Air experiments
Contents

Topic: Air
Air pressure

http://www.primaryscience.ie/media/pdfs/col/air_pressure.pdf

What you will need:
Paper cup
Plastic bottle
Water

BACKGROUND
The space around us is not empty but is filled with air, which is pushing on everything around us. This is called air pressure.
When tyres are pumped up, air is squashed inside. This makes lots of pressure. Therefore the tyres can support a truck which is carrying a heavy load.

ACTIVITY 1
To show that air takes up space:
Place a cup upside down into water

ACTIVITY 2
To show that air is pressing on everything:

1) Squeeze air out of a plastic bottle.
2) Let go and see what happens. (The bottle regains its shape because air pressure forces air back into the bottle).
3) Now put the lid on before you let go and see what happens. (No air can get in so the bottle stays squeezed.)

Topic: Air
Make a parachute

Show that air can exert pressure by making a parachute.

What you will need:

A large cotton handkerchief
Some string
A weight such as a rubber (eraser)

What to do:
Cut the string into 4 pieces, about 40 cm per piece.
Tie a piece of string to each corner of the handkerchief.
Tie the ends of the string together and attach the rubber.
Now allow your parachute to fall from a height.

What happens?
As the parachute falls, air is trapped inside the umbrella part. The air is squashed (compressed) so that it has greater pushing power than the air around it. The air presses up from under the parachute and pushes it upward.

Topic: Air
Balloon Rocket

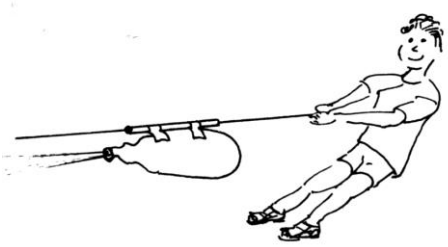
http://www.sciencebob.com/experiments/balloonrocket.php

What you will need

- Piece of string (about 2 to 3 metres long)
- Balloon
- 2 chairs
- Drinking straw
- Tape
- Scissors

What to do

1. Tie one end of the string to a chair, door knob, or let your partner hold on to it.
2. Put the other end of the string through the straw. (Tape the end to help it go through.)
3. Pull the string tight and tie it to another support in the room, (or get another person to hold this end).
4. Blow up the balloon (but don't tie it.) Pinch the end of the balloon and tape the balloon underneath the straw with its nozzle pointing to the closest end of the fishing line. Let go of your balloon.
5. as shown in the picture. You're ready for launch.
6. Let go and watch the rocket fly!



How does it work?

So how does it work? It's all about the air...and thrust. As the air rushes out of the balloon, it creates a forward motion called THRUST. Thrust is a pushing force created by energy. In the balloon experiment, our thrust comes from the energy of the balloon forcing the air out. Different sizes and shapes of balloon will create more or less thrust. In a real rocket, thrust is created by the force of burning rocket fuel as it blasts from the rockets engine - as the engines blast down, the rocket goes up!

Make it an experiment

The project above is a DEMONSTRATION. To make it a true experiment, you can try to answer these questions:

1. Does the shape of the balloon affect how far (or fast) the rocket travels?
2. Does the length of the straw affect how far (or fast) the rocket travels?
3. Does the type of string affect how far (or fast) the rocket travels? (try fishing line, nylon string, cotton string, etc.)
4. Does the angle of the string affect how far (or fast) the rocket travels?

Topic: Air
Use a Straw to Stab a Potato

http://www.sciencekids.co.nz/experiments/stabapotato.html

Is it possible to stab a potato with a drinking straw? Find out with this fun science experiment for kids that shows how air pressure can be used in surprising ways.

What you'll need:

•Stiff plastic drinking straws
•A raw potato

Instructions:

1. Hold a plastic drinking straw by it sides (without covering the hole at the top) and try quickly stabbing the potato, what happens?
2. Repeat the experiment with a new straw but this time place your thumb over the top, covering the hole.

What's happening?

Placing your thumb over the hole at the top of the straw improves your ability to pierce the potato skin and push the straw deep into the potato. The first time you tried the experiment you may have only pierced the potato a small amount, so why are you more successful on the second attempt?

Covering the top of the straw with your thumb traps the air inside, forcing it to compress as you stab the straw through the potato skin. This makes the straw strong enough to pierce the potato, unlike the first attempt where the air is pushed out of the straw.

Topic: Air
Warm Air Needs More Room

http://www.sciencekids.co.nz/experiments/heavyair.html

As its temperature rises, air starts to act a little differently. Find out what happens to a balloon when the air inside it heats up with this fun science experiment for kids.

What you'll need:

•Empty bottle
•Balloon
•Pot of hot water (not boiling)

Instructions:

1. Stretch the balloon over the mouth of the empty bottle.
2. Put the bottle in the pot of hot water, let it stand for a few minutes and watch what happens.

What's happening?

As the air inside the balloon heats up it starts to expand. The molecules begin to move faster and further apart from each other. This is what makes the balloon stretch. There is still the same amount of air inside the balloon and bottle, it has just expanded as it heats up.

Warm air therefore takes up more space than the same amount of cold air, it also weighs less than cold air occupying the same space. You might have seen this principle in action if you've flown in or watched a hot air balloon.

Topic: Air
Make a Ping Pong Ball Float

http://www.sciencekids.co.nz/experiments/pingpongball.html

Can you control a ping pong ball as it floats above a hair dryer? Put your hand-eye coordination skills to the test while learning the important role that forces such as gravity and air pressure play in this simple experiment for kids.

What you'll need:

•At least 1 ping pong ball (2 or 3 would be great)
•A hair dryer

Instructions:

1. Plug in the hair dryer and turn it on.
2. Put it on the highest setting and point it straight up.
3. Place your ping pong ball above the hair dryer and watch what happens.

What's happening?

Your ping pong ball floats gently above the hair dryer without shifting sideways or flying across the other side of the room. The airflow from the hair dryer pushes the ping pong ball upwards until its upward force equals the force of gravity pushing down on it. When it reaches this point it gently bounces around, floating where the upward and downward forces are equal.

The reason the ping pong ball stays nicely inside the column of air produced by the hair dryer without shifting sideways is due to air pressure. The fast moving air from the hair dryer creates a column of lower air pressure, the surrounding higher air pressure forces the ping pong ball to stay inside this column, making it easy to move the hair dryer around without losing control of the ping pong ball.

See if you can float 2 or even 3 ping pong balls as an extra challenge.

Topic: Air
Experience Gravity Free Water (Air Pressure)

http://www.sciencekids.co.nz/experiments/gravityfreewater.html

What goes up must come down right? Well try bending the rules a little with a cup of water that stays inside the glass when held upside down. You'll need the help of some cardboard and a little bit of air pressure.

What you'll need:

•A glass filled right to the top with water
•A piece of cardboard

Instructions:

1. Put the cardboard over the mouth of the glass, making sure that no air bubbles enter the glass as you hold onto the cardboard.
2. Turn the glass upside down (over a sink or outside until you get good).
3. Take away your hand holding the cardboard.

What's happening?

If all goes to plan then the cardboard and water should stay put. Even though the cup of water is upside down the water stays in place, defying gravity! So why is this happening? With no air inside the glass, the air pressure from outside the glass is greater than the pressure of the water inside the glass. The extra air pressure manages to hold the cardboard in place, keeping you dry and your water where it should be, inside the glass.

Topic: Air
Design and Test a Parachute

http://www.sciencekids.co.nz/experiments/freefall.html

Learn about air resistance while making an awesome parachute! Design one that can fall slowly to the ground before putting it to the test, making modifications as you go.

What you'll need:

•A plastic bag or light material
•Scissors
•String
•A small object to act as the weight, a little action figure would be perfect

Instructions:

1. Cut out a large square from your plastic bag or material.
2. Trim the edges so it looks like an octagon (an eight sided shape).
3. Cut a small whole near the edge of each side.
4. Attach 8 pieces of string of the same length to each of the holes.
5. Tie the pieces of string to the object you are using as a weight.
6. Use a chair or find a high spot to drop your parachute and test how well it worked, remember that you want it to drop as slow as possible.

What's happening?

Hopefully your parachute will descend slowly to the ground, giving your weight a comfortable landing. When you release the parachute the weight pulls down on the strings and opens up a large surface area of material that uses air resistance to slow it down. The larger the surface area the more air resistance and the slower the parachute will drop.

Cutting a small hole in the middle of the parachute will allow air to slowly pass through it rather than spilling out over one side, this should help the parachute fall straighter.

Topic: Air
Egg Bubbles

http://www.sciencekids.co.nz/experiments/eggbubbles.html

This fun science experiment for kids focuses on some of the interesting characteristics of eggs. Prove the existence of a small air pocket inside an egg as well as thousands of small holes in the shell called pores, while learning what air does as it is heated.

What you'll need:

•A clear glass or jar
•Hot water (adult supervision is a good idea when using hot water)
•An egg
•A magnifying glass

Instructions:

1. Place the egg carefully into the glass or jar.
2. Carefully pour hot water into the glass or jar until it is nearly full.
3. Leave the glass or jar on a table or flat surface and watch the egg closely for a few minutes (the glass may become hot so be careful).
4. Use your magnifying glass to closely examine what is happening.

What's happening?

After surrounding the egg with hot water you will notice tiny bubbles forming on the egg shell which eventually bubble their way to the surface.

An egg contains a small air pocket at its larger end between the shell and egg white. When the air trapped inside this small pocket begins to heat up it expands and tries to find a way out of the shell, but how does it escape?

They're too small to see under normal conditions but with the help of a magnifying glass you can see that egg shells contain thousands of small holes called pores (human skin has pores too).

The pores allow air to pass through the shell, making it look like the egg is breathing as the air expands and is forced through the shell.

Topic: Air and wind
Wave in a bottle experiment

Explore the wonders of how God's creation works with wave in a bottle. Students will discover how and why water behaves and will be amazed at the power of the God's creation.

Aim: To create a wave in the bottle using coloured water and air.

Apparatus/Materials needed:

- empty plastic bottle and cap
- vegetable oil
- water
- food colouring

Procedure:

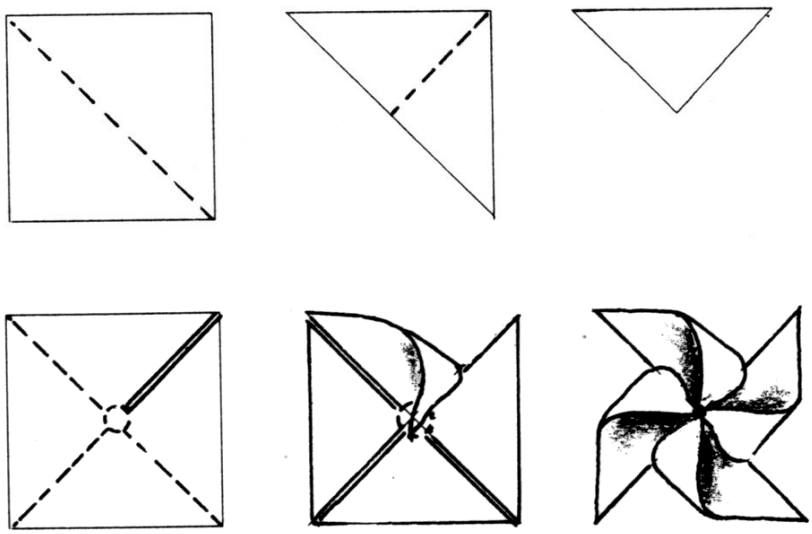
1. Wash a bottle and take off the label by soaking it in hot water.
2. Fill the bottle with 3/4 cup of water.
3. Add a few drops of food colouring.
4. Pour 1 cup of oil into the bottle. Screw the cap on.
5. Roll the bottle on its side and let it settle for a few minutes.
6. The water will sink to the bottom and the oil will rise to the top.
7. Now tip the bottle back and forth and make some waves.
8. The waves will be bigger at one end of the bottle and smaller at the other.

Observation: What do you observe? Why?
Your bottle wave is like an ocean wave.
Water moves up and down and doesn't go forward as the wave goes through the water.
The friction between water and wind makes a wave.
Longer waves travel faster than shorter ones and go further before friction makes them disappear.

Topic: Air
Make a pin wheel

A Pinwheel

- You will need paper; scissors; a drinking straw; a small piece of cork or a soft rubber; a five cent piece; a drawing pin.
- Cut a piece of paper 15cm square. Fold the paper in half to make a triangle. Fold it in half again to make a smaller triangle. Press hard on the fold lines.
- Open the paper so it is flat. Find the point in the middle where the 4 fold lines meet. Put the 5 cent piece on this spot. Trace around it with a pencil.
- Carefully cut along the 4 fold lines just to the circle. (Don't cut all the way through the circle!)
- Take the right corner of each triangle and hold it to the small circle. Put one corner on top of another. When you have 4 corners on top of one another, push the drawing pin through all of them. Now push the pin through the top of the straw, and then through the cork. Watch the pin wheel spin as you blow it or hold it in the wind.

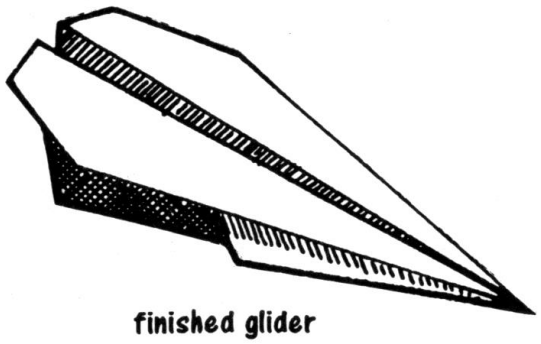


Topic: Air
Make a paper glider and a whirly twirly

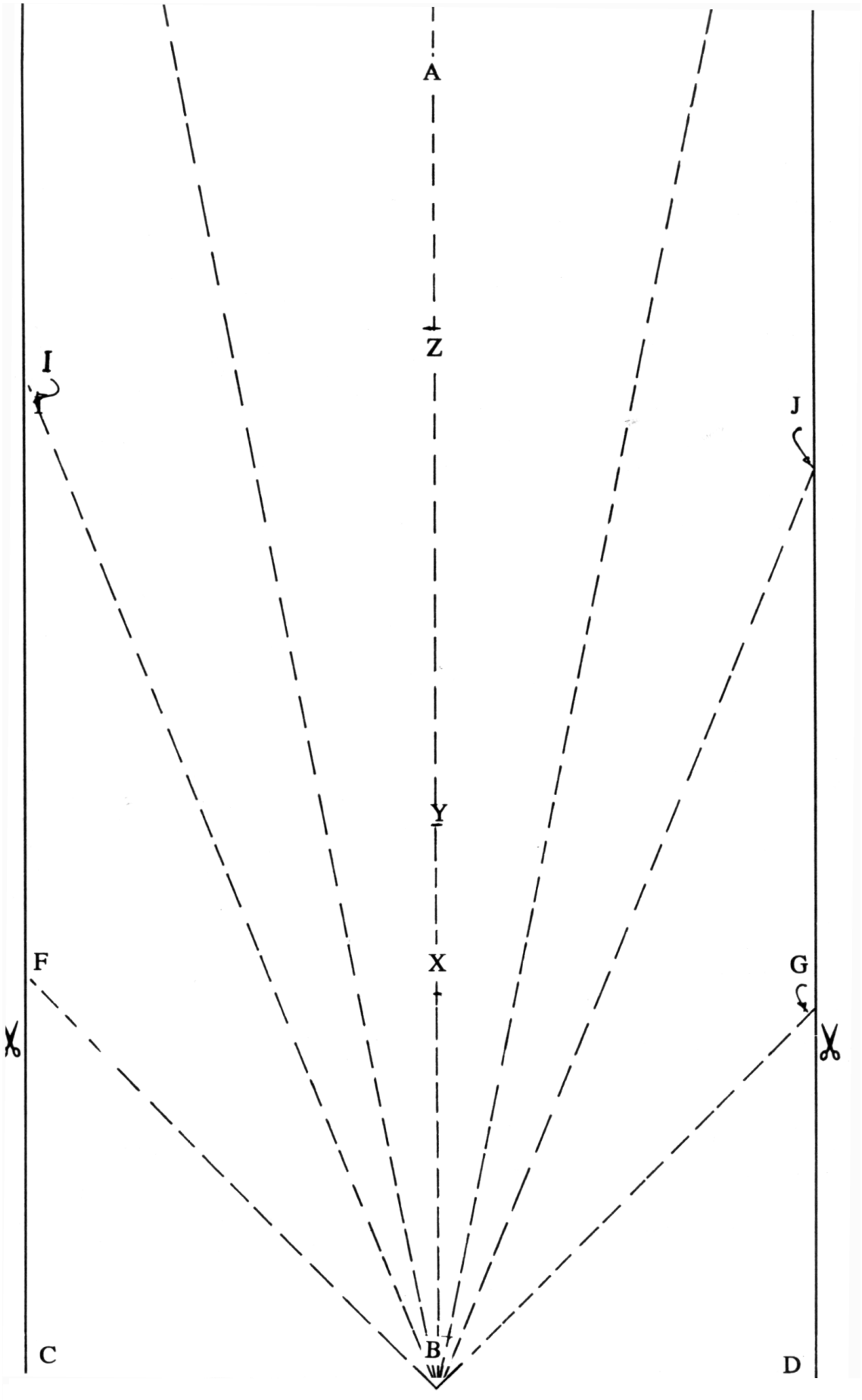
See patterns on the following pages

For the glider:

- You will need paper and scissors.
- Cut out the rectangle as shown.
- Fold along line A-B so you can see the marks.
- Fold point C to meet E along line B-F.
- Fold point D to meet E along line B-D.
- Fold point F to meet H along line B-I.
- Fold point G to meet H along line B-J.
- Fold point I to meet K.
- Fold point J to meet K. (This completes the wings.)
- Hold plane along line A-B at point H. (Do not hold the wings.)
- Uncrease the wings about half way. Turn the plane so that the wings are on top. Throw the plane gently into the air.



finished glider


A
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I
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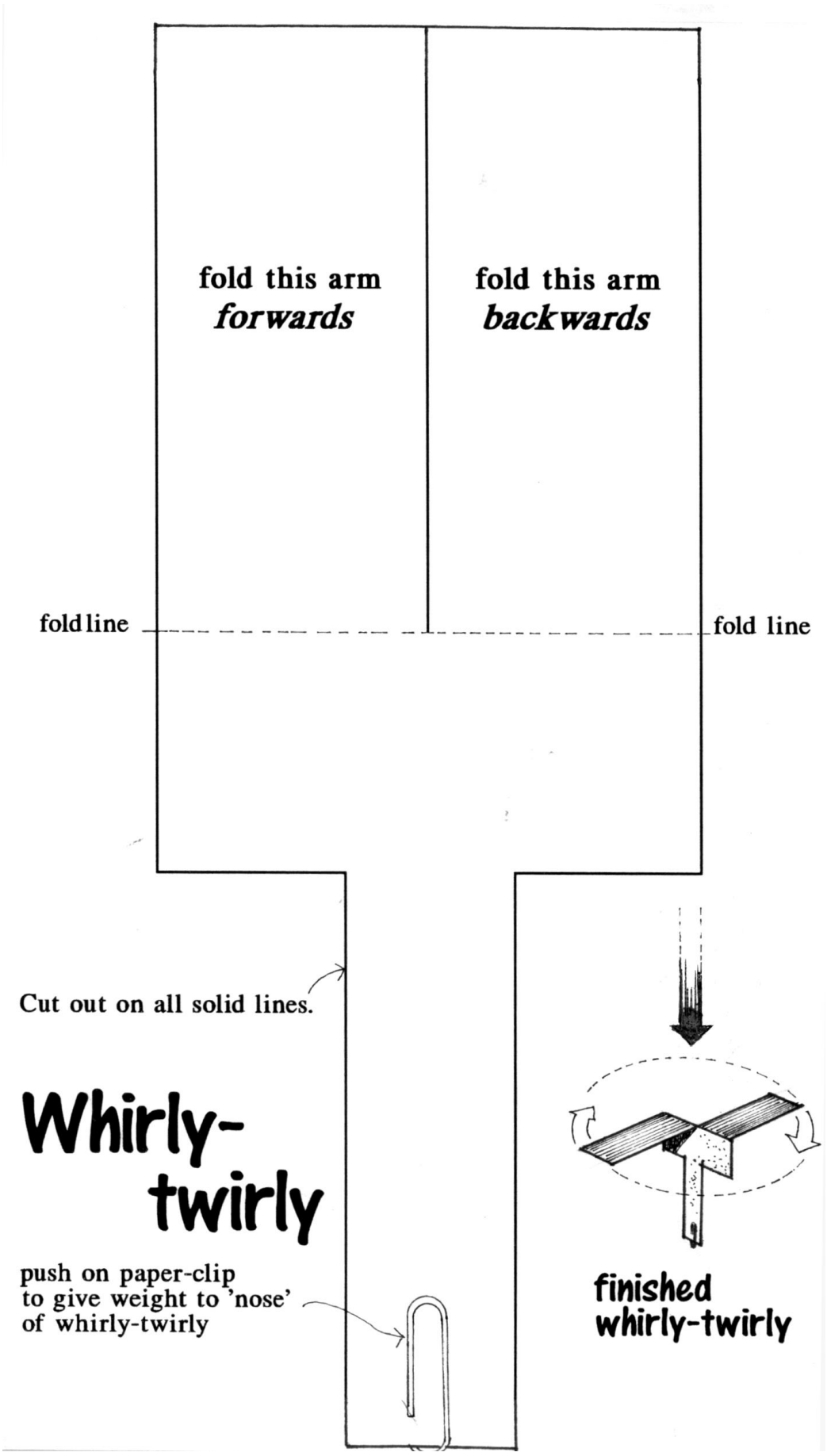
fold this arm
forwards
fold this arm
backwards
fold line
fold line
Cut out on all solid lines.
Whirly-
twirly
push on paper-clip
to give weight to 'nose'
of whirly-twirly
finished
whirly-twirly

Topic: Air and wind
Make a wind sock

Have fun with things that move with air.
Make a wind-sock for your porch or verandah.
Steps:
1. Take a piece of A4 paper (21 x 30 cm).
2. Make a colourful design on your paper and add a message in colourful letters.
3. Reinforce top (longer side) with masking tape as shown.
4. Make paper into a cylinder by gluing together the two shorter sides.
5. Using both glue and staples, attach ribbon to the top for suspending the wind-sock. Attach coloured streamers to the bottom.