Quiz 9
Name:_____

The pressure at a depth h below the surface of the liquid: $P = \rho gh$
Pressure (P) = F/A (F: force; A: area)
The buoyant force: Upward force on the same volume of water
Archimedes Principle states that the buoyant force on a submerged object is equal to the weight of the fluid that is displaced by the object.
The specific gravity of a substance is the ratio of its density to that of water.
The pressure above the atmospheric pressure—this is called the gauge pressure.
Bernoulli's equation:

1. A bottle has a mass of 35.00 g when empty and 98.44 g when filled with water. When filled with another fluid, the mass is 89.22 g. What is the specific gravity of this other fluid?
To find the specific gravity of the fluid, take the ratio of the density of the fluid to that of water, noting that the same volume is used for both liquids.

2. The maximum gauge pressure in a hydraulic lift is 17.0 atm. What is the largest-size vehicle (kg) it can lift if the diameter of the output line is 25.5 cm?
The force exerted by the gauge pressure will be equal to the weight of the vehicle.

3. Determine the minimum gauge pressure needed in the water pipe leading into a building if water is to come out of a faucet on the fourteenth floor, 44 m above that pipe.
The minimum gauge pressure would cause the water to come out of the faucet with very little speed. This means that the gauge pressure needed must be enough to hold the water at this elevation.

4. A geologist finds that a Moon rock whose mass is 9.28 kg has an apparent mass of 6.18 kg when submerged in water. What is the density of the rock?
The difference between the actual mass and the apparent mass is the mass of the water displaced by the rock. The mass of the water displaced is the volume of the rock times the density of water, and the volume of the rock is the mass of the rock divided by its density. Combining these relationships yields an expression for the density of the rock.

5. A scuba diver and her gear displace a volume of 69.6 L and have a total mass of 72.8 kg. (a) What is the buoyant force on the diver in seawater? (b) Will the diver sink or float?
(a)   The buoyant force is the weight of the water displaced, using the density of seawater.

(b)The weight of the diver is Since the buoyant force is not as large as her weight, although she will do so very gradually since the two forces are almost the same.

6. Estimate the air pressure inside a category 5 hurricane, where the wind speed is 300 km/h.
(set the pressure outside the hurricane is atmospheric pressure and the speed of the wind

outside the hurricane is 0)

The air pressure inside the hurricane can be estimated by using Bernoulli's equation, Eq. 10–5. Assume that the pressure outside the hurricane is atmospheric pressure, the speed of the wind outside the hurricane is 0, and the two pressure measurements are made at the same height.