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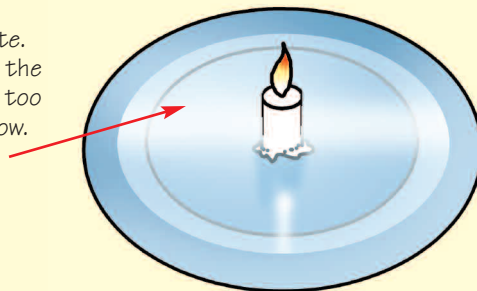
Mysterious Rising Water

LEVEL OF DIFFICULTY
2

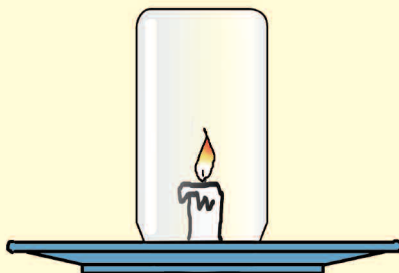
2
RISK
FACTOR

You'll need an old dinner plate, a clean jam jar about 150mm (6") tall, and a candle stub about 50mm (2") tall.

- 1 Stick the candle stub (or a birthday cake candle) in the middle of a round dinner plate. Pour on enough water to cover the base of the plate to about 10mm deep - less if it gets too near the edge - you don't want it to overflow. Light the candle.

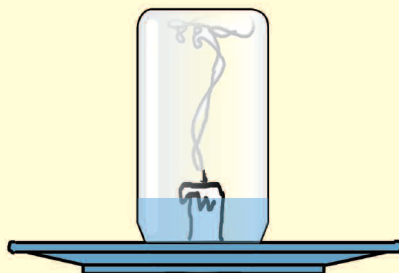


- 2 Place the jam jar upside down over the candle and leave it resting on the plate. Wait....



- 3 The candle goes out. A few moments later water begins to fill up the jam jar seemingly in defiance of gravity and common sense.

You will see bubbles too if you haven't poured enough water on the plate to go up in the jar.



What the Boffin says....

Air is heavy stuff. We don't realise this because we live with it all around us, inside and outside. We only really notice it in situations when there is no air, and then it's easy to see that air is heavy and exerts pressure in all directions on everything in it. A number of experiments in this booklet use the pressure of the atmosphere to drive them. In this one the candle has burned up the oxygen in the air (about one fifth of its volume) so we have lost some air from inside the jar, which the air outside the jar wants to replace. In attempting to do that, it just pushes the water up into the 'gap' left inside. Physicists explain this in terms of the way that gases and liquids always move to cancel out differences in pressure.

You will notice a short pause after the candle goes out before the water rises. This is because the air inside the jar has been heated, and this maintains the pressure for a short while. As soon as the air cools, though, the pressure drops and the water starts to rise inside the jar.

Air Powered Rocket



LEVEL OF DIFFICULTY
3

4
RISK
FACTOR

This is a true rocket although there is no engine on board. Instead it is powered by a pulse of compressed air delivered by stamping hard on a pop bottle. They really do go well.

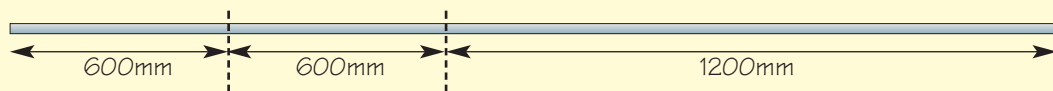
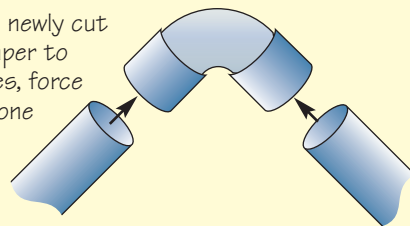
Construction requires care but it's not precision engineering, and safety is an issue during the launch operation so take note of where your spectators are and don't let anyone examine the rocket closely from above whilst a launch is imminent.

- 1** You will need – 2.4m (8ft) of 20mm diameter white plastic overflow pipe; a 90° elbow for the pipe; a roll of duct tape (or other tough and sticky tape); a colour supplement or other shiny paper magazine; a 1.5Ltr (or 2Ltr) plastic pop bottle; a hacksaw (or just a hacksaw blade); and some medium (150grit) sand paper. 600mm of 100mm x 50mm timber; a piece of 5mm plywood about 100mm x 500mm.

First make the launcher.

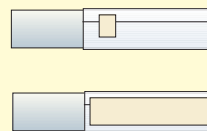
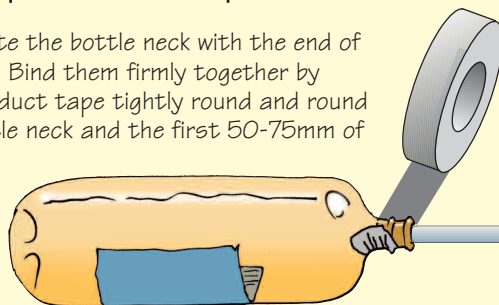
Using the hacksaw cut the pipe into 3 lengths, 2 about 600mm (2ft) long, the other about 1.2m (4ft).

- 2** After cleaning the newly cut ends with sand paper to remove rough edges, force the long pipe and one of the short pipes into the elbow. It should be a tight fit.

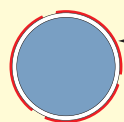


- 3** With help, mate the bottle neck with the end of the long tube. Bind them firmly together by wrapping the duct tape tightly round and round both the bottle neck and the first 50-75mm of the tube.

This is an important joint and must be airtight.

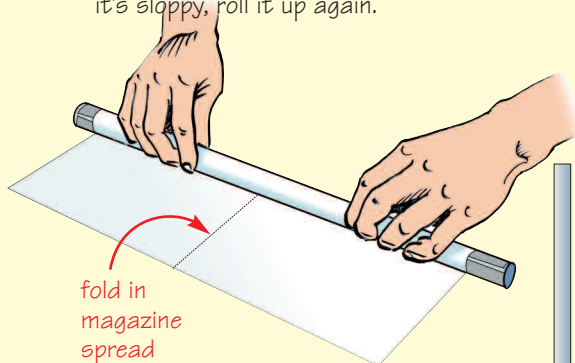


- 4** Stick pieces of duct (or masking) tape longwise on the remaining short pipe to cover the majority of the external surface. Total coverage is not necessary - there just has to be enough tape to make the external diameter a tiny bit larger than the original pipe. This is the forming tube.

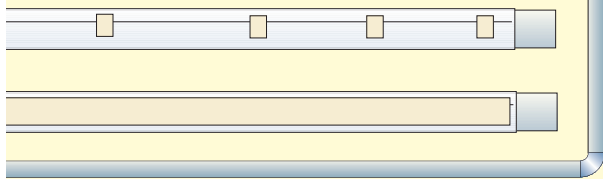


End view of forming tube with tape applied - diameter is slightly increased by the tape (shown in red).

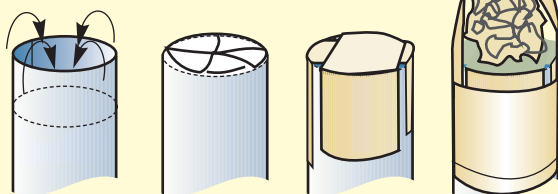
- 5** **Now make the rocket itself.** Pull out the centre spread of the glossy mag, flatten it out and roll it around the forming tube. It should be a good fit - just loose enough to move it up and down the tube. If it's sloppy, roll it up again.



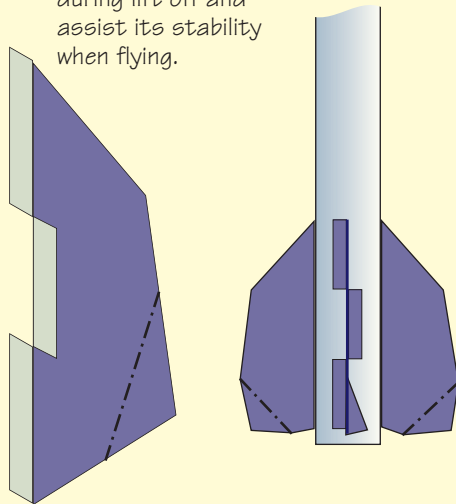
- 6** Tack the loose edge of the rocket with bits of masking tape or sellotape. Then finish with a long strip to bind the entire edge flat.



- 7** **Form the nose:** slide the rocket body 12mm past one end of the forming tube. Push the edges in at 90° to make 4 fold-ins. Tape the ends down with duct tape - you need a good airseal here. Cut off a 300mm length of masking tape and screw it into a loose ball the same diameter as the rocket. Tape this onto the nose as shown.



- 8** **Tailfins.** These can be made to almost any design from simple to ornate, and 2, 3 or 4 makes little difference. The key factor is the twist on the fins which will spin it during lift off and assist its stability when flying.



Cut the fins from a cereal box or similar light card. Leave a tab on the inside edge of the fin that you can snip in two places to form three mounting tabs. Stick these to the rocket body, whilst it is still on the forming tube using quickset glue or masking tape.

Tweak the bottom of the fins in one direction to make sure the rocket spins on ascent.

Other decoration and finishing is entirely optional. Remember though these rockets don't last long so hours spent painting and elaborating might end quickly in tears. That can affect the kids too.

continued on next page...