**FP Physics – Questions on Pressure and Buoyancy / Student Name:**

1) The density of air is 1.29 kg/m3. What is the mass of the air inside a room 4.0 m × 3.0 m × 2.0 m?

A) 3.1 kg B) 31 kg C) 1.9 kg D) 19 kg

2) A 1959 penny has a diameter of 19.55 mm, a thickness of 1.55 mm, and a mass of 2.500 g. What is its density?

A) 5.37 × 103 kg/m3 B) 21.5 × 103 kg/m3 C) 1.34 × 103 kg/m3 D) 2.68 × 103 kg/m3

3) Pressure is defined as

A) mass per unit volume. B) force per unit volume. C) mass per unit area. D) force per unit area.

4) Atmospheric pressure is approximately

A) 1.01 × 103 Pa B) 1.01 × 104 Pa C) 1.01 × 105 Pa D) 1.01 × 106 Pa

5) What is meant by gauge pressure?

6) The deepest point of the Pacific Ocean is 11,033 m, in the Mariana Trench. What is the water pressure at that point? The density of seawater is 1025 kg/m3.

A) 5.55 × 107 Pa B) 8.88 × 107 Pa C) 1.11 × 108 Pa D) 2.22 × 108 Pa

7) A rock is suspended from a scale reads 10.0 N. A beaker of water is raised up so the rock is totally submerged in the water. The scale now reads 6.25 N. What is the density of the rock?

A) 2.33 times the density of water

B) 2.67 times the density of water

C) 3.00 times the density of water

D) 2.50 times the density of water

8) The buoyant force acts through the center of mass of the displaced fluid. TRUE or FALSE



9) A spar buoy consists of a circular cylinder, which floats with its axis oriented vertically. One such buoy has a radius of 1.00 m, a height of 2.00 m and weighs 40.0 kN. What portion of it is submerged when it is floating in fresh water?

A) 1.35 m B) 1.30 m C) 1.25 m D) 1.20 m

10) A barge with vertical sides is 10.0 m wide and 60.0 m long and is floating in fresh water. How far deeper into the water does the barge sink when 300,000 kg of coal are loaded on the barge?

A) 25.0 cm B) 50.0 cm C) 75.0 cm D) 1.00 m

11) A person who weighs 550 N empties her lungs as much as possible and is then completely immersed in water while suspended from a harness. Her apparent weight is now 21.2 N. What is her density?

A) 1050 kg/m3 B) 1040 kg/m3 C) 1030 kg/m3 D) 960 kg/m3

12) A hot air balloon plus its cargo has a mass of 400 kg, and it holds 700 m3 of hot air. It is floating at a constant height in air with a density of 1.29 kg/m3. What is the density of the hot air in the balloon?

A) 0.72 kg/m3 B) 0.57 kg/m3 C) 0.86 kg/m3 D) 0.43 kg/m3

**Figure 15-7**

****

13) Each of the three containers shown in Figure 15-7 weighs the same amount and is filled with water to the same level. All three have the same surface area in contact with the table. Which of the following statements are true?

 I. The pressure at the bottom surface of the container is the same for all three containers.

 II. The force exerted by the water on the bottom surface of the container is the same for all three containers.

 III. The force exerted by the container on the table is the same for all three containers.

A) Statements I, II, and III are true. B) Only Statements I and II are true.

C) Only Statements II and III are true. D) Only Statements I and III are true.

14) In the lab, you half-fill a beaker that has a cross-sectional area *A* with water of density *ρ*W. You now use a light string to lower a piece of metal with a density *ρ*M and a volume *V* into the water, so that it is completely submerged but does not touch the beaker. What is the increase in the pressure at the bottom of the beaker?

15) How a ship floats is described in terms of

A) Bernoulli's principle. B) Pascal's principle. C) Archimedes' principle. D) Poiseuille's equation.

16) A boat loaded with rocks is floating in a swimming pool. If the rocks are thrown into the pool, the water level in the pool, after the rocks have settled to the bottom,

A) rises. B) falls. C) stays the same. D) There is not enough information to answer this question.

17) One day, while swimming below the surface of the ocean, you let out a number of bubbles of air from your mouth. As the bubbles rise toward the surface, their diameters will

A) decrease. B) stay the same. C) increase. D) about half will increase and the other half will decrease.

18) A flask of water rests on a scale. If you dip your finger into the water, without touching the flask, the reading on the scale will

A) decrease. B) stay the same. C) increase. D) behave unpredictably.

19) A cup of water is filled to the brim when an ice cube is placed in it. The tip of the ice cube sticks out of the surface. As the ice melts, you observe that

A) the cup overflows.

B) the cup might overflow but it depends on the actual mass of the ice cube.

C) the water level remains the same.

D) the water level actually goes down.

20) You have two identical pure silver ingots. You place one of them in a glass of water and observe it to sink to the bottom. You place the other in a container full of mercury and observe that it floats. Comparing the buoyant forces in the two cases you conclude that

A) the buoyant force in the water is equal to that in mercury.

B) the buoyant force in the water is larger than that in mercury.

C) the buoyant force in water is smaller than the that in mercury.

D) No conclusion can be made about the respective values of the buoyant forces.