

Safety:

- Instruments:**
- modeling clay
 - a glass bowl

- Chemicals:**
- marbles
 - tap water

- Experiment:**
- Fill the glass bowl with water. Carefully drop a marble into the bowl from a few centimeters above the surface. What happens?
 - Form the modeling clay into a marble-sized ball and drop it into the bowl of water. What happens?
 - Remove the marble and modeling clay from the water. Form the clay into the curving shape of a bowl. Place this carefully on the water's surface. Do you observe anything different? Load the marble onto the clay float. What happens now?

Advice for the teacher:

Marbles and modeling clay sink when thrown into water. Both of these spheres are denser than an equal volume of water, which they displace as they sink. The clay floats, however, if you form it into a bowl-like shape. It now takes up more space than the clay ball. The hollow air volume inside the float displaces a much larger amount of water than the solid ball did. The air inside the float effectively doubles or triples the amount of water mass which has to be displaced for the float to sink. This keeps the clay bowl afloat. Loading the marble into the bowl makes it sink slightly, but even with additional water mass displaced, the bowl still floats.

The pupils should learn that sinking or swimming has nothing to do with weight, but rather from the overall amount of displaced water which is pushed away.

Tip:

As extra homework, ask the pupils to do the following, so that they can experience the forces involved first-hand:

- 1) In a bathtub/swimming pool, push straight down on various sizes of toy boats until they sink. Any noticeable difference as the air volume inside the objects increases? What happens when water spills over the railing and begins to fill the boat? Is it easier or harder to hold the boat down? Why?
- 2) Try the same experiment using sealed, air-filled containers of various sizes. Try to force them to the bottom. What happens when you let go? Is there a container that you can't force under? How might this be useful?
- 3) Is it easier to sink with empty lungs or lungs full of air? Why?