

Physics 10 2nd Midterm (200 pts MAX.) – TEST C
Fall 2004

1. The periodic table was formulated by (a) Democritus (b) Dalton (c) Einstein (d) Mendelieve
2. A liquid has (a) definite shape and volume (b) definite volume but no definite shape (c) no definite shape or volume (d) none of the preceding
3. An atom or molecule with a net electrical charge due to the transfer (loss or gain) of one or more electrons is known as a/an (a) isotope (b) polar atom or molecule (c) ion (d) none of these
4. Units of density are (a) kg/m^3 (b) g/cm^3 (c) both (a) and (b) (d) neither (a) nor (b)
5. All materials are to some extent (a) polymers (b) brittle (c) elastic (d) hard
6. Plastic deformation occurs (a) chiefly in ceramic materials (b) only for metals (c) only in plastics (d) when the elastic limit is reached
7. A plastic is (a) made of monomers (b) a macromolecular solid (c) a crystalline solid (d) an alloy
8. Pressure may be increased by (a) decreasing the applied force (b) decreasing the area of contact (c) increasing the force and area by the same factor (d) none of the preceding
9. An object sinks in a liquid when (a) the buoyant force is greater than the object's weight (b) it is completely immersed (c) its density is greater than that of the liquid (d) the weight of the displaced liquid is greater than that of the object
10. A mechanical advantage can be obtained by the application of (a) Archimedes' principle (b) Pascal's principle (c) Bernoulli's principle (d) surface tension
11. Detergents (a) have no effect on surface tension (b) increase surface tension (c) decrease surface tension (d) none of these
12. When an air-filled balloon is put in a freezer and cooled, the balloon has (a) a pressure increase (b) a pressure reduction (c) a volume decrease (d) both (b) and (c)
13. 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
14. The "relaxation" pressure of the circulatory system is called (a) barometric pressure (b) diastolic pressure (c) systolic pressure (d) air pressure
15. 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
16. Intensity (a) is the same as energy (b) falls off as $1/r$ (c) has units of $\text{J/s}\cdot\text{m}^2$ (d) none of the preceding
17. Standing waves (a) have no motion at all (b) are always out of phase (c) have zero amplitude at the nodal positions (d) can have only one characteristic frequency
18. 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
19. If a sound source and an observer both move with the same constant velocity, the frequency heard by the observer relative to the source frequency would be (a) higher (b) lower (c) the same
20. The upper limit of the frequency range of human hearing is (a) 20dB (b) 120dB (c) 20 kHz (d) 10^9 Hz
21. A change in the sound level intensity from 100 dB to 70 dB corresponds to a decrease in sound intensity by a factor of (a) 10 (b) 100 (c) 1,000 (d) 10,000
22. Heat is (a) a form of energy (b) energy transferred because of a temperature difference (c) internal energy in transit (d) all of the preceding
23. Which of the following is the highest temperature? (a) 0°F (b) 0°C (c) 0°K (d) all are equal
24. 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
25. The specific heat of water is $1.0 \text{ kcal/kg}\cdot^\circ\text{C}$. If the temperature of 2.0 kg of water is lowered by 10°C , the amount of heat removed would be (a) 2 kcal (b) 5 kcal (c) 10 kcal (d) 20 kcal
26. A roaring fire transfers heat to a person sitting nearby chiefly by (a) conduction (b) convection (c) radiation (d) both (a) and (b)
27. 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)

28. Sunlight feels warm on the skin primarily because of (a) visible radiation (b) microwaves (c) ultra-violet radiation (d) infrared radiation
29. Monsoons occur as a result of (a) conduction cycles (b) convection cycles (c) radiation cycles (d) thermal insulation
30. Elements in a vertical column in the periodic table (a) have the same number of protons (b) form a period (c) have similar chemical properties (d) have similar atomic masses
31. What is the density of 1000 kg of water? (a) 1000 kg/cm^3 (b) 1000 kg/m^3 (c) 1000 kg (d) 1000 g
32. 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
33. 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
34. An "empty" rectangular box has the dimensions 1.0 m x 0.80 m x 0.75 m. What mass of air does it contain? (Density of air = 1.25 kg/m^3) (a) 0.77 kg (b) 0.385 kg (c) 1.155 kg (d) 0.875 kg
35. Given a 2-gal bucket, how much lift force would you have to apply to carry it if it were full of water? (1 gal = 0.13 ft^3 , net density of water: 62.4 lb/ft^3) (a) 16.22 lb (b) 16.22 kg (c) 16.22 m (d) 16.22 ft
36. Does Archimedes' principle tell us that if an immersed object displaces liquid weighing 10 N, what is the buoyant force? (a) 10 N (b) 5 N (c) 20 N (d) 30 N
37. If you were swimming and dove down to a depth of 5 ft, what pressure would you experience? (a) 62.4 lb/ft^2 (b) 312 lb/ft^2 (c) 62.4 lb (d) 312 lb
38. A barber's chair rests on a hydraulic piston 10 cm in diameter. The input side has a piston with a cross-sectional area of 10 cm^2 , which is pumped on using a foot pedal. If the chair and the client together have a mass of 160 kg, what force must be applied to the input piston? (a) 200 N (b) 300 N (c) 400 N (d) 500 N
39. What change in pressure (P_o) occurs in a party balloon that is squeezed to one-third its original volume (V_o) with no change in temperature? (a) 3 P_o (b) 2 P_o (c) 1 P_o (d) 0
40. 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
41. 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
42. A cello string 0.75 long has a 220-Hz fundamental frequency. Find the wave speed along the vibrating string. (a) 660 m/sec (b) 330 m/sec (c) 330 m (d) 660 m
43. What is the wavelength of a 340-Hz tone in air? (a) 340 m (b) 1 m (c) 10 m (d) 100 m
44. By international agreement, most orchestras tune to a frequency of 440 Hz, which is called A440 (the A note above middle C). Given that the speed of sound in air at room temperature is 343.9 m/s, what is the wavelength of A440? (a) 0.440 m (b) 0.782 m (c) 1.564 m (d) 1.782 m
45. What is the speed of sound at room temperature (20°C) and normal atmospheric pressure? (a) 331 m/sec (b) 331 m (c) 343 m/sec (d) 343 m
46. If you wish to warm 100 kg of water by 30°C from 0°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
47. Convert the temperature 120°F to the Celsius scale: (a) 120°C (b) 45°C (c) 48.89°C (d) 15°C
48. A European visitor reads that the average temperature of two different places in the United States is 59°F . He asks you what these temperatures are in Celsius. Could you help him? (a) 59°C (b) 15°C (c) 45°C (d) 77°C