Physics 10 Second Test (100 pts) – Test B
T Th 5:30, Spring 2003

1. The electric force between two charged particles (a) is repulsive for unlike charges (b) varies as 1/r (c) depends only on the magnitudes of the charges (d) is much, much greater than the gravitational force
2. 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
3. Lightning rods prevent damage by making contact with (a) streamers (b) stepped leaders (c) return strokes (d) dart leaders
4. 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
5. Electric potential energy is given by (a) Coulomb's law (b) the law of charges (c) electric field lines (d) charge times voltage
6. Electrostatic charges can be placed on an object by (a) friction (b) contact (c) induction (d) all of these
7. 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
8. An insulator may be electrostatically charged by (a) friction (b) contact (c) induction (d) all of these
9. What is the normal human body temperature 98.6°F in °C? (a) 37°C (b) 98.6°C (c) 74°C
10. A child has a temperature of 40°C. Is this serious? Explain in °F. (a) 40°F (b) 72°F (c) 104°F (d) 80°F
11. If a heat engine has heat input of 1000 Joules and rejects 600 joules while doing work. What is the thermal efficiency? (a) 60% (b) 40% (c) 100% (d) 50%
12. A heat energy with 40% thermal efficiency has a heat input of 100 joules per cycle. What is the heat output? (a) 60 Joules (b) 100 Joules (c) 40 Joules (d) 20 Joules
13. If you wish to warm 100 kg of water by 20°C for your bath, how much heat is required? (a) 100 kcal (b) 1000 kcal (c) 2000 kcal (d) 2000 cal
14. 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°. Here you should equate the heat gained by the water to the heat lost by the nails.) (a) 20°C (b) 22°C (c) 40°C (d) 12°C
15. Suppose a bar 1 m long expands 0.5 cm when heated. By how much will a bar 100 m long of the same material expand when similarly heated? (a) 100 m (b) 100.05 m (c) 100.5 m (d) 105 m
16. 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) 3500 cal (b) 500 cal (c) 2200 cal (d) 600 cal
17. Find the mass of 0°C ice that 10 g of 100°C steam will completely melt. (a) 10 g (b) 80 gm (c) 100 g (d) 50 g
18. 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) 5.5 g (b) 11 gm (c) 5 g (d) 50 g
19. During a certain thermodynamic process a sample of gas expands and cools, reducing its internal energy by 3000 J, while no heat is added or taken away. How much work is done during this process? (a) 3000 J (b) 1000 J (c) 2000 J (d) 4000 J
20. What is the ideal efficiency of an automobile engine where fuel is heated to 2700 K and the outdoor air is at 270 K? (a) 27% (b) 54% (c) 90% (d) 80%
21. Two point charges are separated by 6 cm. The attractive force between them is 20 N. Find the force between them when they are separated by 12 cm. (a) 20 N (b) 10 N (c) 5 N (d) 12 N
22. A certain device in a 120-V circuit has a current rating of 20 A. What is the resistance of the device? (a) 6 ohms (b) 20 ohms (c) 20 A (d) 20 V

23. Using the equation Power = current × voltage, find the current drawn by a 1200-W hair dryer connected to 120 V. (a) 10 A (b) 120 A (c) 20 A (d) 30 A
24. How much does it cost to operate a 100-W lamp continuously for 1 week if the power utility rate is 15 ¢/kWh? (a) $2.52 (b) $25.2 (c) $5.04 (d) $0.252
25. 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
26. 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
27. Which of the following is the highest temperature? (a) 0°F (b) 0° C (c) 0° K (d) all are equal
28. A Btu is equivalent to about how many food Calories? (a) ½ (b) ¼ (c) 1/6 (d) 1/8
29. 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
30. The human temperature sense is associated with (a) sight (b) hearing (c) smell (d) touch
31. 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
32. Absolute zero is (a) –273 °C (b) –273 K (c) 273 K (d) 273°F
33. A roaring fire transfers heat to a person sitting nearby chiefly by (a) conduction (b) convection (c) radiation (d) both (a) and (b)
34. A direct change from the solid phase to the gaseous phase is called (a) condensation (b) evaporation (c) sublimation (d) boiling
35. 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)
36. Radiation is a method of heat transfer by means of (a) convection currents (b) molecular interaction (c) electromagnetic waves (d) all of these
37. Sunlight feels warm on the skin primarily because of (a) visible radiation (b) microwaves (c) ultra-violet radiation (d) infrared radiation
38. Monsoons occur as a result of (a) conduction cycles (b) convection cycles (c) radiation cycles (d) thermal insulation
39. A method of heat transfer that generally does not involve mass transfer is (a) conduction (b) convection (c) radiation (d) both (a) and (c)
40. The energy associated with a phase change is called (a) latent heat (b) specific heat (c) radiation (d) none of the preceding
41. The work output of a heat engine is equal to (a) the work input (b) the heat input (c) the heat output (d) the heat input minus the heat output
42. 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
43. The second law of thermodynamics states that (a) a cyclic heat engine cannot convert heat completely to work (b) a cyclic heat engine cannot have 100 percent efficiently (c) heat will not flow spontaneously from a colder body to a hotter body (d) all of the preceding
44. 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
45. The difference between a diesel engine and a gasoline engine is (a) the type of fuel used (b) the type of ignition (c) cycle processes (d) all of these
46. Entropy is a measure of (a) thermal efficiency (b) internal energy (c) the capability to do work (d) temperature
47. 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
48. Thermal efficiency is equal to the ratio of (a) work out/heat in (b) heat out/heat in (c) heat in/heat out (d) heat out/work out