

Aviation Physical Science, AVS 2101 Makeup Class / Buoyancy

Name: _____

Last Four Digits of Student Number: _____

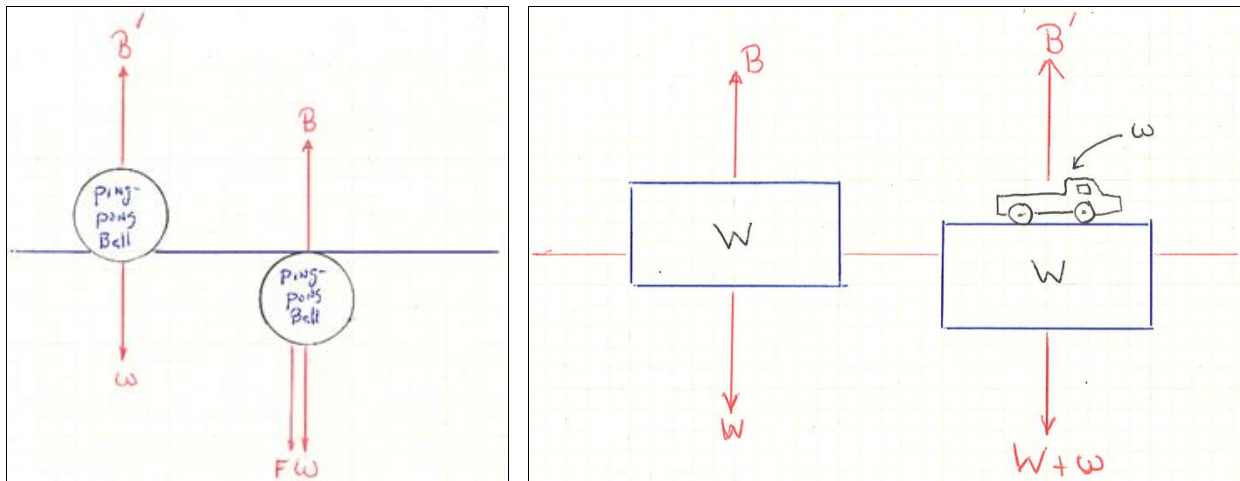
Show all work necessary to support your answers

Problem 1. Mass, density, and Volume. A rectangular bar of metal is supposed to be pure gold. The gold bar has dimensions 5.0 mm X 15.0 mm X 30.0 mm and has mass 0.0158 kg. The density of gold is $\rho_{\text{gold}} = 19.3 \times 10^3 \text{ kg/m}^3$.

- What is the volume of the bar (in m^3)?
- What is the density of the bar (in kg/m^3)?
- Is the bar solid gold?

Problem 2. Equation of Hydrostatic Equilibrium. At what depth in the ocean is the pressure 3.0 times atmospheric pressure ($p_{\text{atm}} = 1.01 \times 10^5 \text{ Pa}$, $\rho_{\text{saltwater}} = 1.03 \times 10^3 \text{ kg/m}^3$)? (Assume that salt water is incompressible.)

Problem 3. Buoyancy and Archimedes Principle. A table-tennis ball has a diameter of 3.80 cm and an average density of 0.0840 g/cm^3 . What force is required to hold it completely under water (picture below left)?



Problem 4. Buoyancy and Archimedes Principle. A small ferryboat is 4.00 m wide and 6.00 m long. When a loaded truck pulls onto it, the boat sinks an additional 4.00 cm into the river. What is the weight of the truck (picture above right)?