

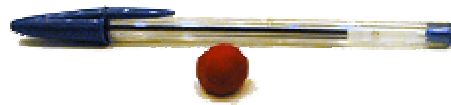
Cartesian Diver

Scuba divers have to control their depth in the water. Since the human body is less dense than water, people float. A diver wears a belt with heavy metal weights so as to sink, and a buoyancy compensator, which may be inflated with air to increase buoyancy or deflated to reduce buoyancy.

Here's an experiment to help you see how this works.

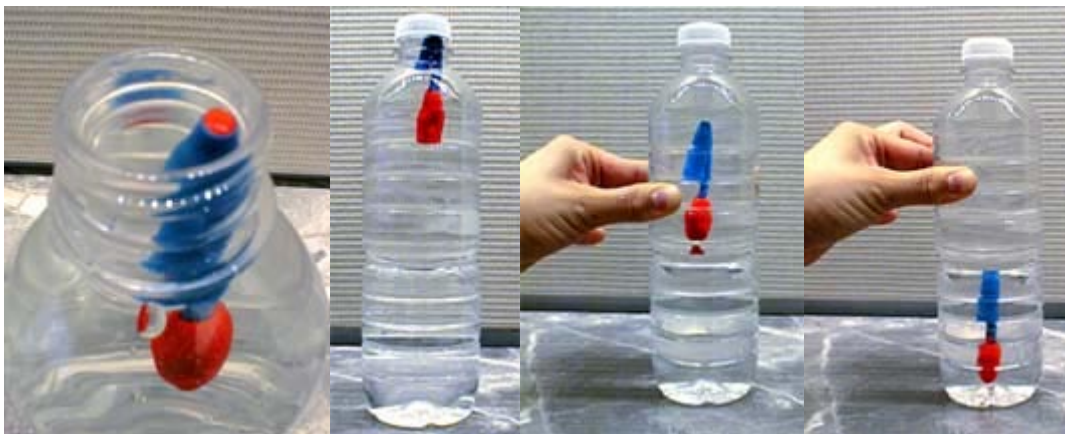
Tools & Materials

- A plastic fizzy-drink bottle
- A pen lid with no holes in the top
- Waterproof modeling clay (Plasticine)
- Water
- A bowl or bucket



The Experiment

1. Half fill the bowl with water.
2. Roll some clay into a ball the size of a marble.
3. Stick the clay to the pointed end of the pen lid.
4. Gently lower the 'diver' into the bowl of water so that the lid remains full of air.
5. If the diver sinks, remove some clay. If it floats, add some more clay. Adjust the amount of clay until the top of the pen lid only just sticks out of the water. The experiment will not work unless the amount of clay is just right.
6. Fill the plastic bottle to the brim.



7. Gently lower the diver into the bottle.
8. Screw on the lid.
9. Check that the only air inside the bottle is in the diver.

If you squeeze the sides of the bottle, the diver should sink. If you stop squeezing, the diver should float back to the top of the bottle. If the diver does not sink when you squeeze really hard, you need to add more clay.

If you are careful, you may be able to make the diver sink to the middle of the bottle, then just hover in the water.



Try these ideas

- What happens if you add salt to the water?
- What happens if you use a bottle with an oval cross-section and squeeze across the widest part of the bottle?
- Instead of using a pen lid and clay, use a medicine dropper. Fill it with enough water so it just float

