AP2 FIZZIX POP Q1
BL3

AP2 POP Quiz #1 2015

Work with A (ONE, UNO, SINGLE) Human. EACH of you must submit your own solutions. Use g=10 m/s^2 for math-based Q's.
Notes are allowed, but NO INTERWEBS!

* Required

1. What is the relationship between "absolute" pressure, P(ab), atmospheric pressure (Patm), and "gauge" pressure, P(g)?

- A) P(ab) = P(g)
- B) P(g) = P(ab) + P(atm)
- C) P(atm) = P(ab) + P(g)
- D) P(ab) = P(atm) + P(g)
- E) P(ab) = P(g) - P(atm)
- F) P(ab) + P(g) + P(atm) = 42

2. I did an example just like this... Within a certain type of the center has a mass density of 10^18 kg/m^3. If a small m were somehow transported to the surface of the earth,

- A) 1000 N
- B) 4000 N
- C) 4 x 10^4 N
- D) 7 x 10^4 N
- E) 4 x 10^9 N

$$m = DV = 10^{18}\left(\frac{4}{3}\pi\left(10^{-5}\right)^3\right)$$

$$m = 10^3\left(\frac{4}{3}\pi\right) \approx 4000$$

3. A solid cylinder disc battery has a radius of 5.1 cm and a height of 0.30 cm. The cylinder is composed of two different materials with mass densities of 1950 kg/m^3 and 1470 kg/m^3. If each of the two materials occupies an equal volume, what is the mass of the cylinder?

- A) 8.4 x 10^-2 kg
- B) 7.1 x 10^-2 kg
- C) 6.5 x 10^-2 kg
- D) 5.3 x 10^-2 kg
- E) 4.2 x 10^-2 kg

$$V = \pi(.051^2)(.0015) = 1.22x10^{-5}\,m^3$$

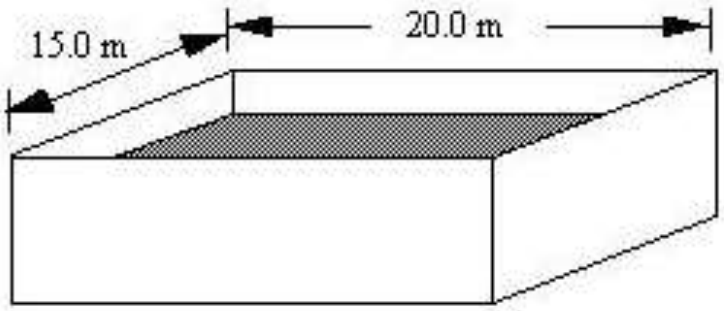
$$M = DV + DV = 1950V + 1470V$$

4. A swimming pool has the dimensions shown in the sketch below. It is filled with water to a uniform depth of 8 m. What is the absolute pressure exerted on the bottom of the pool?

- A) 7.9 x 10^4 Pa
- B) 1.5 x 10^5 Pa
- C) 1.8 x 10^5 Pa
- D) 2 x 10^5 Pa
- E) 2.5 x 10^5 Pa

$$P_{H_2O} = Dgh = (1000)(10)8$$

$$P_{total} = Dgh + 1atm$$



5. The two dams are identical with the exception that the water reservoir behind dam A extends twice the horizontal distance behind it as that of dam B. Which one of the following statements regarding these dams is correct?

$$P_{H_2O} = Dgh$$

- A) The force exerted by the water on dam A is greater than that on dam B.
- B) The force exerted by the water on dam B is greater than that on dam A.
- C) Dam A is more likely to collapse than dam B if the water level rises.
- D) Dam B is more likely to collapse than dam A if the water level rises.
- E) The horizontal distance of the water behind the two dams does not determine the force on them.

6. The operation of a typical hydraulic jack, like a mechanic lifting your car for an oil change, is based on...

- A) Pascal's Principle
- B) Bernoulli's Principle
- C) Archimedes' Principle
- D) GHS Principle

7. Which one of the following statements concerning a completely enclosed fluid is true?

- A) Any change in the applied pressure of the fluid produces a change in pressure that depends on direction.
- B) The pressure at all points within the fluid is independent of any pressure applied to it.
- C) Any change in applied pressure produces an equal change in pressure at all points within the fluid.
- D) An increase in pressure in one part of the fluid results in an equal decrease in pressure in another part.
- E) The force the fluid exerts is the same at all points within the fluid.

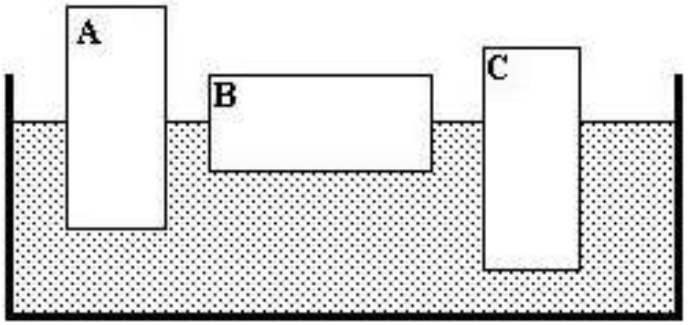
8. The specific gravity of ice is 0.92 and that of seawater is 1.03. A large iceberg floats in Arctic waters. What percent of the volume of the iceberg is exposed?

- A) 0.08 %
- B) 8 %
- C) 11 %
- D) 89 %
- E) 95 %

Archimedes Principal: Dr. Winters…

9. Three blocks labeled A, B, and C are floating in water as shown in the drawing below. Blocks A and B have the same mass and volume. Block C has the same volume, but is submerged to a greater depth than the other two blocks. Which one of the following statements concerning this situation is false?

- A) The density of block A is less than that of block C.
- B) The buoyant force acting on block A is equal to that acting on block B.
- C) The volume of water displaced by block C is greater than that displaced by block B.
- D) The buoyant force acting on block C is greater than that acting on block B.
- E) The volume of water displaced by block A is greater than that displaced by block B.



10. Tuff One: When a block of volume 10^−3 m^3 is hung from a spring scale as shown in Figure A below, the scale reads 10.0 N. When the same block is then placed in an unknown liquid, it floats with 2/3 of its volume submerged as suggested in Figure B. The water is regular pure water. What is the mass of the block?

- A) 1 kg
- B) 2 kg
- C) 3 kg
- D) 4 kg
- E) 9.8 kg

$$W_{Apparent} = W_{Block} - F_B$$

$$10N = W_{Block} - W_{DisplacedH_2O}$$

$$10N = W - 10N$$