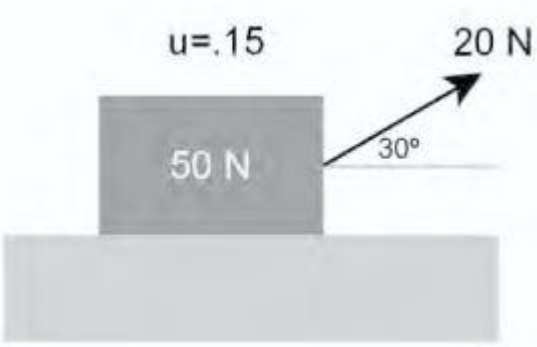
SAT Physics Practice Test 22
Part 4

1. 

A block resting on the surface shown above has a force of 20N applied. Which statement best describes the force between the block and the surface upon which it rests?

A. The normal force is less than 50N.
B. The normal force is greater than 50N.
C. The normal force is equal to 50N.
D. The coefficient of friction increases as the angle increases.
E. The coefficient of friction decreases as the angle increases.

2. $^{226}_{88}Ra \rightarrow ^{222}_{86}Rn + ?$

A radium atom decays into a radon atom as shown in the equation above. Which of the quantities below correctly finishes the equation?

A. Alpha
B. Beta
C. Gamma
D. Neutron
E. Neutrino

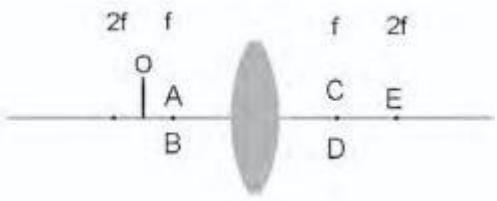
3. 

A large rimmed hoop with a bowling ball inside it rolls down an incline. Which of the following statements best describes the relationship between the hoop and the bowling ball?

A. Their angular accelerations are the same.
B. Their angular displacements are the same.
C. Their angular velocities are the same.

D. Their tangential displacements are the same.
E. Their centripetal accelerations are the same.

4. When a net force acts upon an object, the object is
A. at rest.
B. gaining mass.
C. losing mass.
D. accelerating.
E. moving at constant velocity.



5.
An object (O) is placed in front of a convex lens as shown above. Where is the image located?
A. Point A
B. Point B
C. Point C
D. Point D
E. Point E

6. In the theory of relativity it is stated that all laws of nature are the same in reference frames that
A. accelerate.
B. vibrate.
C. rotate.
D. oscillate.
E. move at a constant rate.

7. Which of the following is/are used for polarized light waves?
I. Sunglasses
II. Remove ultraviolet light
III. Reveal stress patterns
A. I only
B. II only
C. I and III only
D. II and III only
E. I, II, and III

8. A .5 kg ball is swinging at the end of a 2 m string that has a tension of 6.25 N in it. Find the speed of the ball as it travels its circular path.
A. 3.8N
B. 4.4N

C. 5N
D. 5.6N
E. 6.2N

9. A solid copper sphere has a charge of .2C placed on it. Which of the following statements best describes the charge distribution for the sphere?
A. The charge is equally distributed throughout the entire sphere.
B. The charge is concentrated inside the sphere with some charge on the outside.
C. The charge is equally distributed on the outside surface of the sphere.
D. The charge is equally distributed throughout the inside of the sphere only.
E. The charge is concentrated in the center of the sphere.

10. A 30 g icicle that is at a temperature of 0°C falls 6 meters from the eaves of a house to the ground below. If 5% of the kinetic energy that the icicle possesses when it strikes the ground converts into heat, which of the following is plausible? (Note: $H_f$water .335J/g).
A. The ice would become colder during the fall; therefore, no ice would melt.
B. This would not happen because it would break the law of conservation of mass.
C. Less than .3g of the icicle would melt.
D. The frictional work done to stop the icicle's fall would use up all the energy and leave none for anything else.
E. The icicle would shatter and the energy would convert into momentum.

11. Any object that is accelerated to near the speed of light experiences which of the following?
A. An increase in its length
B. An increase in the rate of time passage
C. Decrease in energy
D. Decrease in momentum
E. Increase in mass

12. A bicyclist travels at a constant 25 km/hr for 30 minutes. He coasts for 15 minutes at a constant 20 km/hr and then pedals at a constant 40 km/hr for another 15 minutes. What was the average speed of the cyclist for the past hour?
A. 22.5 km/hr
B. 25 km/hr
C. 27.5 km/hr
D. 30 km/hr
E. 32.5 km/hr

13. A flat plane is raised until a block resting on its surface just slides down the plane at a constant rate. Which statement(s) is/are true?
I. The parallel force equals the frictional force.
II. The weight of the object equals the frictional force.
III. The perpendicular force equals the normal force.
A. I only

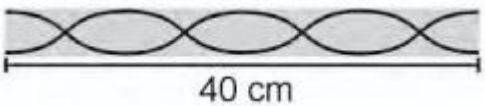
B. II only
C. I and III only
D. II and III only
E. I, II, and III

14. Two gases are insulated from their surroundings but are in contact with each other so heat can flow between them. One gas is hot at t = 0 and the other gas is cold at t = 0. After time passes and the gases equilibrate, which of the following will have happened?
A. The particles in the cold gas will have slowed in their rate of movement.
B. The particles in the hot gas will have increased their rate of movement.
C. The temperature of the cold gas will have decreased.
D. The temperature of the hot gas will have increased.
E. The temperature of the hot gas will have decreased.

15. A driver in an automobile hears a siren behind her and pulls over to let a fire engine pass. The sound of the siren changes as the fire truck approaches is beside her and passes her. Which of the following is/are true under these conditions?
I. The pitch of the sound increases as the fire truck approaches.
II. The wavelength of the sound increases as the fire truck approaches.
III. The wavelength of the sound increases after the fire truck passes.
A. I only
B. II only
C. I and III only
D. II and III only
E. I, II, and III

Part D

1. A magician pulls a tablecloth from under a table full of dishes without disturbing the dishes. This act demonstrates that
A. gravity holds the dishes still.
B. the weight of the dishes is reduced.
C. action-reaction forces are in operation.
D. the dishes have inertia.
E. the dishes have no acceleration.

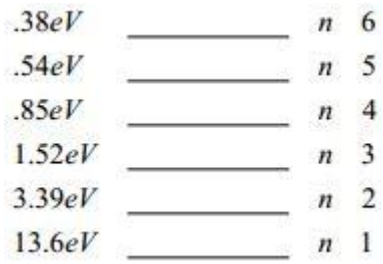
2. 

In the diagram above the open pipe produces a standing wave as shown. What is the frequency of the sound produced in Hertz? (Velocity of sound = 360m/s)
A. 900 Hz
B. 1800 Hz
C. 720 Hz

D. 1440 Hz
E. 2700 Hz

3. Compare a bucket of boiling water to a cup of boiling water. Which statement(s) can be made about the two containers?
I. The heat content of the two is the same.
II. The temperature of the two is the same.
III. The bucket of water contains more heat and is therefore hotter
A. I only
B. II only
C. I and III only
D. II and III only
E. I, II, and III only

4. Find the total capacitance for three capacitors in parallel with each other. The value of the capacitors is 10f, 15f, and 35 f.
A. 60 f
B. 50 f
C. 20 f
D. 10 f
E. 5 f



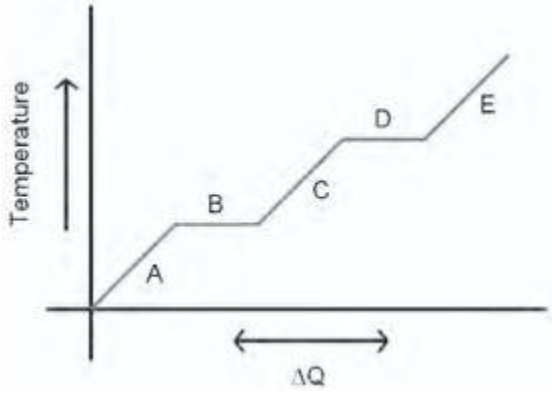
5. A hydrogen electron falls from the n = 3 to the n = 1 energy level. Using the chart above, determine how much energy it must release.
A. +.97eV
B. +2.85eV
C. +10.09eV
D. +12.08eV
E. +13.06eV

6. Four 6 resistors are available to form a resistor network. Which of the following is NOT a possible value for the total resistance of the resistor combinations?
A. 24
B. 12
C. 8
D. 6
E. 1.5

7. A 7.25 kg bowling ball is rolled onto a perfectly level surface at a velocity of 10 m/s. The coefficient of friction between the surface and the bowling ball is .0025. If the surface is perfectly level and is long enough, how far will the bowling ball roll before it comes to a complete stop?
A. 20 m
B. 200 m
C. 2 km
D. 20 km
E. 1/2 km

8. The binding energy of a nucleus is equal to
A. the average energy of each nucleon.
B. the energy needed to split the nucleus into its parts.
C. the mass-energy difference between protons and neutrons.
D. the energy necessary to overcome the neutron-neutron repulsion.
E. the energy required to remove a proton from the nucleus

9. The graph below shows a typical heat and temperature graph for a substance.



Which of the levels represents the solid phase of the substance?
A. Level A
B. Level B
C. Level C
D. Level D
E. Level E

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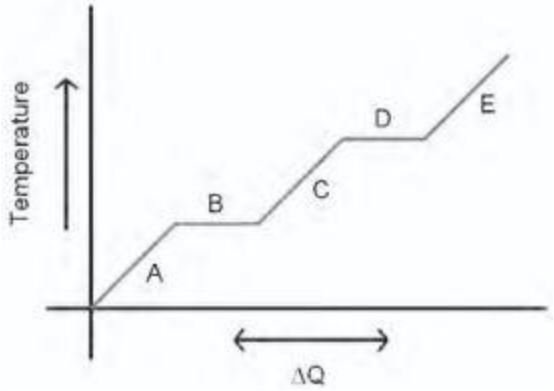

During the phase on the graph represented at Level D, the substance is
A. evaporating.
B. condensing.
C. changing phase.
D. gaining internal energy.
E. All of the above could be correct.

11. When a photon strikes an electron and energizes it, the electron will receive the most energy from the photon if
A. the electron does not spin when it is struck.
B. the photon has a high velocity.
C. the photon has a low velocity.
D. the photon has a long wavelength.
E. the photon has a high frequency.

12. A light ray passes from a material of low refractive index to one of high refractive index. Which of the pairs of quantities listed below describes the light ray as it strikes and passes through the interface between the two materials? Match the descriptions below with the statement that best describes the situation.
A part of the light ray remains inside the low refractive index material.
A. The angle of refraction is larger than the angle of incidence.
B. The angle of refraction is equal to the angle of incidence.
C. The angle of reflection is larger than the angle of incidence.
D. The angle of reflection is smaller than the angle of incidence.
E. The angle of incidence equals the angle of reflection.

13. A light ray passes from a material of low refractive index to one of high refractive index. Which of the pairs of quantities listed below describes the light ray as it strikes and passes through the interface between the two materials? Match the descriptions below with the statement that best describes the situation.
The light ray inside the material with the higher index of refraction bends toward the normal.
A. The frequency of the wave increases.
B. The frequency of the wave decreases.
C. The velocity of the wave increases.

D. The velocity of the wave decreases.
E. Interference from reflected waves causes the light ray to refract.

14. A woman dancing in high-heeled shoes accidentally steps on her partner's foot with the heel of her shoe. Even though her partner outweighs her by 400N and can easily lift her off the floor, he feels pain because
A. her weight is concentrated in a small area.
B. her small foot has a large momentum.
C. her foot has large inertia.
D. his foot has no inertia.
E. his foot has no momentum.

15. If 50g of water at a temperature of 30°C is added to 200g of water at a temperature of 100°C, what will the new temperature of the water be?
A. 68°C
B. 80°C
C. 74°C
D. 86°C
E. 92°C