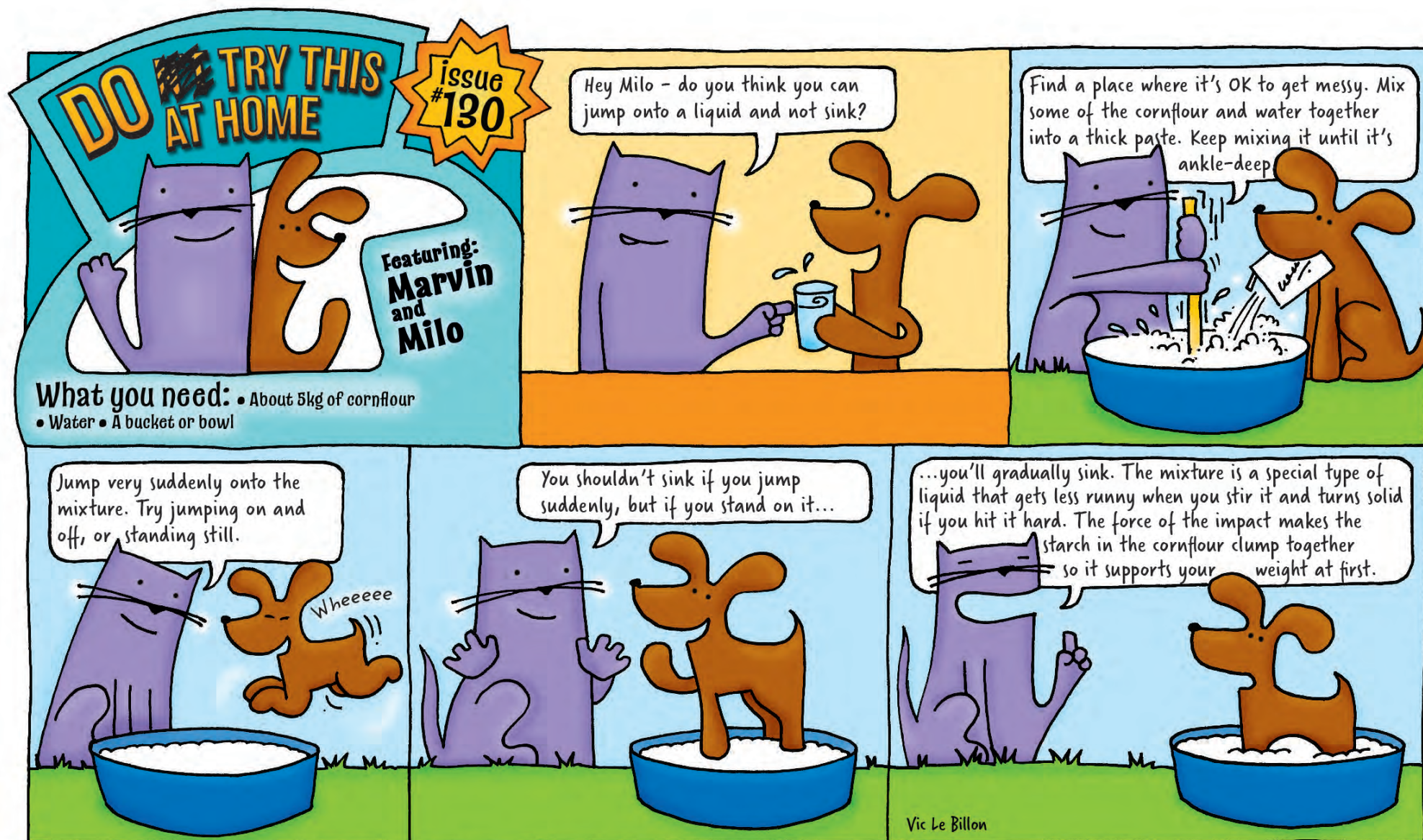
DO ~~NOT~~ TRY THIS AT HOME

issue #129

Featuring: Marvin and Milo

What you need: • A large framed mirror
• Two firm supports to hold it up • A person to watch you





DO TRY THIS AT HOME

issue #131

Featuring: Marvin and Milo

What you need:

- A cheap battery-driven clock
- A freezer
- A small plastic box
- Tissue paper or cotton wool



Vic Le Billon

DO TRY THIS AT HOME

Issue #132

Featuring: **Marvin and Milo**

What you need:

- A large sink, bucket or tank
- Water
- 330ml cans of various drinks
- Kitchen scales

Hey Milo - have you made any New Year resolutions about fizzy drinks?

Fill the large container with water. Lower the cans into it one by one. Make sure you use a variety of diet, sugary or other drinks.

Which ones float? Which ones sink?

You should find that the diet or unsweetened drinks float and the sugary ones sink. Now weigh each can.

Whether something sinks or floats depends on its density. Each can has the same volume but the sugary ones weigh more than the others and so are denser. Sweeteners weigh much less than sugar and some popular fizzy drinks contain about seven teaspoons of sugar or more.

burp!

Vic Le Billon

DO TRY THIS AT HOME

issue #133

Featuring: Marvin and Milo

What you need:

- A flat surface
- About 15 identical flat blocks or books

Hey Milo - how far would you dare to make a tower lean over?

Stack the blocks to make a tall column with each placed exactly over the ones beneath. Move the top block to the right as far as it will go without falling.

Move the top two blocks together so that they overhand the third block as far as possible without falling. Keep going in the same way down the column.

Your stack seems to defy gravity! You have to shift the blocks by tiny amounts towards the end, so it's extremely difficult to build from the bottom up.

When you balance the first block, its centre of mass is at the edge of the block below. Each time you balance a new block plus all those above it, you're judging the centre of mass of this new set.

Vic Le Billon

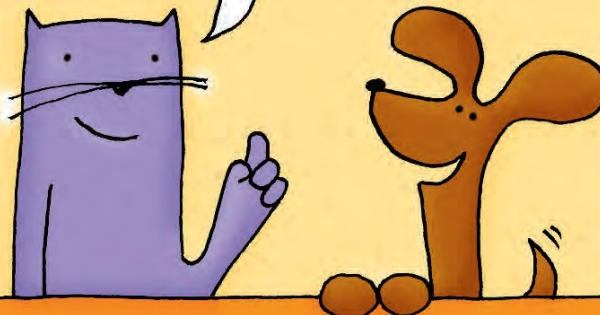


What you need:

- Four or more small magnets
- String or strong thread
- Sticky tape
- A horizontal rod e.g. a pencil
- A flat surface

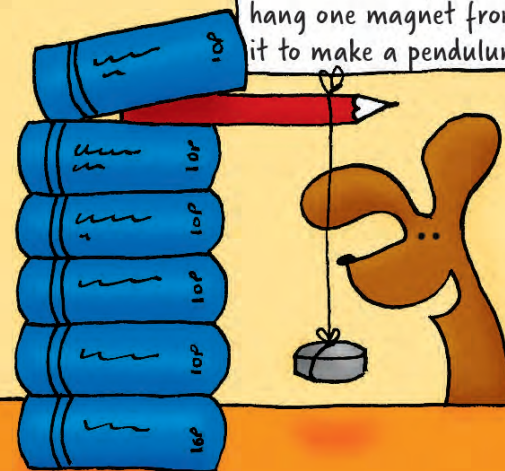
issue #134

Hey Milo - did you know you can cause chaos with magnets?!

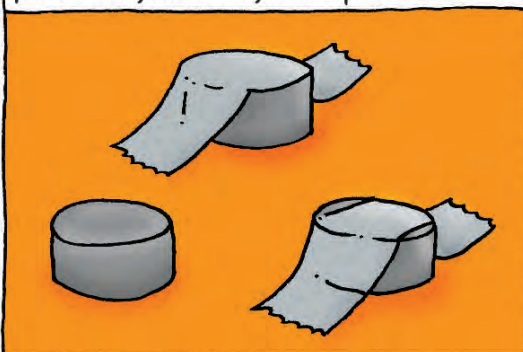


* Keep magnets away from toddlers!

Fix the rod in place and hang one magnet from it to make a pendulum.



Tape the rest down in an equal-sided pattern e.g. a triangle or square.

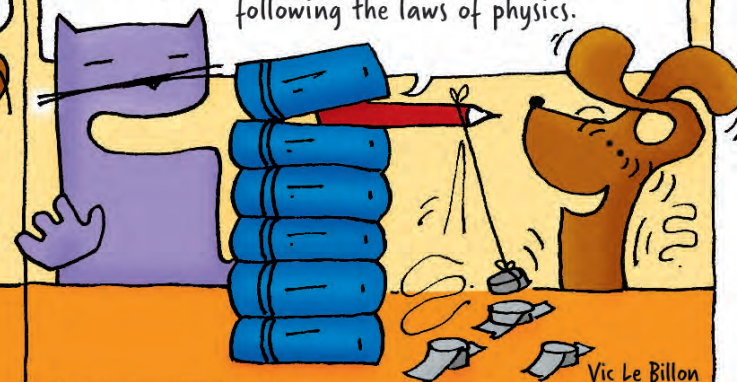


With the pendulum very close to the magnets, give it a gentle push. Try changing its starting point, or swinging it harder.

The pendulum will move weirdly, maybe reversing or hanging around one magnet before settling above another. A slight change to how you start it off will make a big difference to where it ends up.



Gravity, the magnetic attractions and pushes on the string work together in complicated ways so that it's very difficult to predict how the pendulum will swing or where it will settle, even though it's following the laws of physics.



Vic Le Billon

DO TRY THIS AT HOME

issue #135

Featuring: **Marvin and Milo**

What you need:

- Walking toy or object that will slide
- About 50cm of string
- Rubber band
- A small lightweight bag
- Paper clips & binder clips

Hey Milo, I can magically top your toy robot at the edge of the table!

Fix a rubber band round the object and tie the string to it. Put it on a smooth table and attach a small bag to the end weighted down with paperclips and binder clips to make a small weight.

With the object about 30cm from the table edge, try out different weights until it will start to slide if you give it a gentle push.

When you push the object, it will slide till it reaches the edge of the table, then stop. If you're using a walking toy, it should stop walking at the edge.

The force on the toy from the weight acts sideways and downwards, so the string is pulled diagonally, but only the sideways part of it keeps the toy moving forward. As it nears the table edge, the angle of the string changes until there is no part of the force moving the toy forward, so it stops. Some walking toys come with a weight attached, which is why they stop.

Vic Le Billon

DO TRY THIS AT HOME

Issue #136

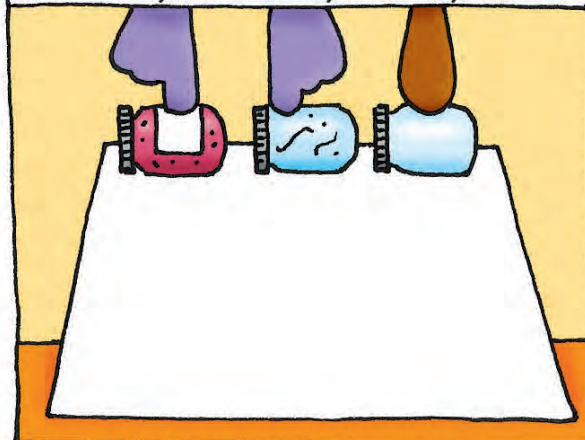
Featuring: Marvin and Milo

What you need: • Three identical jam jars
• Jam • Water • A gentle slope

Hey Milo - let's have a jam-jar race!

Fill one jar with jam, another with water and leave the third empty.

Race all three jars down the slope and see which wins. Try racing them in pairs - the water-filled jar versus the jam-filled jar etc.



The water-filled jar should be fastest by a slight amount, the jam-filled jar next, and the empty jar slowest.

The force due to the weight of the jars makes them rotate as well as move down the slope. The empty jar's mass is around its edge, so a lot of the force goes into making this mass rotate. More of the jam-filled jar's mass is near its centre so less of the force goes into making this mass rotate. The water in the third jar doesn't rotate, so all of the force goes into moving the water straight down the slope.

Vic Le Billon

DO TRY THIS AT HOME

issue #138

Featuring: Marvin and Milo

What you need: • Water • Washing up liquid • Bubble wand or rigid loop • Clean cotton or wool gloves

Hey Milo, have you ever tried to bounce bubbles?

Mix one part of washing up liquid to three parts water in a cup.

Stir and leave it to stand.

Use the loop to blow large bubbles - let one fall onto your bare hand. What happens?

Put the gloves on and let one fall on your gloved hand.

When a bubble hits your bare hand it will pop. But if it falls on your glove you should be able to hold it and bounce it.

Bubbles are incredibly thin films of soap, held together by surface tension. Oil or tiny dirt particles on your hand affect the film, breaking it at once, but the soft, clean fibres of your glove do not.

Vic Le Billon



DO TRY THIS AT HOME

issue #141

Featuring: **Marvin and Milo**

What you need: • A balloon • A little water
• Two plastic cups • A friend

Hey Milo, your party balloon would look better with some ears!

Blow up the balloon to grapefruit size. Get your friend to wet the rims of the cups and hold them firmly against the balloon, one on each side.

Inflate the balloon to normal size then ask your friend to let go of the cups.

The cups will stick tightly to the balloon without help, and if you draw a face on the balloon the cups will look like ears.

At first the balloon dips deep into each cup, but it flattens out as you inflate it, taking up less space in the cups, so the air pressure inside them drops. The air pressure outside them is unchanged, so it presses them firmly against the balloon.

Vic Le Billon

DO ~~NOT~~ TRY THIS AT HOME

Issue #142

Featuring: **Marvin and Milo**

What you need: • Two large plastic bottles
• A washer • Water • Duct tape • Food colouring

Tornado! Stop the recycling Milo because I can make a tornado in a bottle.

Fill one bottle two-thirds full with coloured water.

Turn the other upside down, put a washer between them and tape the joint firmly.

Turn them upside down, let the water flow normally, then swirl the bottles around vigorously.

When you swirl the water, it forms a vortex like a tornado and flows much faster into the lower bottle.

Air from the lower bottle rushes to the top through a hole in the middle of the vortex as the fast-flowing water drains rapidly at the edges.

Vic Le Billon

DO TRY THIS AT HOME

issue #143

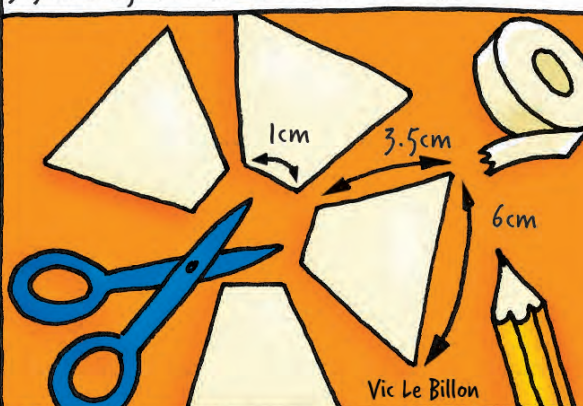
Featuring: **Marvin and Milo**

What you need: • Stiff acetate or plastic wallet
• Scissors • Tape • Smartphone

Hey Milo - I can make a "hologram" appear above your phone.

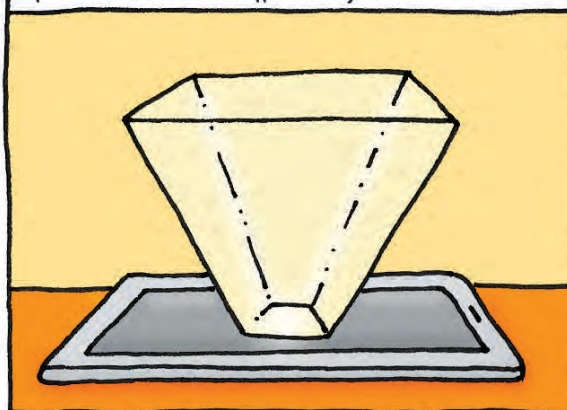


Using shiny, see-through plastic, cut out four identical pieces and tape them together to make a pyramid 6cm on each side, with sloping edges 3.5cm long and a 1cm hole at the base.




Vic Le Billon

Search for "hologram videos" on your phone and switch one on - four moving objects will appear. Place the pyramid at the centre of them and turn off the lights.



KICK-CLACK

You should see a moving 3D image appear to float within the pyramid.



Some light from each image is reflected off of the pyramid face nearest to it, making it look as if an object is floating inside the pyramid.



DO TRY THIS AT HOME

Issue #144

Featuring: Marvin and Milo

What you need: • Six pipe cleaners or coated wires
• Six straws • Scissors • Soap solution • Bubble wand

Hey Milo – did you know that a bubble can be square?

Cut the pipe cleaners in half to make 12 pieces. Twist the ends of three pieces together to make a pyramid shape – make four of these.

Cut the straws in half to make 12 pieces and slide these over each leg of the pyramids. Twist the ends of each leg together to form a cube.

Submerge the cube in the soap solution for a few seconds then lift it out and move it gently till you have a horizontal square in the middle. Blow a bubble and drop it onto the square.

The centre becomes a bulging cube! Attractive forces in the soap mixture pull the film into a shape that minimises distances, creating the central square. These forces also pull the cube in the centre into a more spherical shape

Vic Le Billon

DO TRY THIS AT HOME

issue #145

Featuring: **Marvin and Milo**

What you need: • A plastic cup • A match
• A balloon • Two 1p coins

Hey Milo, can you move a finely-balanced match without touching it?

Lay one coin flat on a table and balance the other on it vertically. Balance the match on the rim of the upper coin...

... then place the cup over the whole set-up. Blow up and tie the balloon then rub it against your hair or jumper.

Move the balloon slowly round the cup, without touching it. The match moves as the balloon does! What happens if you try to move a match lying flat on the table using the balloon?

Rubbing the balloon transfers negatively charged electrons to it, repelling electrons in the match in a way that causes it to spin. Friction acts along the whole match when it's lying flat and stops it moving, but it can spin when it's resting on a point.

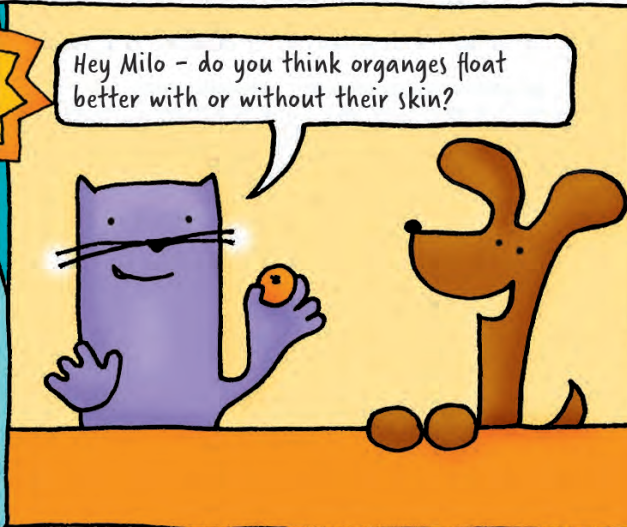
Vic Le Billon

DO TRY THIS AT HOME

Issue #146

Featuring: **Marvin and Milo**

What you need: • An orange
• A deep bowl or container • Water



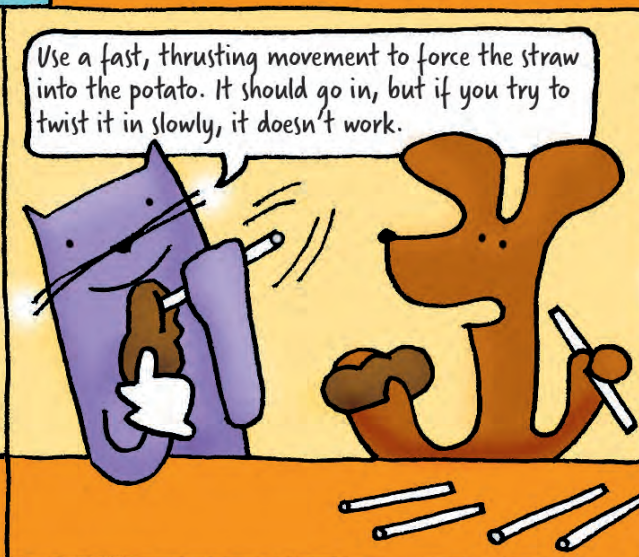
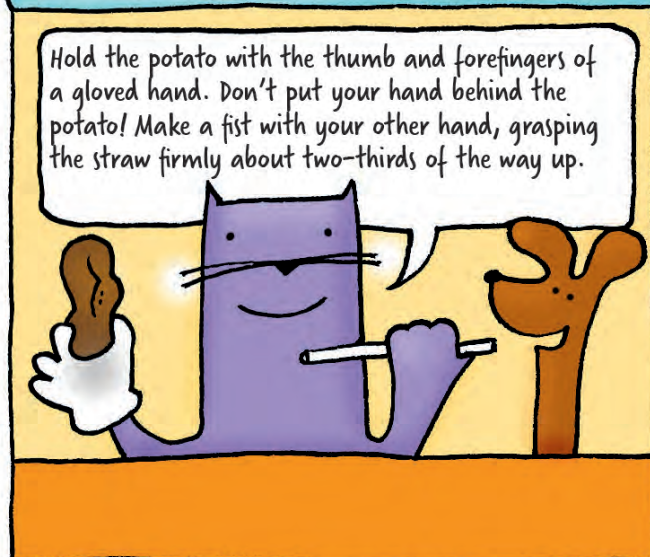
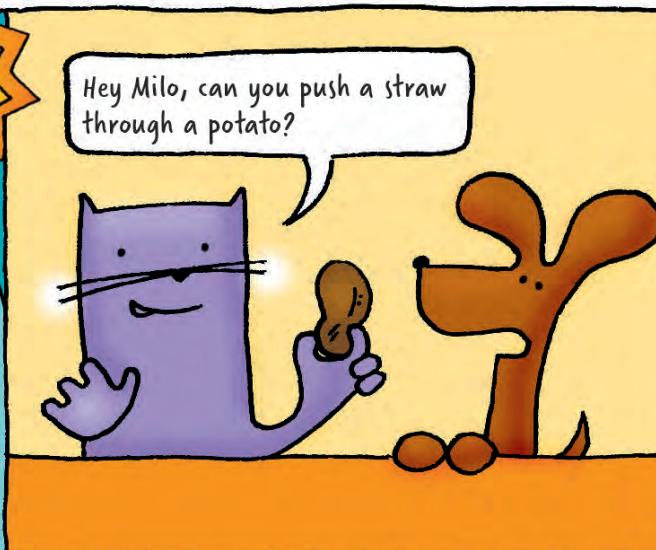
Vic Le Billon

DO TRY THIS AT HOME

issue #147

Featuring: Marvin and Milo

What you need: • A raw baking potato
• A new straw • A thick glove



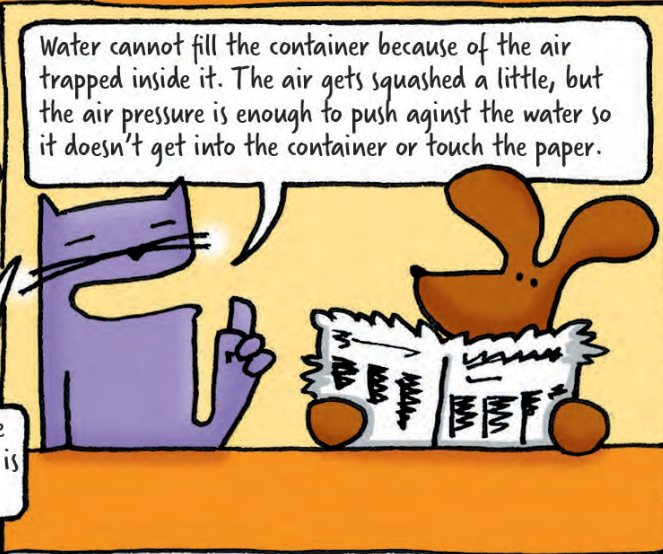
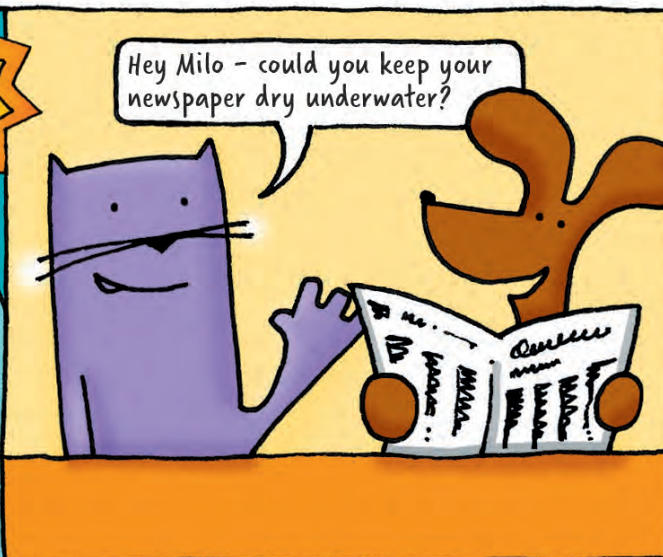
Vic Le Billon

DO TRY THIS AT HOME

issue #148

Featuring: **Marvin and Milo**

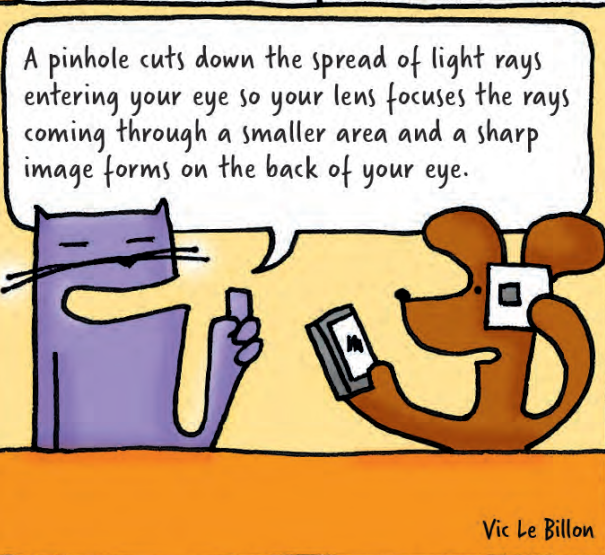
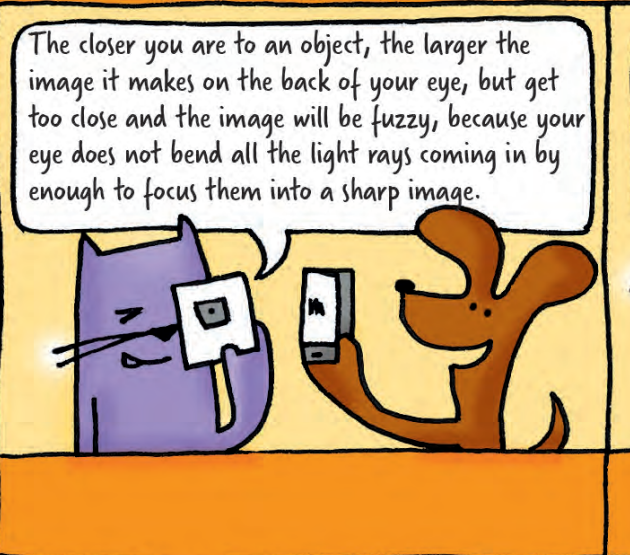
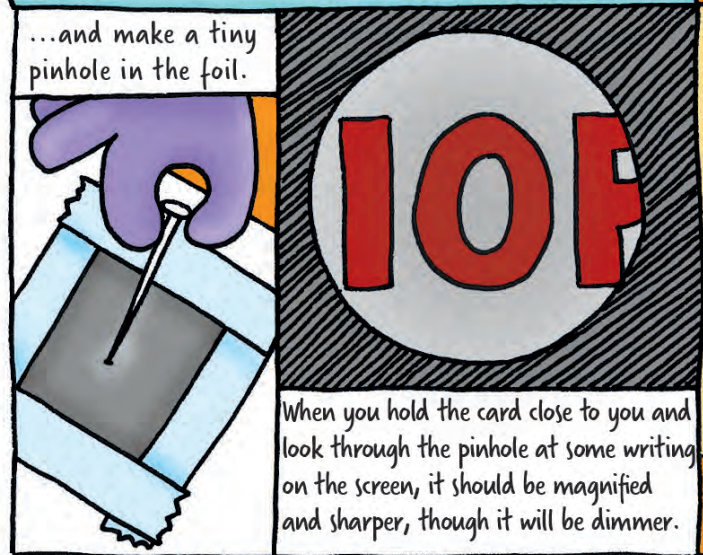
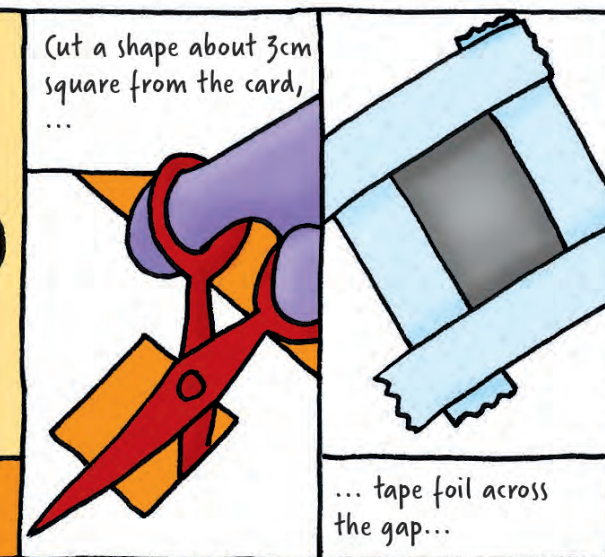
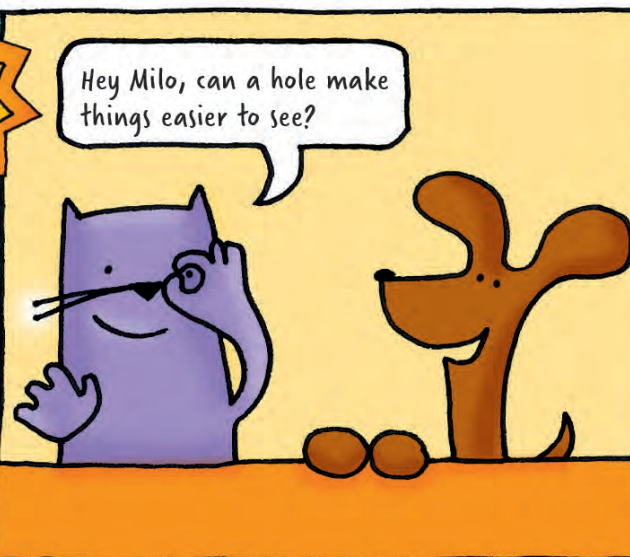
What you need: • Newspaper • Water
• Bucket or deep bowl • Plastic or glass container



Vic Le Billon



What you need: • 10cm x 10cm piece of card • Pin or needle • Aluminium foil • Sticky tape • Computer or phone screen



DO TRY THIS AT HOME

issue #150

Featuring: **Marvin and Milo**

What you need: • Two ball bearings
• Large rubber band • Glue • Two paper clips

Hey Milo - I can make you a spinning toy that winds itself up!

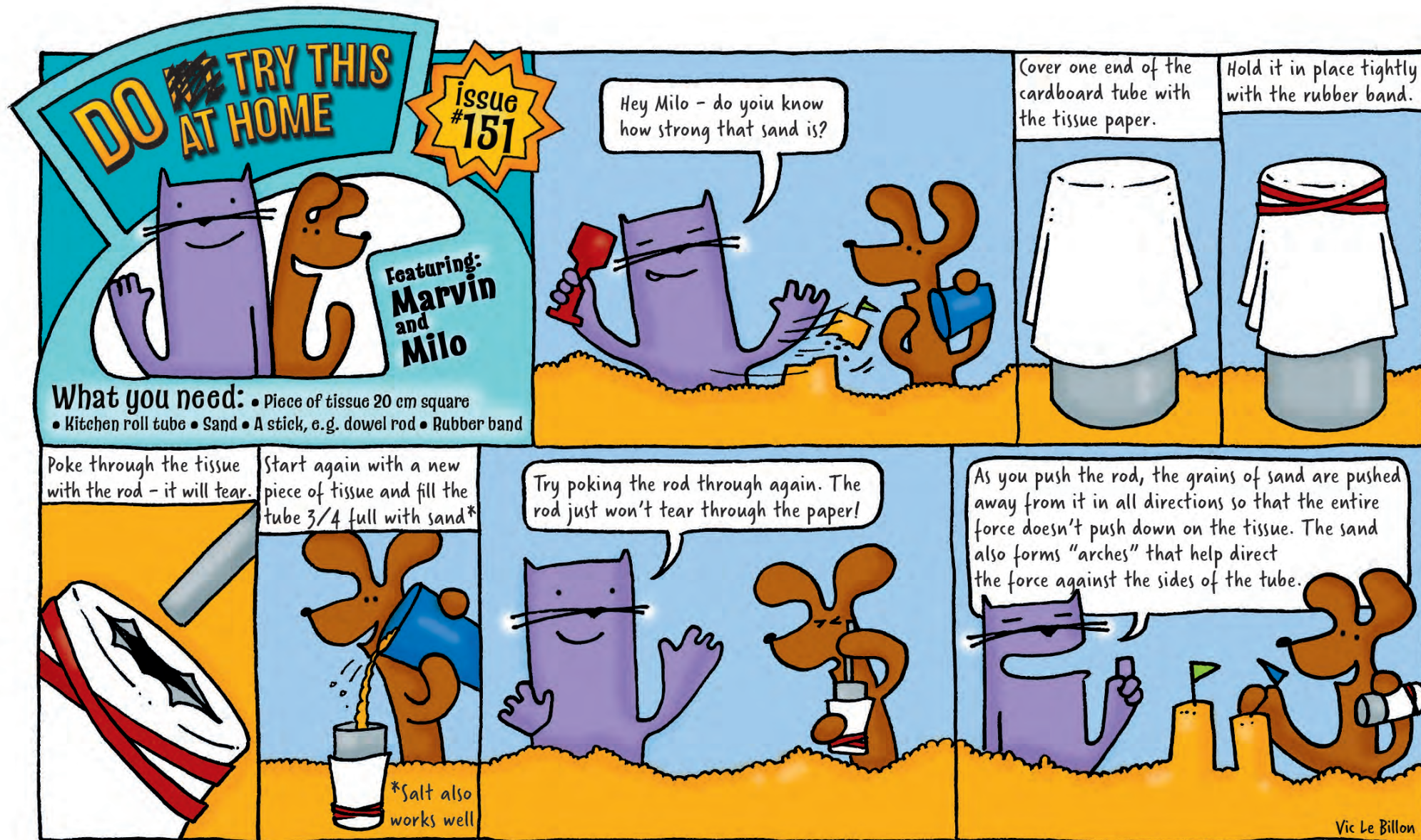
Wind a paper clip into a spiral, tie one end of the rubber band to it and glue it to a ball bearing. Do the same with the other end of the band.

Holding one ball bearing, rotate the other until the band is wound up. Keeping the ball bearings together, drop them onto a smooth surface.

The ball bearings spin, speeding up as the band unwinds. Then the band contracts, winding up the other way. The cycle repeats, with the bearings spinning in the opposite direction.

The twisting in the band makes both bearings turn, so they roll round. When the band has untwisted they're moving so fast that they overshoot, making the band wind up the other way, which slows them to a pause.

Vic Le Billon



DO TRY THIS AT HOME

issue #152

Featuring: Marvin and Milo

What you need: • Blu Tack • String about 1 metre long
• Two 2p coins • Old pair of sunglasses

Hey Milo - I'm not trying to hypnotise you, but I can trick your brain with this pendulum!

Stick the 2p pieces together with Blu Tack and tie the string to it to make a pendulum.

Watch from about 2m away as it's swung from side to side in a straight line.

Break the sunglasses in half at the nose, and put a lens in front of one eye, but look at the moving pendulum through both eyes. Swap the lens to the other eye and watch again.

You'll see the pendulum moving in a circle or ellipse, instead of a straight line. When you put the lens in front of your other eye, you'll see it moving in a circle in the opposite direction.

Sunglasses block some light, delaying signals from your eye to your brain. Normally you don't notice, but when you cover only one eye, that eye sees the pendulum delayed with respect to what the other eye sees, so your brain thinks it's moving in a circle.

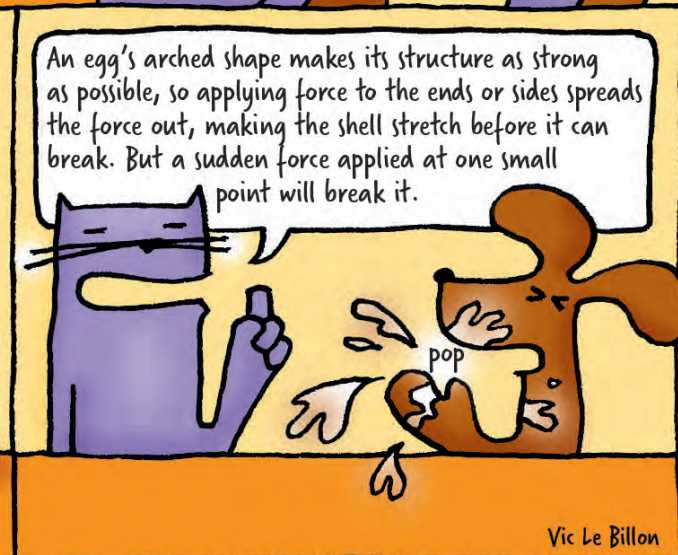
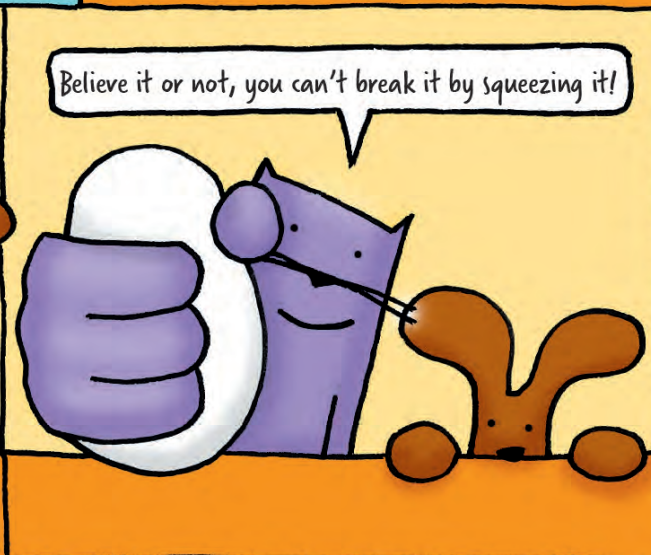
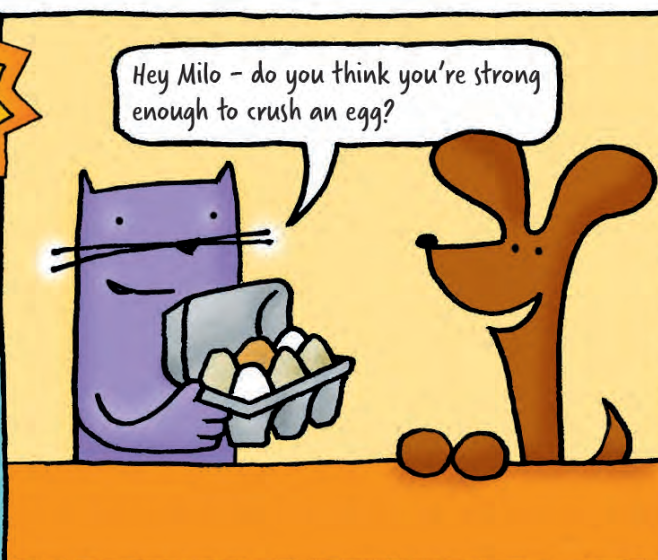
Vic Le Billon

DO TRY THIS AT HOME

issue #153

Featuring: **Marvin and Milo**

What you need: • A raw egg • Plastic bag or glove



Vic Le Billon

DO TRY THIS AT HOME

issue #154

Featuring: **Marvin and Milo**

What you need: • Bottle full of dry sand
• Clear balloon • Funnel • Water

Milo, do you know why your footprints are dry when you step on wet sand?

Fill a balloon with sand. Use an inflated balloon placed over the bottle opening and turn it upside down. The let the air out of the balloon.

Pour water through the funnel into the balloon until all the sand is wet and there's a little water in the neck.

Squeeze the balloon – the level of water in the neck goes down instead of up! The volume of the wet sand expands when you squeeze it and the water fills the gaps between sand grains.

Squeezing the sand causes each layer of grains to shift and the layer below to move the opposite way. These tiny movements create gaps in the bulk of the sand which the liquid can fill.

Vic Le Billon

