Physics 192 Practice Multiple Choice Questions for Final Exam 2013

Name_____

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

1) A rubber ball moving horizontally at 8.50 m/s hits a brick wall and bounces back with exactly the same speed but in the opposite direction. During this collision, its change in momentum is zero. 1) _____

2) As a tile falls from the roof of a building to the ground its momentum is conserved. 2) _____

3) In a collision between a small car and a large truck, the car and the truck undergo the same change in their velocities. 3) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

4) Consider two less-than-desirable options. In the first you are driving 30 mph and crash head-on into an identical car also going 30 mph. In the second option you are driving 30 mph and crash head-on into a stationary brick wall. In neither case does your car bounce off the thing it hits, and the collision time is the same in both cases. Which of these two situations would result in the greatest impact force? 4) _____

A) hitting the other car
B) hitting the brick wall
C) The force would be the same in both cases.
D) We cannot answer this question without more information.
E) None of these is true.

5) If the frequency of a harmonic oscillator doubles, by what factor does the maximum value of acceleration change? 5) _____

A) 4 B) $\sqrt{2}$ C) 2 D) $2/\pi$

6) A simple pendulum has a period T on Earth. If it were used on Planet X, where the acceleration due to gravity is 3 times what it is on Earth, its period would be: 6) _____

A) T/3 B) 3T C) T D) $\sqrt{3}$T E) T/$\sqrt{3}$

7) Two identical objects, each with a mass M, are attached to each other via a spring with a spring constant k. The two objects are oscillating such that one is always moving in the opposite direction and with the same speed as the other. If the spring were replaced with a stiffer spring having a spring constant equal to 2k, and the objects were replaced with objects having a mass of 2M, the period of oscillation would 7) _____

A) increase. B) decrease. C) remain the same.

8) Suppose a water wave is moving radially outward on the surface of the water from a point source. How should the power in a small segment of the wave front depend on the radial distance from the source? 8) _____

A) decrease as 1/r
B) decrease as $1/r^2$
C) independent of r
D) Not enough information

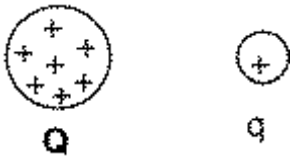
9) Which of the following increases when a sound becomes louder? 9) _____
A) velocity
B) frequency
C) wavelength
D) period
E) amplitude

10) When a guitar is tuned, what is it that is changed? 10) _____
A) The frequency of the fundamental.
B) The amplitude of the fundamental.
C) The wavelength of the fundamental.

11) Which of the following is an accurate statement? 11) _____
A) A system like a vibrating string has only one possible frequency.
B) In order for a singer to break a wine glass by singing, she must adjust the amplitude of the sound she makes so that it is exactly equal to the amplitude of vibration of the wine glass.
C) The sound in an organ pipe can vibrate at an infinite number of frequencies.
D) The fundamental frequency of a system is the name given to the highest possible frequency at which the system will naturally vibrate.

12) If you wanted to know how much the temperature of a particular piece of material would rise when a known amount of heat was added to it, which of the following would be most helpful to know? 12) _____
A) initial temperature
B) density
C) coefficient of linear expansion
D) specific heat
E) thermal conductivity

13) A positive test charge q is released near a positive fixed charge Q. 13) _____



As q moves away from Q, it will move with
A) increasing acceleration.
B) decreasing acceleration.
C) constant velocity.
D) constant acceleration.

14) Two equal and opposite charges a certain distance apart are called an electric "dipole." A positive test charge +q is placed as shown, equidistant from the two charges. 14) _____

Which diagram below gives the direction of the net force on the test charge?

A) B) C) D)

15) Two identically charged balls are a certain distance apart. The vectors in the diagram below show the magnitude and direction of the electrostatic force on each ball. 15) _____

Suppose the charge on the left ball is now doubled (represented by two plus signs). Which diagram below best represents the forces that now act on the two balls?

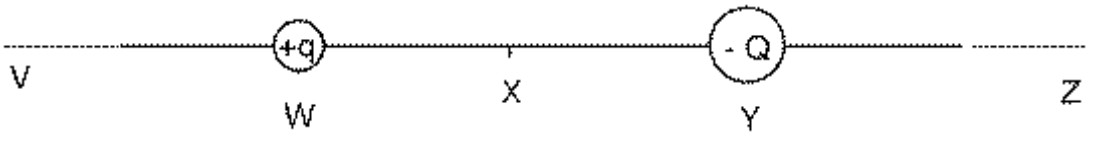
A)

B)

C)

D)

16) The diagram shows two unequal charges +q and -Q, of opposite sign. Charge Q has greater magnitude than charge q. Point X is midway between the charges. 16) _____



In what section of the line will there be a point where the resultant electric field is zero?

A) XY B) WX C) VW D) YZ

17) As an electron moves from a high potential to a low potential, its electrical potential energy 17) _____

A) remains constant. B) decreases. C) increases.

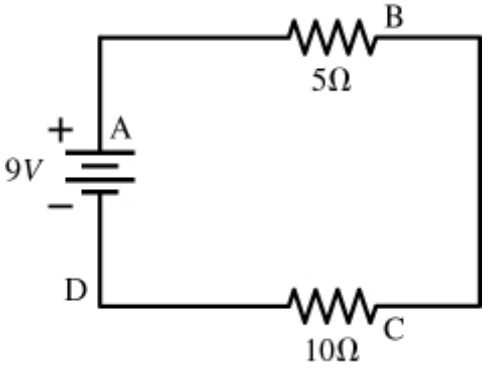
18) Copper wire #1 has a length L and a radius b. Copper wire #2 has a length 2L and a radius 2b. Which statement is true? 18) _____

A) The total resistance of wire #1 is half that of wire #2.
B) The total resistance of wire #1 is twice as high as that of wire #2.
C) The total resistance of wire #1 is equal to that of wire #2.
D) The total resistance of wire #1 is four times higher than that of wire #2.

19) If the length and diameter of a wire of circular cross section are both doubled, the resistance is 19) _____

A) halved.
B) doubled.
C) unchanged.
D) increased fourfold.
E) None of these are true.

20) A 9 V battery is hooked up to two resistors in series. One has a resistance of 5 Ω and the other has a resistance of 10 Ω. Several locations along the circuit are marked with letters, as shown in the figure. Which statement is true? 20) _____



A) The current at A is greater than the current at B, which is equal to the current at C, which is greater than the current at D.
B) The current at A is greater than the current at B, which is greater than the current at C, which is greater than the current at D.
C) The current at A is equal to the current at B, which is equal to the current at C, which is equal to the current at D.

Answers:
1 F
2 F
3 F
4 C
5 a
6 e
7 c
8 a
9 e
10 a
11 c
12 d
13 b
14 c
15 a
16 c
17 c
18 b
19 a
20 c