

Physics 10 Second Test (100 pts) – Test A
T Th 1:30, Spring 2003

1. 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)
2. Thermal expansion, or an increase in dimensions with increasing temperature, occurs (a) in most substances (b) in very few substances (c) only in metals (d) both (b) and (c)
3. 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
4. Which of the following heat units is neither the largest nor the smallest? (a) kilocalorie (b) Btu (c) calorie (d) all are equal
5. Which of the following units could be used for specific heat? (a) Cal/g^o C (b) kcal/kg-K (c) Btu/lb-degree F (d) all of the preceding
6. The smallest temperature unit is (a) degree Fahrenheit (b) degree Celsius (c) the Kelvin (d) all are the same
7. A cucumber has 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
8. One Kelvin unit is equivalent to (a) one degree Fahrenheit (b) 1.8 degree Celsius (c) 9/5 degree Fahrenheit (d) one BTU
9. A method of heat transfer that generally does not involve mass transfer is (a) conduction (b) convection (c) radiation (d) both (a) and (c)
10. The energy associated with a phase change is called (a) latent heat (b) specific heat (c) radiation (d) none of the preceding
11. 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
12. Heat transfer takes place because of a difference in (a) potential energy (b) heat content (c) specific heat (d) temperature
13. Heating in a vacuum can take place by (a) conduction (b) convection (c) radiation
14. Ice, water, and steam coexist at the (a) melting point (b) dew point (c) boiling point (d) triple point
15. A roaring fire transfers heat to a person sitting nearby chiefly by (a) conduction (b) convection (c) radiation (d) both (a) and (b)
16. A direct change from the solid phase to the gaseous phase is called (a) condensation (b) evaporation (c) sublimation (d) boiling
17. 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
18. 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
19. 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
20. The heat output of a heat pump is equal to (a) work input (b) heat input (c) sum of (a) and (b) (d) none of the preceding
21. A heat engine with 100% efficiency would not violate the (a) first law (b) second law (c) third law
22. For every natural process, the entropy of the universe (a) decreases (b) remains constant (c) is destroyed in part (d) increases
23. 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
24. 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
25. 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

26. An insulator may be electrostatically charged by (a) friction (b) contact (c) induction (d) all of these
27. Lightning takes place by (a) intracloud discharges (b) cloud-to-cloud discharges (c) cloud to ground discharges (d) all of these
28. The electric field has units of (a) m/s (b) N-m (c) N/C (d) none of these
29. 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
30. Electric charge is measured in units of (a) volts (b) coulombs (c) newtons (d) de Graaffs
31. 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
32. 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
33. What is the Fahrenheit temperature for 100°C ? (a) 100°F (b) 200°F (c) 212°F (d) 32°F
34. Can the reading on the Celsius and Fahrenheit scales be the same at a particular temperature? If so, what is it? (a) 40 (b) 80 (c) -40 (d) -80
35. What is Kelvin temperature when the Fahrenheit and Celsius temperature are equal? (a) 233 K (b) 313 K (c) 40 K (d) -40 K
36. A heat engine with 40% thermal efficiency has a heat input of 100 joules per cycle. What is the heat output? (a) 100 Joules (b) 60 Joules (c) 40 Joules (d) 20 Joules
37. What would be the final temperature of a mixture of 50 g of 20°C water and 50 g of 40°C water? (a) 20°C (b) 30°C (c) 40°C (d) 50°C
38. What would be the final temperature when 100 g of 25°C water is mixed with 75 g of 40°C water? (a) 25°C (b) 31.4°C (c) 40°C (d) 20°C
39. 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
40. 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
41. 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
42. 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) 5.5 g (b) 11 gm (c) 5 g (d) 50 g
43. 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
44. 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%
45. Two pellets, each with a charge of 1 microcoulomb (10^{-6} C), are located 3 cm (0.03 m) apart. What is the electric force between them? What mass object would experience this same force in the Earth's gravitational field? (a) 20 N (b) 10 N (c) 5 N (d) 3 N
46. 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 60-W bulb connected in a 120-V circuit? (a) 0.5 A (b) 1.0 A (c) 0.5 V (d) 1.0 V
47. Using the equation Power = current \times 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
48. How much does it cost to operate a 100-W lamp continuously for 2 weeks if the power utility rate is 15 ¢/kWh? (a) \$2.52 (b) \$25.2 (c) \$5.04 (d) \$0.252