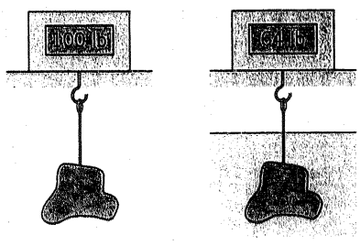
2.87

2.87 As shown in Fig. P2.87, an irregularly shaped object weighs 100 lb in air and 64 lb when fully submerged in water. Determine the volume and specific gravity of the object.



■ FIGURE P2.87

$\mathcal{W}(air) = \gamma \forall$ where $\gamma \sim$ sp. wt. of object and $\forall \sim$ volume of object

$\mathcal{W}(water) = \mathcal{W}(air) - F_B$ where $F_B \sim$ buoyant force and $F_B = \gamma_{H_2O} \forall$

Since $\mathcal{W}(air) = 100\ lb$ and $\mathcal{W}(water) = 64\ lb$

$$64\ lb = 100\ lb - \left(62.4 \frac{lb}{ft^3}\right) \forall$$

so that

$$\forall = \underline{\underline{0.577\ ft^3}}$$

and

$$\gamma = \frac{\mathcal{W}(air)}{\forall} = \frac{100\ lb}{0.577\ ft^3} = 173 \frac{lb}{ft^3}$$

Thus,

$$SG = \frac{\gamma}{\gamma_{H_2O}} = \frac{173 \frac{lb}{ft^3}}{62.4 \frac{lb}{ft^3}} = \underline{\underline{2.77}}$$