



Name: _____

Due Date _____

Assignment 1.03: Hydrostatic Pressure

1. A laptop computer has an area of 0.02 m^2 and a mass of 1.25 kg .
 - (a) What is the weight of the laptop?

 - (b) What is the pressure the laptop exerts on the desk?

2. You push your friend's arm with a force of 20 newtons . What is the pressure when -
 - (a) the force is applied using your hand ($A=0.02 \text{ m}^2$)?

 - (b) the force is applied using a needle with a radius of 0.5 mm ?

3. A tank of water is cylindrical, with a radius of 2 meters , and it is filled to a depth of 4.5 meters .
 - (a) What is the gauge pressure at the bottom of the tank?

 - (b) What is the absolute pressure at the bottom of the tank?

4. The titanic lies under the north Atlantic ocean under approximately 3800 meters of ocean water.
 - (a) What is the (absolute) pressure at this depth?

 - (b) A submarine has a window with an area of 2 m^2 . What amount of force should this window be able to withstand in order to dive to the Titanic's depth?



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5. Chris is diving in the ocean, where he feels a pressure of 8.3×10^6 Pa. How far below the surface of the ocean is he? (Use 1020 kg/m^3 for the density of ocean water.)

6. Saturn's moon, Titan has an acceleration due to gravity of 1.352 m/s^2 , and is covered in lakes of liquid methane. Liquid methane has a density of 422.36 kg/m^3 . If an astronaut's suit is designed to withstand 2.34×10^6 Pa of pressure, how deep into a lake can the astronaut go?

7. In the 2003 movie *The Core*, a ship attempts to journey to the center of the Earth by traveling through the mantle of the Earth. Magma has an average density of approximately 2500 kg/m^3 (though it does get denser as you go deeper into the mantle). Assume the ship is engineered to withstand pressures 1 million times greater than atmospheric pressure. In a clear, coherent paragraph, explain the likelihood that this ship will be able to complete its mission, and the reason why or why not.