CARTESIAN DIVER

Equipment

- 2L empty pop bottle
- Bendy Straw
- Blu Tack

Method

1. Fill the pop bottle until it is almost full with water
2. Cut the straw to about 1 inch under the bendy bit and about ½ inch above the bendy bit
3. Wrap some plasticine around the straw – covering the hole at one end of the straw and leaving the other end open
4. Your straw should look a bit like a walking stick
5. Drop your 'diver' into the pop bottle and watch what happens
6. If it drops to the bottom, you have added too much blue tack and your 'diver' is too heavy so try again, this time using less blue tack!
7. If your diver floats at the top, squeeze the bottle in the middle and watch what happens
8. If your diver stays at the top, try and hook it out and add more blue tack
9. Now squeeze the bottle again and watch what happens
10. Your diver should float in the middle of the bottle when you squeeze the sides and float to the top when you release

The Science

This straw diver contains an air bubble sealed inside. Without squeezing the bottle the overall density of the diver is slightly lower than that of the water, so it floats. When you squeeze the sides of the bottle you increase the pressure on the air bubble, compressing it into a smaller space.

This decrease in volume of the bubble causes an increase in the overall density of the straw diver. When it becomes greater than that of the surrounding water it sinks. Releasing the pressure (by releasing the bottle from your grip) allows the air bubble to expand back to its normal size, and the straw diver floats again.

Human divers use weights to increase their density when diving, but submarines have tanks of compressed air on board to help control their buoyancy. Surrounding the submarine are a number of ballast tanks which, when filled with water, increase the overall density of the submarine and it dives. But when the submarine needs to rise to the surface, the water in these large ballast tanks is replaced with air from the compressed air tanks

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