

# Forces

# 4. Pressure

## CONCEPT 3

## LESSON GUIDE

### FLOATING AND SINKING

#### PRECISE LEARNING POINTS

##### KNOW

I know that what buoyancy and upthrust is.

##### APPLY

I can apply my knowledge of buoyancy and upthrust to explain water displacement.

##### EXTEND

I can extend my knowledge to predict whether an object will float or sink in water.

#### NOTES

The density of an object allows you to decide if it will sink or float when it is put into water. The density of an object is a measure of its mass per unit of volume. Water has a density of approximately **1000 kg/m<sup>3</sup>**. If an object has a density higher than this it will sink. If an object has a density lower than water, it will float.

When something is in water, there are **two forces** acting on it. Its **weight** pushing downwards and the force of the water pushing up, **the upthrust**. Water is therefore providing the buoyancy force.

If an object is floating, the downwards force of weight must be the same as the upwards force of upthrust. If an object sinks, the downwards force of weight must be more than the upwards force of upthrust.

In order to measure upthrust we must look at **water displacement**. When a solid object is lowered into a container of water, it will displace the water from the container equivalent to the volume of the object. The weight of the displaced water is the same as the size of the upthrust force.

**Neutral buoyancy** occurs when an object appears to 'float' beneath the surface of the water. The object is neither sinking nor floating on the surface. When this occurs, both forces of weight and upthrust must be equal when the object is fully under the surface of the water – nothing is sticking out above the water level!