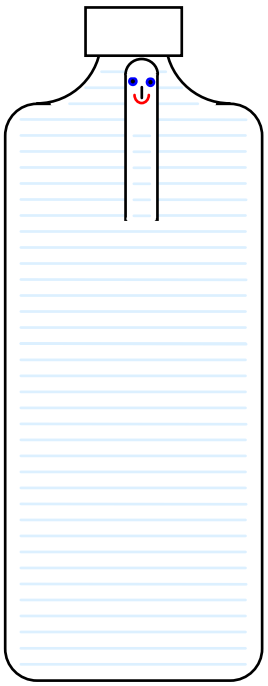
Cartesian Diver



You will need:-

1 x clean and empty 2 litre clear plastic drinks bottle
1 x small test tube
Permanent marker pens
Water.

Method

1). Fill the 2 litre plastic bottle to the very top with water.
2). Draw a face on the small test tube using the permanent marker pens.
3). Half fill the small test tube with water and insert it, open end down, into the open top of the plastic bottle.
The test tube should just float at the top.
If it starts to sink, empty some of the water out of the test tube and try again until it does float.
If it floats too high at the top of the bottle, add some more water to the test tube.
4). Screw the top onto the plastic bottle tightly. The test tube should float at the top of the bottle as in the diagram.
5). Squeeze the plastic bottle, and the test tube should start to sink to the bottom.
When the bottle is released, the test tube should float back up to the top.

Faults.

1). If you are not able to make the test tube sink when the bottle is squeezed, the amount of water in the test tube needs to be increased slightly.
2). If the test tube sinks and then does not float back to the top when the bottle is released then there is too much water in the test tube and it will need to be reduced.

Why it works.

The air trapped in the test tube reduces the average density of the test tube to less than that of the water in the bottle and so it floats.
When the bottle is squeezed, more water is forced into the test tube, so increasing the average density of the test tube and so it sinks.
When the bottle is released, the air in the test tube, which had been compressed, is now able to expand again and force water out of the test tube. This reduces the average density of the test tube again and so it floats once more.