Physics 10 Final (300 Pts MAX.) – TEST B
T TH 5:25 PM, Spring 2004

1. Electrostatic charging (a) occurs best on dry days (b) must be done with a conductor (c) does not involve a transfer or movement of charge (d) none of the preceding
2. Electric fields are represented graphically by (a) dots (b) lines of force (c) arrows that point in the direction of the force on a negative charge (d) a series of straight lines
3. Electrostatic charges can be placed on an object by (a) friction (b) contact (c) induction (d) all of these
4. A heat engine with 40 percent thermal efficiency has a heat input of 100 J per cycle, the heat output of the engine is (a) 40 J (b) 50 J (c) 80 J (d) none of the preceding
5. For a refrigerator, the high-temperature reservoir is (a) the freezer compartment (b) the room (c) the inside of the refrigerator (d) the refrigerator compress
6. Entropy is a measure of (a) thermal efficiency (b) internal energy (c) the capability to do work (d) temperature
7. A direct change from the solid phase to the gaseous phase is called (a) condensation (b) evaporation (c) sublimation (d) boiling
8. Radiation is a method of heat transfer by means of (a) convection currents (b) molecular interaction (c) electromagnetic waves (d) all of these
9. Monsoons occur as a result of (a) conduction cycles (b) convection cycles (c) radiation cycles (d) thermal insulation
10. 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
11. A Btu is equivalent to about how many food Calories? (a) ½ (b) ¼ (c) 1/6 (d) 1/8
12. The specific heat of water is 1.0 kcal/kg•°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
13. Absolute zero is (a) –273 °C (b) –273 K (c) 273 K (d) 273°F
14. Concert halls experience sound problems because of (a) multiple reflections (b) reverberant sound (c) refraction (d) both (a) and (b)
15. A pleasant musical sound is said to be (a) consonant (b) in octave (c) loud (d) dissonant
16. 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
17. For the Doppler effect to occur, there must be (a) a moving source of sound (b) a moving listener (c) relative motion between a source of sound and listener (d) all of these
18. 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
19. 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)
20. 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
21. Electric charge (a) is not a fundamental property (b) is given an arbitrary sign designation (c) always experiences an attractive force (d) is found associated only with electrons
22. Lightning takes place by (a) intracloud discharges (b) cloud-to-cloud discharges (c) could to ground discharges (d) all of these
23. Electric potential is (a) the force per charge (b) the same as electric potential energy (c) the electric potential energy per charge (d) given by Coulomb's law
24. A heat engine converts (a) work to heat energy (b) heat energy to work (c) heat from a low-temperature reservoir to heat in a high-temperature reservoir (d) none of the preceding
25. According to the first law of thermodynamics, if heat is added to a closed system, it goes into (a) entropy (b) work (c) internal energy (d) work and/or internal energy
26. A heat engine with 100% efficiency would not violate the (a) first law (b) second law (c) third law

27. A method of heat transfer that generally does not involve mass transfer is (a) conduction (b) convection (c) radiation (d) both (a) and (c)
28. 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
29. Heating in a vacuum can take place by (a) conduction (b) convection (c) radiation
30. 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)
31. 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
32. Radio waves travel at the speed of light 300,000 km/s. What is the wavelength of radio waves received at 100.1 MHz on your FM radio dial? (a) 300,000 km (b) 100.1 km (c) 3 m (d) 100.1 m
33. What is the frequency in vibrations per second of 60-Hz wave? What is its period? (a) 0.01666 sec (b) 60 sec (c) 0.0332 sec (d) 30 sec
34. 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
35. 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
36. 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? (a) 340 m/sec (b) 680 m/sec (c) 1020 m (d) 680 m
37. 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 cal/g C°). (a) 31.4°C (b) 22.1°C (c) 22.1°F (d) 22.1°K
38. 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 cal/g°C.) (a) 50 gm (b) 5.0 gm (c) 5.5 gm (d) 10 gm
39. 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
40. 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
41. What would be the final temperature of a mixture of 50 g of 10° C water and 50 g of 50° C water? (a) 10°C (b) 20°C (c) 30°C (d) 40°C
42. Suppose the heat engine in with 40% efficiency had a heat input of 180 kcal per cycle. What would be the heat output? (a) 40 Kcal (b) 120 Kcal (c) 108 Kcal (d) 180 Kcal
43. What is the ideal efficiency of an OTEC power plant where fuel is heated to 2700 K and the outdoor air is at 270 K? (a) 10% (b) 20% (c) 90% (d) 80%
44. The wattage marked on a light bulb is not an inherent property of the bulb but depends on the voltage to which it is connected, usually 110 or 120 V. How many amperes flow through a 120-W bulb connected in a 120-V circuit? (a) 0.5 A (b) 2.0 A (c) 0.75 A (d) 1.0 A
45. What is the electric force of attraction between charges of +3 C and –6 C separated by distance 2m? (a) -40.5×10^8N (b) -20.25×10^8N (c) -40.5×10^9N (d) -20.25×10^9N
46. A light bulb has a resistance of 250 Ω. What voltage is required for the bulb to draw a current of 0.4 A? (a) 10 Volt (b) 1000 Volt (c) 100 Volt (d) 200 Volt
47. A 3- Ω resistor is connected with a 12-Ω resistor and the combination is connected to a 12-V battery. How much current does the battery supply? (a) 4.0 amp (b) 0.8 amp (c) 8.0 amp (d) 0.4 amp
48. Two 1 1/2 -V batteries are connected in series to a 3- Ω resistor. How much current flows through each battery? (a) 6 amp (b) 2.5 amp (c) 1.5 amp (d) 1 amp