## Phys.12- Q2W2- Test- Fluid mechanics

**Problem**

1.An ice cube is placed in a glass of water. The cube is 2.1 cm on each side and has a density of 0.919 g/cm$^3$. What is the magnitude of the buoyant force on the ice?

A. $10.3 \times 10^{-2}$ N B. $12.3 \times 10^{-2}$ N C. $14.3 \times 10^{-2}$ N D. $8.3 \times 10^{-2}$ N

2.A hydraulic lift consists of two pistons that connect to each other by an incompressible fluid. If one piston has an area of 0.49 m$^2$ and the other an area of 6.2 m$^2$, how large a mass can be raised by a force of 220 N exerted on the smaller piston?

A. 280 kg B. 260 kg C. 300 kg D. 320 kg

3.The absolute pressure below the surface of a freshwater lake is $2.43 \times 10^5$ Pa. At what depth does this pressure occur? Assume that atmospheric pressure is $1.01 \times 10^5$ Pa and that the density of the water is $1.00 \times 10^3$ kg/m$^3$.

A. 11.5 m B. 12.5 m C. 14.5 m D. 13.5 m

4. A cubical block of wood with a volume of $1.77 \times 10^3$ cm$^3$ floats on the surface of water ($\rho_w$ = 1.00 g/cm$^3$). Oil ($\rho_o$ = 0.60 g/cm$^3$) is poured over the block until it is completely covered. If 6.4 cm of the block's vertical side lies below the water's surface, what is the mass of the block?

A. 0.9 kg B. 1.5 kg C. 1.1 kg D. 1.3 kg

5.A ship floats 0.186 m higher when in sea water than it does in fresh water. Given the densities of sea water ($\rho_{sw}$ = 1.0250 g/cm$^3$) and fresh water ($\rho_{fw}$ = 1.0000 g/cm$^3$), determine how much of the ship's hull lies beneath the surface of both kinds of water.

A. 6.63 m in fresh water; 6.44 m in sea water
B. 8.63 m in fresh water; 8.44 m in sea water
C. 9.63 m in fresh water; 9.44 m in sea water
D. 7.63 m in fresh water; 7.44 m in sea water

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**Multiple Choice**

*Identify the choice that best completes the statement or answers the question.*

____ 6. Which of the following statements is always true?
   a. Pressure always increases when force decreases or the area acted on decreases.
   b. Pressure always increases when force increases or the area acted on increases.
   c. Pressure always increases when force decreases or the area acted on increases.
   d. Pressure always increases when force increases or the area acted on decreases.

____ 7. Which of the following is a fluid?
   a. gold
   b. helium
   c. ice
   d. iron

____ 8. Which of the following statements is true according to Pascal's principle?
   a. Pressure in a fluid is the same throughout the fluid.
   b. Pressure in a fluid is greatest at the center of the fluid.
   c. Pressure in a fluid is greatest at the walls of the container holding the fluid.
   d. Pressure in a fluid is greatest at the top of the fluid.

____ 9. If an object is only partially submerged in a fluid, which of the following is true?
   a. The density of the fluid is less than the density of the object.
   b. The density of the fluid is greater than the density of the object.
   c. The volume of the displaced fluid equals the volume of the object.
   d. The density of the fluid equals the density of the object.

____ 10. For incompressible fluids, density changes little with changes in
   a. depth.
   b. temperature.
   c. pressure.
   d. free-fall acceleration.

____ 11. For an ideal fluid flowing through a horizontal pipe, Bernoulli's principle and the continuity equation state that the pressure within the pipe does which of the following? (Assume measurements are taken along the pipe in the direction of fluid flow.)
   a. Pressure remains constant as the pipe diameter increases.
   b. Pressure increases, then decreases as the pipe diameter increases.
   c. Pressure increases as the pipe diameter increases.
   d. Pressure decreases as the pipe diameter increases.

____ 12. What does the net force between two levels in a fluid equal?
   a. the weight of the fluid above the top level
   b. the weight of the fluid between the levels
   c. the force applied to the fluid's surface
   d. the force applied to the fluid's sides

____ 13. Which of the following is *not* a fluid?
   a. hydrogen
   b. wood
   c. seawater
   d. carbon dioxide

____ 14. A buoyant force acts in the opposite direction of gravity. Therefore, which of the following is true of an object completely submerged in water?
   a. The net force on the object is larger than the weight of the object.
   b. The object appears to weigh more than it does in air.
   c. The net force on the object is smaller than the weight of the object.
   d. The net force on the object is equal to the weight of the object.

____ 15. Why does an ideal fluid move faster through a pipe with decreasing diameter?
   a. The pressure within the fluid increases.
   b. The fluid moves downhill.
   c. The pipe exerts more pressure on the fluid.
   d. The pressure within the fluid decreases.

____ 16. Which of the following is *not* an example of laminar flow?
a. water flowing evenly from a slightly opened faucet
b. smoke twisting as it moves upward from a fire
c. smoke rising upward in a smooth column through air
d. a river moving slowly in a straight line

____ 17. If the air pressure in a tire is measured as $2.0 \times 10^5$ Pa, and atmospheric pressure equals $1.0 \times 10^5$ Pa, what pressure does the air within the tire exert outward on the tire walls?
a. $4.0 \times 10^5$ Pa
b. $1.0 \times 10^5$ Pa
c. $2.0 \times 10^5$ Pa
d. $3.0 \times 10^5$ Pa

____ 18. What does the difference between gauge pressure and absolute pressure equal?
a. zero
b. the pressure within the fluid
c. the pressure at the bottom of the fluid
d. the pressure at the surface of the fluid

____ 19. An ideal fluid flows through a pipe made of two sections with diameters of 1 cm and 3 cm, respectively. By what factor would you have to multiply the velocity of the liquid flowing through the 1 cm section to obtain the velocity of liquid flowing through the 3 cm section?
a. $\frac{1}{3}$
b. $\frac{1}{9}$
c. 9
d. 6

____ 20. What factors affect the gauge pressure within a fluid?
a. fluid density, depth, free-fall acceleration
b. fluid volume, depth, free-fall acceleration
c. fluid weight, depth, free-fall acceleration
d. fluid mass, depth, free-fall acceleration

____ 21. When a gas is poured out of one container into another container, which of the following does *not* occur?
a. The gas flows into the new container.
b. The gas spreads out to fill the new container.
c. The gas changes shape to fit the new container.
d. The gas keeps its original volume.

____ 22. What happens when a person blows between two paper cups that are hung by strings 10 cm apart?
a. The cups do not move.
b. The cups move away from each other.
c. The cups move upward.
d. The cups move toward each other.

____ 23. How does a liquid differ from a gas?
a. A liquid has definite volume, unlike a gas.
b. A liquid has both definite shape and definite volume, whereas a gas has neither.
c. A liquid has definite shape, whereas a gas has definite volume.
d. A liquid has definite shape, unlike a gas.

____ 24. Which of the following is *not* an example of turbulent flow?
a. a river flowing swiftly around rocks in rapids
b. a river flowing slowly in a straight line
c. water flowing unevenly from a fully opened faucet
d. smoke twisting as it moves upward from a fire

____ 25. Why does the lift on an airplane wing increase as the speed of the airplane increases?
a. The pressure above the wing becomes less than the pressure below the wing.
b. The pressure behind the wing becomes greater than the pressure in front of the wing.
c. The pressure behind the wing becomes less than the pressure in front of the wing.
d. The pressure above the wing becomes greater than the pressure below the wing.

____ 26. Which of the following statements about floating objects is correct?
a. The displaced volume of fluid is greater than the volume of the object.
b. The buoyant force equals the object's weight.
c. The object's density is equal to the density of the fluid on which it floats.
d. The object's density is greater than the density of the fluid on which it floats.

____ 27. The gauge pressure for the air in a balloon equals $1.01 \times 10^5$ Pa. If atmospheric pressure is equal to $1.01 \times 10^5$ Pa, what is the absolute pressure of the air inside the balloon?
a. $2.02 \times 10^4$ Pa
b. $5.05 \times 10^5$ Pa
c. $1.01 \times 10^5$ Pa
d. 0 Pa

____ 28. Which of the following properties is *not* characteristic of an ideal fluid?
a. turbulent flow
b. laminar flow
c. incompressible
d. nonviscous

____ 29. Which of the following statements about completely submerged objects resting on the ocean bottom is correct?
a. The buoyant force acting on the object is equal to the object's weight.
b. The displaced volume of fluid is greater than the volume of the object.
c. The apparent weight of the object depends on the object's density.
d. The weight of the object and the buoyant force are equal and opposite.

____ 30. Which of the following occurs to a person standing near the edge of a railroad track when a high-speed train passes?
a. The person is unaffected by the train.
b. The person tends to be pulled toward the train.
c. The person tends to be pushed away from the train.
d. The person tends to be pushed upward into the air.

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