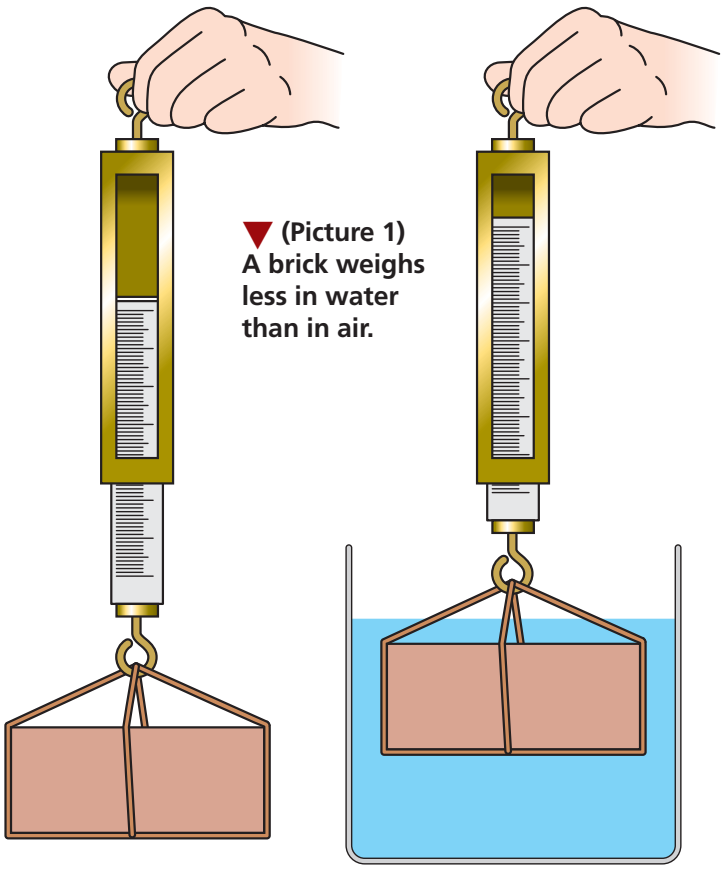
7 Floating

If something FLOATS, it means that the force pressing down is balanced by the force pressing up.

If you tie a brick to a forcemeter and then lower the brick into water, something extraordinary happens – the brick weighs less (Picture 1)!

You can try this with any object and you will get the same result; the object weighs less when placed in water. We say things are 'buoyed up' by the water.



▼ **(Picture 1) A brick weighs less in water than in air.**

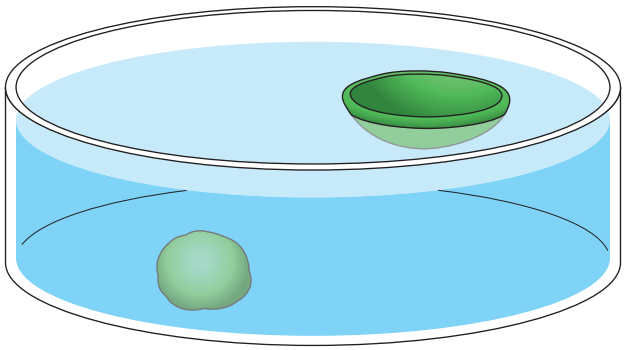
Floating

Things weigh less in water than in air because water is 'thicker' (**DENSER**) than air.

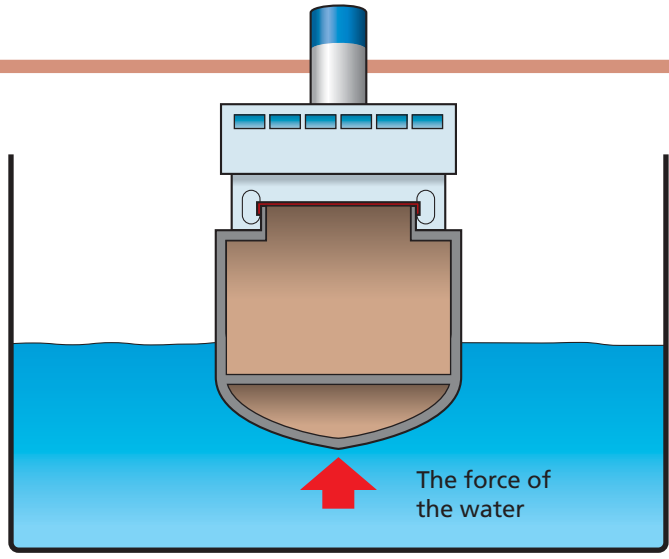
For example, when you put a brick in water it pushes some of the water away. However, the water presses back against the space it was pushed out of. This is called **BUOYANCY**.

Because the brick presses down more than the water pushes back, the brick sinks. But in many other cases, objects do not push down as hard and so they do not sink. Instead, they float.

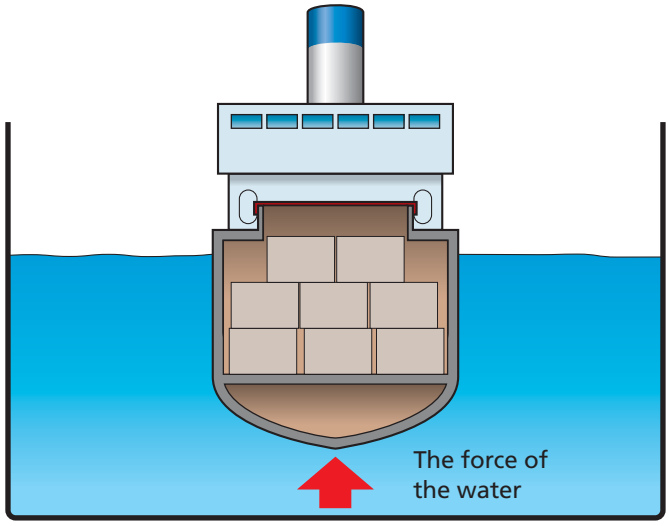
As a general rule, the more dense something is, the more likely it is to sink. A piece of Plasticine made into a ball, for example, will sink through water. But even dense materials can be made to float. If the Plasticine ball is squashed into a sheet and then shaped into a boat, it will float (Picture 2). This is because the boat is now a combination of very light air and dense Plasticine. The Plasticine boat is,



▶ **(Picture 2) Plasticine is denser than water. Made into a ball it sinks. But made into a boat it floats, because the inside now contains air, which is less dense than Plasticine. The downward force of the air, plus the force of the Plasticine, can now be balanced by the upward force of the water.**



◀ **(Picture 3) A ship floats high or low depending on what it contains. If it contains mainly air it will float high in the water. If it is carrying cargo (which is heavier than air) it will float lower.**

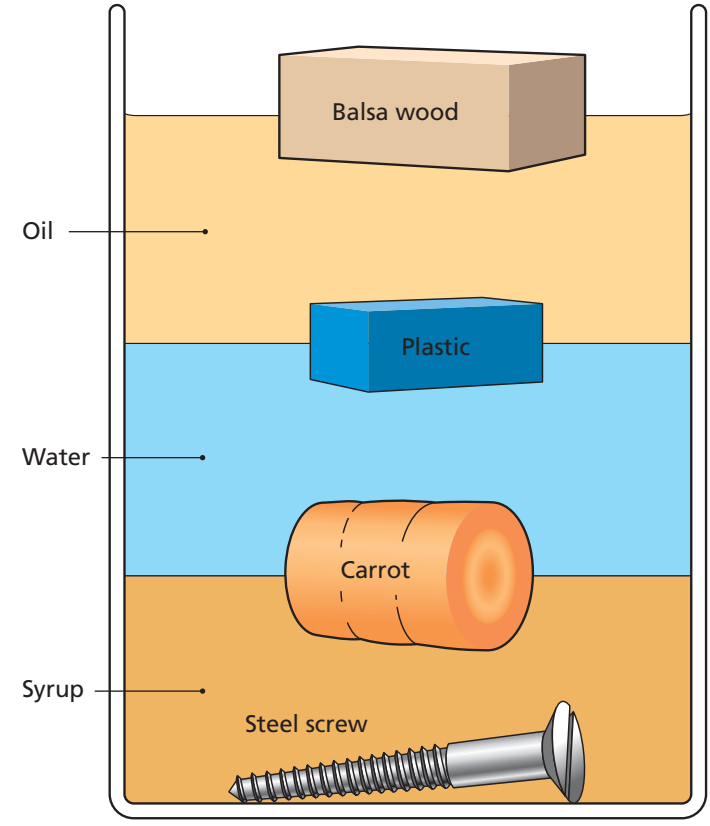


overall, less dense than water. In a similar way, a real ship made of steel is, overall, still able to float (Picture 3).

Floating and density

Thick (dense) liquids push back more than thin ones. As a result, heavy things will float in a dense liquid, but sink in a less dense liquid (Picture 4). For example, the Dead Sea contains a huge amount of salt. As a result, it is much denser than ordinary water. This is why no-one can sink in it – even if they can't swim.

▼ **(Picture 4) Whether something floats or sinks depends on how dense it is. Water will float on syrup because it is less dense than syrup. Oil will float on water because it is less dense than water. A carrot will sink in oil and water because it is more dense than both. But a carrot will float on syrup because it is less dense than syrup. Balsa wood, or a cork, will float on oil because they are less dense than syrup, water and oil. A steel screw is more dense than the liquids and so it will sink through all of them.**



Summary

- **Water and other liquids support solids.**
- **If a solid is light enough it will float.**
- **Some heavy materials are made light enough to float by making them hollow.**

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