Fluid Mechanics

Exercises I: STATICS

1. What is the head (vertical height) for water of density 1000 Kg/m^3 subject to a pressure of 500.000 Pa (500 kPa)?

2. What would be the (a) gage pressure and (b) absolute pressure of water at depth 12 m below the surface? [density of water = 1000 Kg/m^3 and P_{atm} = 101000 N/m^2 (101 kN/m^2)]

3. The string of a helium balloon slips from your hand and rises up into the air. When this happens:

   a The balloon rises indefinitely because helium is lighter than air.

   b The balloon rises until it reaches an altitude where the air and helium specific weight are equal.

   c The balloon rises until it reaches an altitude where its weight equals that of the same volume of air.

4. A metal block is suspended with a wire in a tank full of cold water. The cold water is replaced by hot water with a lower specific weight. What happens to the force in the wire?

   a increases

   b decreases

   a stays the same

5. You are standing at the bottom of a lake with your torso above water. Which statement is correct:

   a There is no buoyancy force on you since you are supported by the bottom of the lake.

   b There is a buoyancy force that is proportional to the weight of your body below the water level.

   c There is a buoyancy force that is proportional to the volume of your body below the water level.

   d There is a buoyancy force only when you jump up from the bottom of the lake.

6. If liquid pressure were the same at all depths, would there be a buoyant force on an object submerged in the liquid? Explain with an example.