

Sarajevo School of Science and Technology

Sarajevo, 10 May 2014

PHYSICS - Entrance Exam

Name: _____

Circle the correct answer.

1. An object is dropt from rest. If it falls the distance s_1 during the first second and an additional distance s_2 in the next second, the ratio s_1/s_2 is:

- a) 1
- b) 2
- c) 3
- d) 5

2. A ball is thrown vertically upward, reaches its highest point and fols back down. Which of the following statements is thru :

- a) The acceleration is always in the direction of motion.
- b) The acceleration is always oposit to the velocity.
- c) The acceleration is always directed up.
- d) The acceleration is always directed down.

3. An object is moving at constant velocity. The total force F acting on that object is given by:

- a) $F = v^2/2m$
- b) $F = mv$
- c) $F = mg$
- d) $F = 0$

4. A mass is suspended from a string and accelerates with an acceleration of $0.7g$. It follows that the tension in the string is

- a) equal to the weight of the mass.
- b) not zero but less than the weight of the mass.
- c) greater than the weight of the mass.
- d) zero.

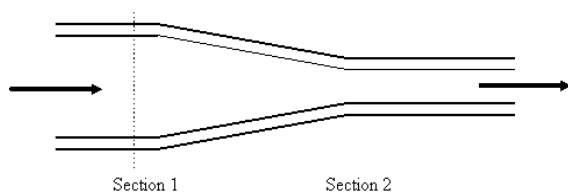
5. At the surface of a certain planet, acceleration due to gravity is only one-quarter of that on Earth. A 4kg brass ball is transported to that planet. Which of the following statements is NOT true?

- a) The mass of the brass ball on this planet is only a quarter of its mass as measured on Earth.
- b) The weight of the brass ball on this planet is only a quarter of the weight as measured on Earth.
- c) The brass ball has the same mass on the other planet as on Earth.

6. Suppose you sit on a rotating piano stool and hold a 2kg mass in each outstretched hand. If without moving your arms relative to your body you now drop these masses,

- a) your angular velocity remains unchanged.
- b) your angular velocity increases.
- c) your angular velocity decreases, but your kinetic energy increases.
- d) your kinetic energy and angular velocity increase.

7. Water flows through the pipe shown in the figure. The flow is laminar.



The pressure

- a) is less at *section 1* than at *section 2*.
- b) at *section 1* equals that at *section 2*.

c) is greater at *section 1* than at *section 2*.

d) at *section 1* is unrelated to that at *section 2*.

8. If the surface temperature of the sun were to drop by a factor of 2, the radiant energy impinging on Earth per second would be reduced by a factor

a) 2

b) 4

c) 8

d) 16

9. Two solid objects, one made of aluminum the other made of lead, have equal apparent weights when submerged in water. Mark the correct statement.

a) The mass of the lead object is more than that of aluminum object.

b) The mass of the aluminum object is more than that of lead object.

c) Both objects have the same mass.

d) The answer depends on the shape of the objects.

10. Aluminum has a specific heat more than twice that of copper. Two blocks of copper and aluminum, both of the same mass and both at 0 °C, are dropped into two different calorimeters. Each calorimeter is filled with 100 g of water at 60 °C (the calorimeter cans have negligible heat capacities). After equilibrium has been attained,

a) the copper has a higher temperature than the aluminum.

b) the copper has lower temperature than the aluminum.

c) the temperatures of the two calorimeters are the same.

d) The answer depends on the masses of the metal blocks.

11. In the equation $\Delta Q = \Delta U + \Delta A$, which expresses the first law of thermodynamics, the quantities ΔA and ΔQ represent

a) the work done by the system and the heat supplied to the system.

- b) the work done on the system and the heat supplied to the system.
- c) the work done on the system and the heat supplied by the system.
- d) the work done by the system and the heat supplied by the system.

12. If the length of a pendulum is doubled, its frequency of oscillation is changed by a factor of

- a) 2
- b) $\sqrt{2}$
- c) $1/\sqrt{2}$
- d) $1/4$

13. The relation between wavelength λ , frequency f and propagation velocity v of a wave is

- a) $v = f/\lambda$
- b) $\lambda = f/v$
- c) $f = v/\lambda$
- d) $v = \lambda f^2$
- e) none of the above.

14. Two charged objects attract each other with a force F . If the charges of both objects are doubled and the separation between them is also doubled, the force between them is than

- a) $16F$
- b) $4F$
- c) F
- d) $F/2$
- e) $F/4$

15. Two cylindrical copper wires have the same mass and are at the same temperature. Wire A is twice as long as wire B. The resistance of wire A is related to that of wire B by

- a) $R_A = R_B/4$
- b) $R_A = R_B/2$

- c) $R_A = R_B$
- d) $R_A = 2R_B$
- e) $R_A = 4R_B$

16. When two identical resistors are connected in series across a battery, the power dissipated by them is 20 W. If these resistors are connected in parallel across the same battery, the total power dissipated will be

- a) 5 W
- b) 10 W
- c) 20 W
- d) 40 W
- e) 80 W

17. A gas of atomic hydrogen is bombarded with electrons of sufficient energy to excite the hydrogen atoms to the $n = 4$ level. The total number of emission lines in the resulting spectrum is

- a) 1
- b) 3
- c) 6
- d) 9
- e) 16

18. A beta-ray is

- a) an energetic neutron emitted by a nucleus
- b) an energetic photon emitted by a nucleus
- c) an energetic electron emitted by a nucleus
- d) an energetic proton emitted by a nucleus
- e) none of the above

19. When ${}_{83}\text{Bi}^{215}$ decays to ${}_{84}\text{Po}^{215}$ the following is released:

- a) a proton
- b) a neutron
- c) positron
- d) an electron
- e) an alpha-particle