Quiz 5--PHYS 101-3T--Fall 2013

Multiple Choice
Identify the choice that best completes the statement or answers the question.

1. Which state of matter is associated with the very highest of temperatures?
   a. plasma
   b. solid
   c. liquid
   d. gas

2. A copper wire of length 2.0 m, cross sectional area $7.1 \times 10^{-6}$ m$^2$ and Young's modulus $11 \times 10^{10}$ N/m$^2$ has a 1960 N load hung on it. What is its increase in length?
   a. 1.0 mm
   b. 0.50 mm
   c. 2.5 mm
   d. 5.0 mm

3. In a mercury barometer at atmospheric pressure, the height of the column of mercury in a glass tube is 760 mm. If another mercury barometer is used that has a tube of larger diameter, how high will the column of mercury be in this case?
   a. greater than 760 mm
   b. less than 760 mm
   c. equal to 760 mm

4. The standard kilogram is a platinum-iridium cylinder 3.9 cm in height and 3.9 cm in diameter. What is the density of the material? ($V_{cyl} = \pi r^2 h$)
   a. 21.5 g/cm$^3$
   b. 19.3 g/cm$^3$
   c. 13.6 g/cm$^3$
   d. 10.7 g/cm$^3$

5. When you drink liquid through a straw, which of the items listed below is primarily responsible for this to work?
   a. water pressure
   b. mass of the water
   c. gravity
   d. inertia
   e. atmospheric pressure

6. A stonecutter's chisel has an edge area of 0.50 cm$^2$ ($=5 \times 10^{-5}$ m$^2$) If the chisel is struck with a force of 45 N, what is the pressure exerted on the stone?
   a. 900 000 Pa
   b. 450 000 Pa
   c. 9 000 Pa
   d. 90 000 Pa
7. Two beakers are filled to the brim with water. A wooden block is placed in beaker b so it floats. (Some of the water will overflow the beaker.) Both beakers are then weighed. Which scale reads a larger weight?

a. Beaker a  
b. Beaker b  
c. both the same weight

8. A 15 000-N car on a hydraulic lift rests on a cylinder with a circular piston of radius 0.20 m. If a connecting cylinder with a piston of 0.040-m radius is driven by compressed air, what force must be applied to this smaller piston in order to lift the car?

a. 600 N  
b. 1 500 N  
c. 15 000 N  
d. 3 000 N

9. If the column of mercury in a barometer stands at 726 mm, what is the atmospheric pressure? (The density of mercury is $13.6 \times 10^3$ kg/m$^3$ and $g = 9.80$ m/s$^2$)

a. 0.968 atm  
b. 0.925 atm  
c. 1.03 atm  
d. 1.07 atm

10. How deep under the surface of a lake would the pressure be double that at the surface? (1 atm = 1×10$^5$ Pa; let g=9.8 m/s$^2$)

a. 10.2 m  
b. 1.00 m  
c. 32.2 m  
d. 9.80 m

11. A blood platelet drifts along with the flow of blood through an artery that is partially blocked. As the platelet moves from the wide region into the narrow region, the blood pressure:

a. increases  
b. decreases  
c. stays the same
Name: ________________________

12. A heavily loaded boat is floating in a pond. The boat sinks because of a leak. What happens to the surface level of the pond?
   a. It goes up.
   b. More information is needed to reach a conclusion.
   c. It goes down.
   d. It stays the same.

13. A solid rock, suspended in air by a spring scale, has a measured mass of 9.00 kg. When the rock is submerged in water, the scale reads 3.30 kg. What is the density of the rock? (water density = 1 000 kg/m³)
   a. 4.55 × 10³ kg/m³
   b. 1.58 × 10³ kg/m³
   c. 1.20 × 10³ kg/m³
   d. 3.50 × 10³ kg/m³

14. Bernoulli’s equation is based on which of these laws:
   a. Conservation of Energy
   b. Conservation of Matter
   c. Archimedes’ Law
   d. Conservation of Continuity

15. An ideal fluid, of density 0.90 × 10³ kg/m³, flows at 6.0 m/s through a level pipe with radius of 0.50 cm. The pressure in the fluid is 1.3 × 10⁵ N/m². This pipe connects to a second level pipe, with radius of 1.5 cm. Find the speed of flow in the second pipe.
   a. 0.67 m/s
   b. 0.33 m/s
   c. 18 m/s
   d. 54 m/s

16. Water (density = 1 × 10³ kg/m³) flows at 15 m/s through a pipe with radius 0.040 m. The pipe goes up to the second floor of the building, 3.0 m higher, and the pressure remains unchanged. What is the speed of the water flow in the pipe on the second floor?
   a. 13 m/s
   b. 15 m/s
   c. 16 m/s
   d. 14 m/s

17. The kelvin temperature scale is based, in part, on which of these temperatures:
   a. the freezing point of water
   b. freezing point of hydrogen
   c. water’s condensation temperature
   d. the triple point of water
18. 88°F is how many degrees Celsius?

a. 49  
b. 158  
c. 31  
d. 56

19. Which of the following properties can be used to measure temperature?

a. the volume of gas held at constant pressure  
b. the length of a solid  
c. the color of a glowing object  
d. all of the above

20. A steel wire, 150 m long at 10°C, has a coefficient of linear expansion of $11 \times 10^{-6}/°C$. Give its change in length as the temperature changes from 10°C to 45°C.

a. 5.8 cm  
b. 1.8 cm  
c. 12 cm  
d. 0.65 cm

21. At room temperature, the coefficient of linear expansion for Pyrex glass is ____ that for ordinary glass.

a. less than  
b. the same as  
c. stronger than  
d. more than

22. Two moles of nitrogen gas are contained in an enclosed cylinder with a movable piston. If the molecular mass of nitrogen is 28, how many grams of nitrogen are present?

a. 0.14 g  
b. 42 g  
c. 112 g  
d. 56 g

23. Two one-liter containers each contain 10 moles of a gas. The temperature is the same in both containers. Container A holds helium (molecular mass = 4 u), and Container B holds oxygen (molecular mass = 32 u). Which container has the higher pressure and by what factor?

a. Container A has 8 times the pressure of Container B.  
b. More information is needed to answer this question.  
c. Both containers have the same pressure.  
d. Container A has 2 times the pressure of Container B.

24. A rigid container has a volume of 0.1 m$^3$ and holds 10 moles of gas. If the gas is at a pressure of 1.5 atmospheres, what is the temperature of the gas in °C? (The ideal gas constant is 8.314 J/(mol K).)

a. 180 °C  
b. −113 °C  
c. 0.0018 °C  
d. −93°C
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Answer Section

MULTIPLE CHOICE

1. ANS: A
   PTS: 1
2. ANS: D
   PTS: 1
3. ANS: C
   PTS: 1
4. ANS: A
   PTS: 1
5. ANS: E
   PTS: 1
6. ANS: A
   PTS: 1
7. ANS: C
   PTS: 1
8. ANS: A
   PTS: 1
9. ANS: A
   PTS: 1
10. ANS: A
    PTS: 1
11. ANS: B
    PTS: 1
12. ANS: C
    PTS: 1
13. ANS: B
    PTS: 1
14. ANS: A
    PTS: 1
15. ANS: A
    PTS: 1
16. ANS: A
    PTS: 1
17. ANS: D
    PTS: 1
18. ANS: C
    PTS: 1
19. ANS: D
    PTS: 1
20. ANS: A
    PTS: 1
21. ANS: A
    PTS: 1
22. ANS: D
    PTS: 1
23. ANS: C
    PTS: 1
24. ANS: D
    PTS: 1