# Physics 10 2nd Midterm (200 pts MAX.) – TEST D
# Spring 2005

1. The black writing material in a pencil is (a) carbon (b) ink (c) lead (d) none of the preceding
2. Polymers are composed of (a) plastics (b) monomers (c) alloys (d) ionic molecules
3. The material with the greatest density is (a) osmium (b) zinc (c) water (d) iron
4. The geometric pattern or arrangement of particles in a crystalline solid is known as the (a) lattice (b) ionic structure (c) macromolecular pattern (d) none of these
5. Pressure has units of (a) N (b) $N/m^2$ (c) N-m (d) m/N
6. The buoyant force in a liquid (a) increases with depth (b) acts on all surfaces of an immersed object (c) is independent of the liquid's density (d) none of the preceding
7. In a full, closed container of a liquid, the pressure does not depend on (a) the shape of the container (b) the liquid's mass density (c) the acceleration due to gravity (d) the depth
8. The pressure at a depth in a liquid depends on the liquid's density. (a) volume (b) shape (c) weight (d) mass
9. 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
10. Hot air rises because it is (a) less dense than the surrounding air (b) contained in a balloon (c) not covered by the gas laws (d) none of the preceding
11. When the volume of a gas is decreased (a) the pressure must increase (b) the density must increase (c) the temperature must increase (d) Boltzmann's constant changes
12. For a balloon to rise, the gas inside must have than the air outside. (a) fewer molecules per unit volume (b) less density (c) less humidity (d) less internal energy
13. 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
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. If the motions of two oscillators of the same frequency are always in the same direction, we say they are (a) in resonance (b) in phase (c) out of phase (d) destructive
16. Concert halls experience sound problems because of (a) multiple reflections (b) reverberant sound (c) refraction (d) both (a) and (b)
17. A pleasant musical sound is said to be (a) consonant (b) in octave (c) loud (d) dissonant
18. The Doppler effect (a) is caused by resonance (b) occurs for a person riding in a car with the car horn blowing (c) gives rise to beats (d) is used in radar
19. 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)
20. The degree Fahrenheit is equal to the unit interval on (a) the Celsius scale (b) the Kelvin scale (c) both (a) and (b) (d) none of the preceding
21. Which of the following units could be used for specific heat? (a) Cal/g° C (b) kcal/kg-K (c) Btu/lb-degree F (d) all of the preceding
22. A cucumber ahs a food energy value of 5 Calories. If all this energy could be transferred to a kilogram of water, it would raise the temperature by (a) 5°F (b) 5K (c) 10°C (d) 50°C
23. A method of heat transfer that generally does not involve mass transfer is (a) conduction (b) convection (c) radiation (d) both (a) and (c)
24. Boiling starts in a heated liquid when the vapor pressure in formed bubbles is (a) negative (b) zero (c) greater than one atmosphere (d) below the triple-point pressure
25. Heating in a vacuum can take place by (a) conduction (b) convection (c) radiation
26. 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
27. Using a scale, a student determines the mass of a rock to be 0.50 kg and then, using the water-displacement method, finds that the rock has a volume of $0.96m^3$. What is the density? (a) $0.52kg/m^3$ (b) $0.52kg/m^2$ (c) 0.52 kg (d) 0.50 $kg/m^3$
28. 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

29. 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
30. What change in pressure (Po) occurs in a party balloon that is squeezed to one-third its original volume (Vo) with no change in temperature? (a) 3 Po (b) 2 Po (c) 1 Po (d) 0
31. If a train of friegh cars, each 10m long, rolls by you at the rate of three cars each second. What is the speed of the train? (a) 10 m/sec (b) 20 m/sec (c) 30 m/sec (d) 30 m
32. What beat frequencies are possible with tuning forks of frequencies 259, and 261 Hz? (a) 1 Hz (b) 2 Hz (c) 3 Hz (d) 4 Hz
33. A bat flying in a cave emits a sound and receives its echo 0.1 s late. How far away is the cave wall? (a) 17 m (b) 34 m (c) 51 m (d) 102 m
34. If you wish to warm 100 kg of water by 30° C from 0° C for your bath, how much heat is required? (a)1000 Kcal (b) 2000 Kcal (c) 3000 Kcal (d) 4000 Kcal
35. 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
36. Convert the temperature 120°F to the Celsius scale: (a) 120°C (b) 45°C (c) 48.89°C (d) 15°C
37. What is the Kelvin temperature when the Fahrenheit and Celsius temperatures are equal? (a) 40K (b) -40C (c) -40F (d) 233K
38. A container holding 0.250 kg of water at 20.0 $^oC$ is placed in the freezer compartment of a refrigerator. How much energy must be removed from the water to turn it into ice at 0 $^oC$? (a) -25,000 cal (b) -2,500 cal (c) -256 cal (d) -25.6 cal
39. A quantity of what looks like lead shot, having a mass of 100 g, is poured into a test tube. The tube is then partially submerged in a beaker of boiling water and kept there until the shot reaches 100.0 $^oC$. The hot shot, as it were, is then quickly transferred to a vessel containing 100 g of water at 20.00 $^oC$. The contents are gently stirred until they come to an equilibrium temperature of 22.41 $^oC$. What is the specific heat of the shot? The effect of the vessel is negligible. (a) $0.031\frac{cal}{gm^oC}$ (b) $0.31\frac{cal}{gm^oC}$ (c) $3.1\frac{cal}{gm^oC}$ (d) $31.0\frac{cal}{gm^oC}$
40. Units of density are (a) kg/m$^3$ (b) g/cm$^3$ (c) both (a) and (b) (d) neither (a) nor (b)
41. All materials are to some extent (a) polymers (b) brittle (c) elastic (d) hard
42. Plastic deformation occurs (a) chiefly in ceramic materials (b) only for metals (c) only in plastics (d) when the elastic limit is reached
43. A plastic is (a) made of monomers (b) a macromolecular solid (c) a crystalline solid (d) an alloy
44. 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
45. 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
46. A fixed quantity of gas is held in a cylinder capped at one end by a movable piston. The pressure of the gas is initially 1 atmosphere (101 kPA) and volume is initially 0.3 m$^3$. What is the final volume of the gas if the pressure of the gas is increased to 3 atmospheres at constant temperature? (a) 0.05m$^3$ (b)0.1m$^3$ (c) 0.2m$^3$ (d) 0.3m$^3$
47. A heat engine takes in 1200 J of heat from the high-temperature heat source in each cycle and does 400 J of work in each cycle. How much heat is released into the environment in each cycle? (a) 1200 J (b) 800 J (c) 400 J (d) 1600 J
48. A hot plate is used to transfer 400 Cal (1 Cal = 4.2 J) of heat to a beaker containing ice and water. 500 J of work are also done on the contents of the beaker by stirring. How much ice melts in the process? (a) 2.2 grams (b) 4.4 grams (c) 6.5 grams (d) 8.8 grams
49. If the specific heat capacity of ice is 0.5 cal/g·C°, how much heat would have to be added to 200 g of ice, initially at a temperature of -10 C°, to raise the ice to the melting point? (a) 200 cal (b) 400 cal (c) 800 cal (d) 1000 cal
50. Suppose that a merry-go-around is accelerated at a constant rate of 0.005 rev/sec$^2$, starting from rest, how many revolutions do the merry-go-around make at the end of 1 minute? (a) 9 rev (b) 6 rev (c) 3 rev (d) 1 rev