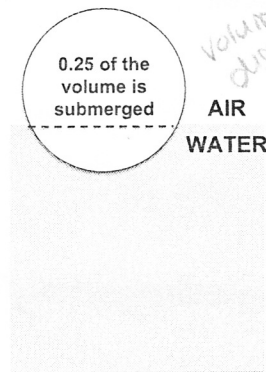


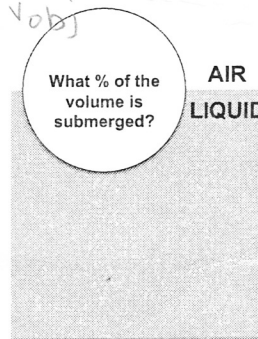
Problem 1

A solid sphere floats with 25% of its volume submerged in water. (a) Draw a free-body diagram of the sphere. (b) Find the density of the sphere. The density of water is 1000 kg/m^3 . (c) The sphere is then placed in a bath full of a liquid with density 835 kg/m^3 . What percentage of the volume of the sphere is submerged in the liquid?

$$F_b = \rho V g$$



Volume displaced $V_{obj} = V_{\text{underwater}}$



$$\rho = \frac{m}{V}$$

b)

Volume submerged = 25%

$$\rho_s = 1000 \text{ kg/m}^3$$

$$\rho_w = 1000 \text{ kg/m}^3$$

$$V = 25\% \text{ of } 1000 \text{ kg} \\ = 250 \text{ L}$$

$$\rho_s V_{obj} = \rho_s V_s$$

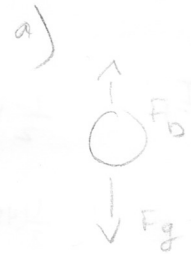
$$V_{obj} = (0.25 V_s)$$

$$\rho_s (0.25) = \rho_s V_s$$

$$1000(0.25) = \rho_s$$

$$250 \text{ kg/m}^3 = \rho_s$$

$$\rho = \frac{m}{V}$$



$$c) \rho_l = 835 \text{ kg/m}^3$$

$$\rho_s = 250 \text{ kg/m}^3$$

$$= 250 \text{ kg (930)}$$

$$\rho_l V_{obj} = \rho_s V_s$$

$$(835 \text{ kg/m}^3)(V_{obj}) = (250)(V_s)$$

$$\frac{V_{obj}}{V_s} = \frac{250}{835}$$

$$0.30 = V_{obj}/V_s$$

30% submerged

PHYS 1008
Multiple choice #3
All sections

Last name (please print): _____

First name: _____

Student #: _____

- 1.5
1. ($\frac{1}{2}$ point) An electron is moving against the direction of a constant magnetic field. Which of the following statement is *true*?
- ☒ A. The magnetic force acting on the electron is zero.
- B. The magnetic force acting on the electron is maximum.
- C. The magnetic force acting on the electron is negative.
- ✓
2. ($\frac{1}{2}$ point) A charged particle is moving at a known velocity. It enters a magnetic field which is *perpendicular to the velocity*. The particle will move in a circle whose radius depends directly on what?
- ☒ A. The particle's mass.
- B. The direction of the magnetic field.
- C. The direction of the velocity.
- ✓
3. ($\frac{1}{2}$ point) How much energy is stored in a capacitor in an AC circuit at the instant the current reaches zero?
- A. There is no energy stored in the capacitor.
- ☒ B. The energy stored is at its maximum value.
- C. The energy stored is at half its maximum value because the voltage lags the current.
- ✓
4. ($\frac{1}{2}$ point) Which of the following statements regarding AC circuits is *false*?
- A. The root-mean-square (RMS) value of the voltage is less than the peak voltage.
- ☒ B. The reactance of a capacitor in an AC circuit depends on the frequency.
- X
- ☒ C. The power dissipated in a resistor in an AC circuit is zero.