

HOMEMADE WATER BOMB

ENGINEERING CHALLENGE 19

Designed by Louis,
Design engineer at Dyson

The brief

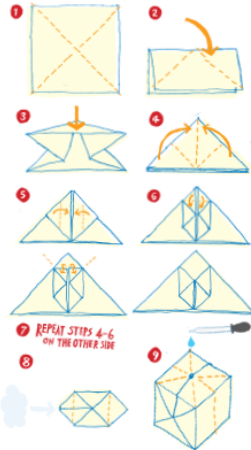
Make your own water bomb out of paper.

The method

1. Take a square piece of paper, fold it in half diagonally to create a crease and unfold. Repeat in the opposite direction so you have an 'x' shape.
2. Flip the paper over and fold in half top to bottom.
3. Flip the paper over again and press down in the middle, while folding in the flaps on the side. You should get a triangle.
4. Take the flaps on the front side and fold them up to the middle.
5. Fold the side corners to the middle line. This should create little pockets.
6. Take the flaps above the pockets and push them in to the pockets.
7. Repeat steps 4 – 6 on the other side.
8. Blow in the little hole in the bottom to inflate.
9. Use the pipette to fill your water bomb.

Materials

Square piece of paper
Water and a pipette



Design icons

Christchurch Cathedral in New Zealand is made from 98 giant cardboard tubes and designed to last for up to 50 years. The tubes are coated with three layers of waterproof polyurethane.

The cathedral was designed by Shigeru Ban, a Japanese architect who has been building with cardboard since 1986. The new cathedral is earthquake-proof, fireproof and won't get soggy in the rain.

How does it work?

Folding paper makes it more rigid.

WATER CLOCK

ENGINEERING CHALLENGE 13

Designed by Sam,
Teacher and Design
and Technology enthusiast
at Malmesbury Primary School

The brief

Create a water clock that times exactly one minute with 200ml of water.

The method

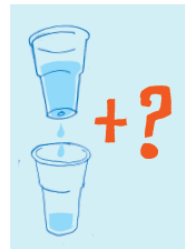
1. A simple water clock could consist of two plastic cups fixed one above the other with a hole in the top cup to allow water to pass from one to the other.
2. Additional cups, string, straws, plasticine, etc. can also be used to create more elaborate examples or to help slow the water if necessary.

Top tip

You will need to use a timer to observe and measure time accurately and make changes depending on your results. The size and position of the holes, the number of cups the water passes through, the angle of straws and flow rates will all affect your design.

Materials

Plastic cups
Straws
Plasticine
String
A timer
Wooden doweling or similar to act as a stand
Scissors (with adult supervision)
Tape
Drawing pins



Design icons

Water clocks are among the most ancient of time pieces, with known examples from Egypt dating to the 16th Century BC. Examples with gears and feedback systems were developed during the Greek and Roman periods.



CARTESIAN DIVER

ENGINEERING CHALLENGE 10

Designed by Daryl,
Design engineer at Dyson

The brief

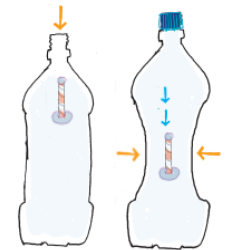
Build a Cartesian diver.

The method

1. Put a small ball of plasticine on the top of the straw to seal it.
2. Roll a sausage of plasticine and wrap it around the bottom of the straw, leaving the bottom open. This is your diver.
3. Now attempt to balance the diver so that it stays upright.
4. Place the diver vertically in the drinking glass. Add or remove weight from the base or top so that when you push it down, it just about bobs back up to the surface (and stays upright).
5. Once you are happy, place the completed diver in the two litre bottle filled to the top with water. Screw on the lid. Squeeze the bottle, and the diver will drop down to the bottom of the bottle. Release it and it floats back to the surface.

Materials

Drinking straw cut to 30mm in length
Plasticine
A two litre bottle
A drinking glass and water



How does it work?

This is all about density. When the diver floats, there is a volume of air trapped inside, when the bottle is squeezed, the air is compressed but the water is not.

The volume of air trapped decreases, and the displaced water reduces. The diver loses buoyancy, and sinks. When the pressure on the bottle is released, the air expands, displaces the water and the diver floats.

Design icons

Submarines are surrounded by ballast tanks, which help control their buoyancy. When filled with water, the tanks increase the density of the submarine and it sinks. When the submarine needs to rise, the water in the ballast tanks is replaced with compressed air.

Here are some activities for you to try. You might need to zoom in! We know that what you have at home will vary, so we've put 3 to choose from. Do the best you can. Plastic bottles work just as well for the water clock for example, but take particular care when trying to make holes in them and get an adult to do it for you if necessary. Don't forget to take pictures and we'll put them on the website.