

$$\text{ave.} = 7.7$$

$$\sigma = 2.6$$

Name Answer Key

Lab: early late (please circle one)

Quiz #8: Fluids

I forgot to give picture
so I didn't grade this
problem

Problem 1 (2 points)

Three blocks labeled A, B, and C are floating in water as shown in the drawing. Blocks A and B have the same mass and volume. Block C has the same volume, but is submerged to a greater depth than the other two blocks. Which of the following statements concerning this situation is false?

D

- a) The density of block A is less than that of block C.
- b) The volume of water displaced by block C is greater than that displaced by block B.
- c) The buoyant force acting on block C is greater than that acting on block B.
- d) The volume of water displaced by block A is greater than that displaced by block B.
- e) Two of the above.

Problem 2 (4 points)

An object weighs 50.0 N when weighed in air and 37.5 N when completely submerged in water. What is the density of the object?

$$\left. \begin{array}{l} W_{\text{air}} = 50.0 \text{ N} \\ W_{\text{water}} = 37.5 \text{ N} \end{array} \right\} F_B = 50.0 \text{ N} - 37.5 \text{ N} = \underline{12.5 \text{ N}} \quad m = \frac{W_{\text{air}}}{g} = \underline{5.10 \text{ Kg}}$$

$$F_B = \rho_{\text{fluid}} V_{\text{submerged}} g = \rho_{\text{fluid}} V_{\text{obj}} g \quad (V_{\text{sub}} = V_{\text{obj}} \text{ since completely submerged})$$

$$V_{\text{obj}} = \frac{F_B}{\rho_{\text{fluid}} g} = \frac{12.5 \text{ N}}{(1000 \text{ Kg/m}^3)(9.80 \text{ m/s}^2)} = \underline{1.28 \times 10^{-3} \text{ m}^3}$$

$$\rho = \frac{m}{V} = \frac{5.10 \text{ Kg}}{1.28 \times 10^{-3} \text{ m}^3} = \underline{4.00 \times 10^3 \frac{\text{Kg}}{\text{m}^3}}$$

Problem 3 (4 points)

A car drives off a country bridge and ends up at the bottom of a lake. The car door is rectangular with dimensions 0.80 m by 1.20 m and is at an (average) depth of 4.50 m. How much force does the water exert on the car door?

$$p = p_0 + \rho g d \quad p_0 = p_{\text{atm}} = 1.013 \times 10^5 \text{ Pa}$$

$$p = (1.013 \times 10^5 \text{ Pa}) + (1000 \text{ Kg/m}^3)(9.80 \text{ m/s}^2)(4.50 \text{ m}) = \underline{1.45 \times 10^5 \text{ Pa}}$$

$$F = p A = (1.45 \times 10^5 \text{ Pa})(0.80 \text{ m} \times 1.20 \text{ m})$$

$$\underline{F = 1.40 \times 10^5 \text{ N}}$$