

Vasquez High School -- Physics -- Spring '15 -- Test #1 -- 100 points

Write TRUE if the statement is true OR write the word that substitutes for the underlined word that would make it true. Writing false only earns partial credit. Three points each.

- _____ 1) Internal energy is proportional to the average kinetic energy of the particles in matter.
- _____ 2) 4.184 J is the amount of energy needed to raise one gram of water one Kelvin.
- _____ 3) When two waves having displacements in opposite directions meet, destructive interference occurs.
- _____ 4) For a standing wave, there is always one more node than antinode.
- _____ 5) Energy transferred as heat divided by mass, then divided by the specific heat capacity yields the latent heat.
- _____ 6) The special thermodynamic process, the adiabatic one, involves a constant volume where no work is done.
- _____ 7) By doubling the mass in a mass-spring system in simple harmonic motion, one increases the period of the motion by a factor of two.
- _____ 8) The fact that light spreads out as it passes through a very narrow crack in a door is evidence of a phenomenon called refraction.
- _____ 9) Frequency is the inverse of period.
- _____ 10) The speed of water coming out of a hose, with your thumb covering much of the opening, can be calculated using the continuity equation.

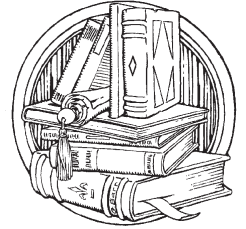
Multiple Choice. Write the letter that best answers each example. Three points each.

- _____ 11) Stretching a spring increases its _____ energy.
- a) mechanical kinetic c) gravitational potential
b) vibrational kinetic d) elastic potential
- _____ 12) In an oscillating mass-spring system, the distance of the maximum compression of the spring is a measure of
- a) amplitude b) frequency c) period d) equilibrium
- _____ 13) What is a set of particles or interacting components that is considered a distinct physical entity called?
- a) an engine b) a system c) an environment d) an ideal gas or liquid
- _____ 14) Which best describes what occurs when a substance undergoes thermal expansion?
- a) As the temperature increases, the volume of the substance increases.
b) As the temperature increases, the volume of the substance decreases.
c) As the temperature increases, the density of the substance increases.
d) As the temperature increases, the mass of the substance increases.



_____ 15) Which of the following is a correct statement of Bernoulli's principle?

- a) The density of a fluid increases as the fluid's velocity increases.
- b) The density of a fluid decreases as the fluid's velocity increases.
- c) The pressure of a fluid increases as the fluid's velocity increases.
- d) The pressure of a fluid decreases as the fluid's velocity increases.



_____ 16) If an object weighing 50.0 N displaces a volume of water with a weight of 10.0 N, what is the buoyant force on the object?

- a) 10.0 N
- b) 40.0 N
- c) 50.0 N
- d) 60.0 N

_____ 17) The absolute pressure 20 m beneath the ocean is 3.03×10^5 Pa. Atmospheric pressure above the ocean is 1.01×10^5 Pa. What pressure does the sea water apply?

- a) 4.04×10^5 Pa
- b) 3.03×10^5 Pa
- c) 2.02×10^5 Pa
- d) 1.01×10^5 Pa

_____ 18) Which concept does the first law of thermodynamics describe?

- a) conservation of mass
- b) conservation of energy
- c) work-energy equivalence
- d) conservation of entropy

_____ 19) A wave that is produced by a single motion that does not repeat is a _____ wave.

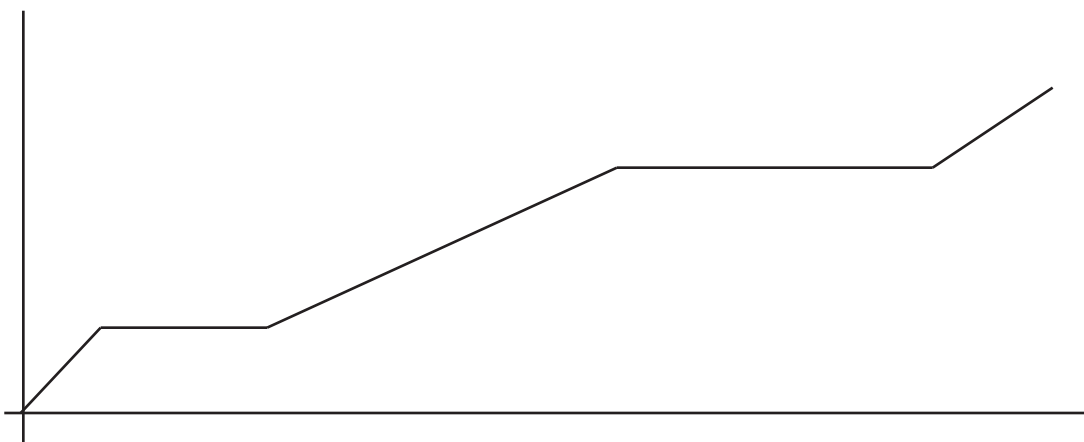
- a) transverse
- b) compressional
- c) pulse
- d) continuous

_____ 20) What must be true of the combined entropy of a system and its environment?

- a) It increases.
- b) It remains constant.
- c) It decreases.
- d) It decreases at first, then increases.
- e) It talks too much and then has a sandwich.

21) Label the following phase diagram with letters/intervals as accurately as you can: (easy ten points)

- a) steam
- b) water
- c) water and steam
- d) latent heat of vaporization
- e) ice and water
- f) latent heat of freezing
- g) ice
- h) temperature axis
- j) energy axis
- k) boiling point
- l) melting point



Calculation Section. As usual, show all your work. Write all pertinent equations. Label with units where applicable. Five points each.

22) Goliath of Gath reputedly stood 3.20 meters tall. If he could whistle a note whose wavelength was equal to his height, what was the frequency of his whistle? The speed of sound is 338 m/s.

23) A three-headed baby was recently born on the planet Schwartz. The baby weighed 13.7 kg. The baby's crib hung from springs with a total spring constant of 2.94×10^2 N/m. If the crib is rocked in simple harmonic motion, what is the period of its motion?

24) Deep in the jungles of outer Slobovia resides the killer pincher armadillo. Brian Williams recently reported catching one. He stated that he hung it vertically from a spring with a spring constant of 5.47×10^2 N/m and that it elongated the spring a distance of 18.2 cm. What is the mass of the armadillo?

25) KLOS radio broadcasts rock and roll music in LA at 95.5 MHz on the FM dial. Given that the speed of light is 3.00×10^8 m/s, what is the wavelength of such a radio wave?

26) A certain oscillating mass-spring system has a period of 1.2 s with a 1.0 kg mass. What will be the period be if a 5.3 kg mass is substituted for the 1.0 kg mass?

27) Describe the phenomenon of resonance, as it applies to a singer breaking a crystal goblet with her voice?
