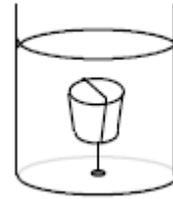AP Physics Multiple Choice Practice – Fluid Mechanics

1. A cork has weight mg and density 25% of water density. A string is tied around the cork and attached to the bottom of a water-filled container. The cork is totally immersed. Express in terms of the cork weight mg, the tension in the string
   A) 0
   B) mg
   C) 2mg
   D) 3mg
   E) 4mg

2. Which of the following is the best statement of Pascals Law?
   A) pressure on a confined liquid is transmitted equally in all directions
   B) a numerical arrangement where each number is the sum of the two numbers above
   C) two electrons cannot occupy the same quantum state at the same time
   D) the volume of a gas is directly related to its temperature
   E) the farther away a galaxy is the faster it is receding

3. When submerged under water, the apparent mass of one cubic meter of pure gold is 18300 kg. What would be its mass in air?
   A) 16300 kg   B) 17300 kg   C) 18300 kg   D) 19300 kg   E) 20300 kg

4. An ideal fluid flows through a long horizontal circular pipe. In one region of the pipe, it has radius R. The pipe then widens to radius 2R. What is the ratio of the fluids speed in the region of radius R to the speed of the fluid in region with radius 2R
   A) ¼   B) ½   C) 1   D) 2   E) 4

5. A fluid is forced through a pipe of changing cross section as shown. In which section would the pressure of the fluid be a minimum
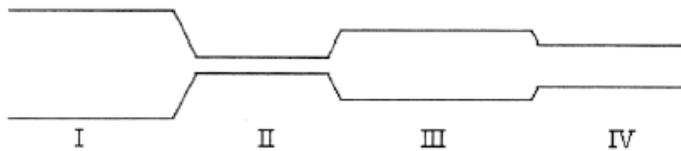
   A) I   B) II   C) III   D) IV   E) all section have the same pressure.

6. Three fishing bobbers all float on top of water. They have the following relationships:
   -A,B: same mass, same density, different shapes
   -B,C: same size, same shape,
           mass & density C < mass & density B
   Three identical weights are tied to each bob, and each is pulled completely beneath the water. Which bob will displace the greatest amount of water
   A) A
   B) B
   C) C
   D) A and B
   E) All displace the same amount of water.

7. A hydraulic press allows large masses to be lifted with small forces as a result of which principle?
   A) Pascal's
   B) Bernoulli's
   C) Archimedes'
   D) Huygens'
   E) Newton's

8. A 500 N weight sits on the small piston of a hydraulic machine. The small piston has an area of 2 cm^2. If the large piston has an area of 40 cm^2, how much weight can the large piston support?
   A) 25 N
   B) 500 N
   C) 10000 N
   D) 40000 N

9. As a rock sinks deeper and deeper into water of constant density, what happens to the buoyant force on it?
   A) It increases.
   B) It remains constant.
   C) It decreases.
   D) It may increase or decrease, depending on the shape of the rock.

10. 50 cm^3 of wood is floating on water, and 50 cm^3 of iron is totally submerged. Which has the greater buoyant force on it?
    A) The wood.
    B) The iron.
    C) Both have the same buoyant force.
    D) Cannot be determined without knowing their densities.

11. Salt water is more dense than fresh water. A ship floats in both fresh water and salt water. Compared to the fresh water, the amount of water displaced in the salt water is
    A) more.
    B) less.
    C) the same.
    D) Cannot be determined from the information given.

12. A liquid has a specific gravity of 0.357. What is its density?
    A)   357 kg/m^3 B)   643 kg/m^3 C)   1000 kg/m^3 D)   3570 kg/m^3

13. Water flows through a pipe. The diameter of the pipe at point B is larger than at point A. Where is the water pressure greater?
    A) Point A
    B) Point B
    C) Same at both A and B
    D) Cannot be determined from the information given.

14. Liquid flows through a 4 cm diameter pipe at 1.0 m/s. There is a 2 cm diameter restriction in the line. What is the velocity in this restriction?
    A) 0.25 m/s   B) 0.50 m/s   C) 2 m/s   D) 4 m/s

15. A copper block is connected to a string and submerged in a container of water.
    Position 1: The copper is completely submerged, but just under the surface of the water.
    Position 2: The copper is completely submerged, mid-way between the water surface and the bottom of the container.
    Position 3: The copper is completely submerged, but just above the bottom surface of the container.

    Assume that the water is incompressible.   What is the ranking of the buoyant forces (B) acting on the copper blocks for these positions, from least to greater?
    (A) $B_1 < B_2 < B_3$
    (B) $B_3 < B_2 < B_1$
    (C) $B_1 = B_2 = B_3$
    (D) $B_1 < B_2 = B_3$
    (E) $B_3 < B_1 = B_2$