

Physics 10 2nd Midterm (200 pts Max.) – Test A

Wednesday, Spring 2004

Please fill up the bubbles in your Scantron Answer Sheet fully and completely. It is your responsibility to make sure the bubbles are being filled.

1. Pressure has units of (a) N (b) N-m (c) N/m² (d) m/N
2. Pascal's principle is applied in (a) a hydraulic press (b) a garage lift (c) a hydraulic brake system (d) all of the preceding
3. A hydraulic jack is an application of (a) Archimedes' principle (b) Bernoulli's principle (c) Pascal's principle (d) Newton's principle
4. A mechanical advantage can be obtained by the application of (a) Archimedes' principle (b) Pascal's principle (c) Bernoulli's principle (d) surface tension
5. The pressure at a depth in a liquid depends on the liquid's _____ density. (a) volume (b) shape (c) weight (d) mass
6. When a quantity of dilute gas in a rigid container is heated, it (a) expands (b) has a pressure reduction (c) loses internal energy (d) none of the preceding
7. Atmospheric pressure is measured with (a) a thermometer (b) a barometer (c) a pump (d) none of the preceding
8. The lungs fill with air (a) when the diaphragm relaxes (b) when the lung pressure is less than atmospheric pressure (c) during exhalation (d) when there is systolic pressure
9. A normal systolic blood pressure would be (a) 70 torr (b) 80 torr (c) 125 torr (d) 180 torr
10. The "relaxation" pressure of the circulatory system is called (a) barometric pressure (b) diastolic pressure (c) systolic pressure (d) air pressure
11. The period of an SHM oscillation (a) increases with amplitude (b) is equal to $1/f$ (c) has units of hertz (d) is always in phase
12. A disturbance with particle oscillations parallel to the direction the wave propagation is called a (a) transverse wave (b) longitudinal wave (c) water wave (d) light wave
13. The energy of a wave (a) is proportional to the square of its amplitude (b) is equal to Iat (c) falls off as $1/r^2$ (d) all of the preceding
14. If the combined waveforms of two identical interfering waves is smaller than that of either wave, the interference is said to be (a) constructive (b) destructive (c) standing (d) both (b) and (c)
15. When driven at resonance, a rope vibrates (a) out of phase (b) at only one possible frequency (c) at only the 2nd harmonic or 2nd overtone (d) at maximum amplitude
16. Which of the following sound frequencies would not be heard by the human ear? (a) 15 Hz (b) 900 Hz (c) 15000 Hz (d) 19 kHz
17. Concert halls experience sound problems because of (a) multiple reflections (b) reverberant sound (c) refraction (d) both (a) and (b)
18. The speed of sound in air is 340 m/s. If a plane flies at a speed of 510 m/s, it has a Mach number of (a) 1.5 (b) 2.0 (c) 2.5 (d) 2.7
19. A pleasant musical sound is said to be (a) consonant (b) in octave (c) loud (d) dissonant
20. The speed of sound in air on a day when the air temperature is 25 degree C is (a) 331 m/s (b) 346 m/s (c) 352 m/s (d) 360 m/s
21. Temperature is (a) a measure of heat (b) a relative measure of hotness and coldness (c) internal energy in transit (d) both (b) and (c)
22. When a bimetallic strip is heated, it bends toward the metal with the (a) greater thermal expansion (b) smaller thermal expansion (c) greater specific heat (d) lower specific heat
23. Which of the following is the highest temperature? (a) 0° F (b) 0° C (c) 0° K (d) all are equal
24. A Btu is equivalent to about how many food Calories? (a) 1/2 (b) 1/4 (c) 1/6 (d) 1/8

25. The specific heat of substance A is ten times greater than that of substance B. If equal amounts of heat are added to equal masses of the substances, the temperature increase of substance A is (a) the same as that of B (b) ten times greater than that of B (c) 1/10 that of B (d) none of the preceding
26. A method of heat transfer that generally does not involve mass transfer is (a) conduction (b) convection (c) radiation (d) both (a) and (c)
27. A direct change from the solid phase to the gaseous phase is called (a) condensation (b) evaporation (c) sublimation (d) boiling
28. The freezing point of water is decreased by (a) the addition of more water (b) pressure (c) dissolved table salt (d) both (b) and (c)
29. Radiation is a method of heat transfer by means of (a) convection currents (b) molecular interaction (c) electromagnetic waves (d) all of these
30. Sunlight feels warm on the skin primarily because of (a) visible radiation (b) microwaves (c) ultra-violet radiation (d) infrared radiation
31. What is the volume of 1000 kg of water? (a) 1 cm^3 (b) 1000 m^3 (c) 1 m^3 (d) 1000 cm^3
32. What is the weight of a cubic meter of cork? (For the density of cork, use 400 kg/m^3 .) (a) 220 lb (b) 440 lb (c) 660 lb (d) 880 lb
33. Find the density of a 5-kg solid cylinder. The cylinder is 10 cm tall and has a radius of 3 cm. (a) 17.7 kg/m^3 (b) 17.7 g/cm^3 (c) 17.7 kg/cm^3 (d) 17.7 g/cm
34. A 1-liter container completely filled with lead has a mass of 11.3 kg and is submerged in water. What is the buoyant force acting on it? (a) 11.3 N (b) 1000 N (c) 9.8 N (d) 9.8 kg
35. The depth of water behind the Hoover Dam in Nevada is 220m. What is the water pressure at the base of this dam? (Neglect the pressure due to the atmosphere.) (a) 220 kPa (b) 2160 kPa (c) 220 kg (d) 220 N
36. When a 2.0-kg object is suspended in water, it "masses" 1.5 kg. What is the density of the object? (a) 1000 kg/m^3 (b) 4000 kg/m^3 (c) 500 kg/m^3 (d) 2000 kg/m^3
37. About how many kilograms of air occupy a classroom that has a 200 m^2 floor area and a 4-m-high ceiling? (Assume a chilly 10 degree temperature.) (a) 1000 kg (b) 800 kg (c) 125 kg (d) 1000 m^3
38. Gusts of wind make the Sears Building in Chicago sway back and forth at a vibration frequency of about 0.1 Hz. What is its period vibration? (a) 0.1 sec (b) 5 sec (c) 10 sec (d) 20 sec
39. A skipper on a boat notices wave crests passing his anchor chain every 5 sec. He estimates the distance between wave crests to be 15m. He also correctly estimates the speed of the waves. What is this speed? (a) 5 m/sec (b) 15 m/sec (c) 10 m/sec (d) 3 m/sec
40. What is the approximate distance of a thunderstorm when you note a 3-s delay between the flash of lightning and the sound of thunder? (speed of sound in air = 340 m/s) (a) 340 m/sec (b) 680 m/sec (c) 1020 m (d) 680 m
41. How much more intense than the threshold of hearing is a sound of 30 dB? (a) 10 times (b) 100 times (c) 1000 times (d) 3 times
42. What is the wavelength of a 340-Hz tone in air? (a) 340 m (b) 1 m (c) 10 m (d) 100 m
43. If you wish to warm 100 kg of water by 30° C for your bath, how much heat is required? (Give your answer in calories and joules.) (a) 1000 Kcal (b) 2000 Kcal (c) 3000 Kcal (d) 4000 Kcal
44. What will be the final temperature of 100 g of 20° C water when 100 g of 40° iron nails are submerged in it? (The specific heat of iron is $0.12\text{ cal/g }^\circ\text{C}$. Here you should equate the heat gained by the water to the heat lost by the nails.) (a) 31.4° C (b) 22.1° C (c) 22.1° F (d) 22.1° K
45. Will burns a 0.6-g peanut beneath 50 g of water, which increases in temperature from 22° C to 50° C . Assuming 40% efficiency, what is the food value in calories of the peanut? (a) 1000 Cal (b) 1500 Cal (c) 2500 Cal (d) 3500 Cal
46. A 50-gram chunk of 80° C iron is dropped into a cavity in a very large block of ice at 0° C . How many grams of ice will melt? (The specific heat capacity of iron is $0.11\text{ cal/g}^\circ\text{C}$.) (a) 50 gm (b) 5.0 gm (c) 5.5 gm (d) 10 gm
47. Convert the temperature 120° F to the Celsius scale: (a) 120° C (b) 45° C (c) 48.89° C (d) 15° C
48. On a very hot day the temperature gets up to 100° F . A strict SI buff has his Kelvin thermometer along. What does it read? (a) 100K (b) 37.78K (c) 310.78K (d) 137.78K