

# Oil and Water



**What's heavier, a tonne of bricks or a tonne of feathers?**

*How about neither, they both weigh a tonne!*

So what's the difference?

**Density.** Density is how 'packed together' an object is. Gold is considered heavy because it's naturally very well packed together, but you can make it 'light as a feather' if you spread that gold out over a very large area.

Density is measured by an objects weight divided by an objects size:

$$\rho = \frac{m}{V},$$

or density = mass (or weight) ÷ volume (or size)

Density is the reason things float – not whether they are heavy or light! An object that is more dense than water will sink. An object that is less dense than water will float. What else floats?

Fresh water will float on salt water, and hot water will float on cold water.

## Let's explore density:

1. Fill a small plastic bottle half way up with water.
2. Next, fill it with vegetable oil.
3. What do you notice? (The oil floats on the water because it is less dense. Even if you poured the exact same *size* of water and oil, the oil will weigh *less*. That's one thing it means to be less dense.)
4. Now drop a plastic bead in the bottle. What happens? Why? (the bead will float on the water, but sink in the oil, because it has a density right between oil and water. What else will do this trick? Will ice?)
5. Just for fun, place a single drop of food colouring in the bottle. What happens? Why? (The drip floats down through the oil, sits there in an oil bubble for a bit, and then bursts out to colour the water. This is because the food colour is designed to react to water, not oil.)  
Now **screw the lid on tightly** and hold it up to the light, can you mix colours?
6. (When you're ready to mess things right up, try dropping a fizzy tablet such as Alka seltzer in – what happens?)

So much fun with oil and water!

