

Name: _____ Block: _____

Buoyancy

1. A block is 0.12 m wide, 0.07 m long and 0.09 m tall and has a mass of 0.50 kg. The block is floating in water at a temperature of 25°C. (You can look up the density of water at 25°C in your Physics Reference Tables.)
- (a) If the block weighs 0.50 kg, what volume of the block will be below the surface of the water?

$$5.02 \times 10^{-4} \text{ m}^3$$

- (b) If the entire block were pushed under water, how much water would it displace?

$$7.56 \times 10^{-4} \text{ m}^3$$

- (c) How much additional mass could be piled on top of the block before it sinks?

$$0.254 \text{ kg}$$

2. The SS United Victory was a cargo ship launched in 1944. The ship had a mass of 4400 tonnes empty, and a mass of 15 200 tonnes fully loaded. (1 tonne = 1 000 kg). The density of sea water is $1\,025 \frac{\text{kg}}{\text{m}^3}$. What volume of sea water did the SS United Victory displace when fully loaded?

$$14\,829 \text{ m}^3$$

3. An empty box is 0.11 m per side. It will slowly be filled with sand that has a density of $3\,500 \frac{\text{kg}}{\text{m}^3}$. What volume of sand will cause the box to sink in water at 40°C ? (You may neglect the weight of the box.)

$$3.77 \times 10^{-4} \text{ m}^3$$