Chapter 31 Fluid Mechanics (Examples) (S14)

Example 1: What is the density of the earth?

Example 2: A piece of paper (8 1/2" by 11") is lying on a horizontal surface. What is the magnitude of the force caused by air pressure acting on the top of the paper?

Example 3: How much pressure acts on the bottom of a 3000 m deep ocean?

Example 4: To what maximum height can a column of alcohol (0.806 gm/cc) be raised at sea level on earth by a vacuum pump?

Example 5: A vertical pipe is filled with two fluids which do not mix. The upper fluid is 30 m deep and has a density of 3700 kg/m^3. The lower fluid is 50 m deep and has a density of 8500 kg/m^3. What is the pressure at the bottom of the pipe?

Example 6: A u-tube is partially filled with water and then kerosene (0.82 gm/cc) is poured on top of the water in one side of the u-tube until the difference in height between the level of water in the two sides is 20 cm. How thick is the layer of kerosene?

Example 7: What is the buoyant force acting on an object when it is completely submerged in water? The object has a mass of 1.2 kg and a volume of 0.3 m^3.

Example 8: A 30 kg child sits on a raft which just barely keeps her out of the water. The Styrofoam raft is 0.4 x 0.4 x 0.2 m. What is the density of the Styrofoam?

Example 9: A 3/4 inch diameter hose can fill a 10 gallon (1 gallon = 231 in^3) can in 80 seconds. What is the speed of the water after a 1/4 inch nozzle has been screwed onto the hose?

Example 10: A water tank has a hole in its side. The hole is 10 m below the surface of the water and 20 liters of water leak out every minute. What is the diameter of the hole?

Example 11: An airplane wing is just able to lift a 5000 kg plane. If the speed of the air over the top of the wing is 100 m/s and under the bottom of the wing it is 60 m/s, what is the area of the wing?

Example 12: A pump is used to empty a flooded basement. The pump intake is located 4 m below the outflow. The intake diameter is 20 cm and output diameter is 10 cm. What is the intake pressure in atmospheres if 1 cubic meter of water is being pumped out each minute?