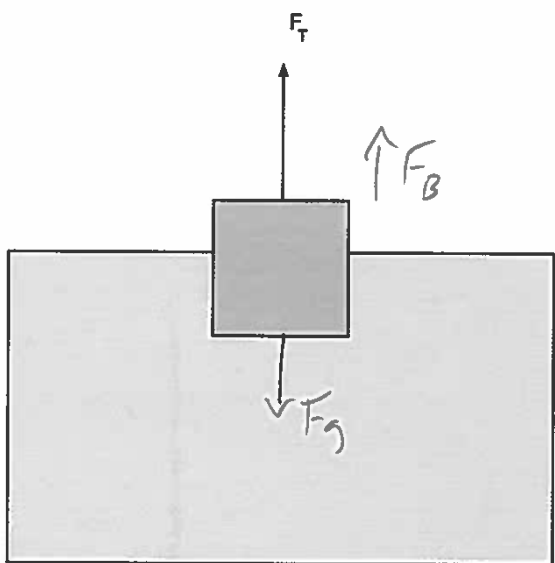


Physics 10154 - Quiz 11A

A cube of Aluminum (density = 2720 kg/m³) is 62.0% immersed in a container of liquid water. If the cube has sides of length 7.20 cm,

- What is the tension in the string?
- If the string is cut, the cube will sink to the bottom of the container. Once the cube is completely immersed and sinking toward the bottom of the container, what will its acceleration be?



$$V_{\text{cube}} = (0.072)^3$$

$$= 0.0003732 \text{ m}^3$$

$$V_{\text{water}} = 0.62 V_{\text{cube}}$$

$$= 0.0002314$$

$$\Sigma F_y = F_T + F_B - F_g = 0$$

$$F_B = \rho_w V_w g$$

$$= (1000)(0.0002314)(9.8)$$

$$= 2.268 \text{ N}$$

$$F_g = \rho_c V_c g$$

$$= (2720)(0.0003732)(9.8) = 9.95 \text{ N}$$

$$F_T = F_g - F_B = \boxed{7.68 \text{ N}}$$

b) $F_B = (1000) V_{\text{cube}} (9.8) = 3.658 \text{ N}$ $V_w = V_{\text{cube}}$ if immersed

$$\Sigma F = F_B - F_g = ma$$

$$m = \rho_c V_c = 1.015 \text{ kg}$$

$$3.658 - 9.95 = 1.015 a$$

$$a = -6.20 \text{ m/s}^2$$

$$\text{or } \boxed{6.20 \text{ m/s}^2 \text{ down}}$$