

# Tutorial - Buoyancy, Floatation and Stability

1. A crane is used to lower weights into the sea (density =  $1025 \text{ kg/m}^3$ ) for an underwater construction project. Determine the tension in the rope of the crane due to a rectangular  $0.4 \text{ m} \times 0.4 \text{ m} \times 3 \text{ m}$  concrete block (density =  $2300 \text{ kg/m}^3$ ) when it is (a) suspended in the air and (b) completely immersed in water.
  2. A  $200 \text{ kg}$  granite rock ( $\rho = 2700 \text{ kg/m}^3$ ) is dropped into a lake. A man dives in and tries to lift the rock. Determine how much force the man needs to apply to lift it from the bottom of the lake. Do you think he can do it?
  3. The volume and the average density of an irregularly shaped body are to be determined by using a spring scale. The body weighs  $7200 \text{ N}$  in air and  $4790 \text{ N}$  in water. Determine the volume and the density of the body. State your assumptions.
  4. Find the volume of the water displaced and position of centre of buoyancy for a wooden block of width  $2.5 \text{ m}$  and of depth  $1.5 \text{ m}$ , when it floats horizontally in water. The density of wooden block is  $650 \text{ kg/m}^3$  and its length  $6.0 \text{ m}$ .