

Physics 10 Final (300 Pts MAX.) – TEST A

T TH 5:25 PM, Spring 2004

1. An insulator may be electrostatically charged by (a) friction (b) contact (c) induction (d) all of these
2. The electric field has units of (a) m/s (b) N-m (c) N/C (d) none of these
3. Electric charge is measured in units of (a) volts (b) coulombs (c) newtons (d) de Graaffs
4. 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
5. 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
6. For every natural process, the entropy of the universe (a) decreases (b) remains constant (c) is destroyed in part (d) increases
7. The energy associated with a phase change is called (a) latent heat (b) specific heat radiation (d) none of the preceding
8. Heat transfer takes place because of a difference in (a) potential energy (b) heat content (c) specific heat (d) temperature
9. Ice, water, and steam coexist at the (a) melting point (b) dew point (c) boiling point (d) triple point
10. 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)
11. Which of the following heat units is neither the largest nor the smallest? (a) kilocalorie (b) Btu (c) calorie (d) all are equal
12. The smallest temperature unit is (a) degree Fahrenheit (b) degree Celsius (c) the Kelvin (d) all are the same
13. One Kelvin unit is equivalent to (a) one degree Fahrenheit (b) 1.8 degree Celsius (c) 9/5 degree Fahrenheit (d) one BTU
14. Sonar depends on sound (a) reflection (b) refraction (c) reverberation (d) resonance
15. The bel unit is a comparative measure of sound (a) frequency (b) quality (c) intensity level (d) none of these
16. A person hears thunder 4 seconds after seeing a lightning flash. The lightning was approximately how far away? (a) 1.3 km (b) 1.5 km (c) 2.6 km (d) 3.0 km
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. Waves can propagate through (a) matter (b) space (c) time (d) both (a) and (b)
19. When two waves interfere, which of the following add? (a) Displacement (b) Wavelength (c) Phase (d) None of these
20. The propagation of energy through a medium or space from a disturbance is a(n) (a) oscillation (b) vibration (c) wave (d) harmonic
21. 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
22. 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
23. Electrostatic charges can be placed on an object by (a) friction (b) contact (c) induction (d) all of these
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. 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
26. Entropy is a measure of (a) thermal efficiency (b) internal energy (c) the capability to do work (d) temperature
27. A direct change from the solid phase to the gaseous phase is called (a) condensation (b) evaporation (c) sublimation (d) boiling
28. Radiation is a method of heat transfer by means of (a) convection currents (b) molecular interaction (c) electromagnetic waves (d) all of these

29. Monsoons occur as a result of (a) conduction cycles (b) convection cycles (c) radiation cycles (d) thermal insulation
30. 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
31. If a train of freight 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. 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. 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
34. How much more intense than the threshold of hearing is a sound of 30 dB? (a) 10 times (b) 100 times (c) 1000 times (d) 3 times
35. What is the wavelength of a 340-Hz tone in air? (a) 340 m (b) 1 m (c) 10 m (d) 100 m
36. 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
37. What would be the final temperature when 100 g of 25° C water is mixed 75 g of 40° C water? (a) 31.4°C (b) 31.4°F (c) 31.4°K (d) 22.1°C
38. Find the mass of 0° C ice that 20 g of 100° C steam will completely melt. (a) 80 gm (b) 40 gm (c) 160 gm (d) 200 gm
39. In a weather forecast, it is reported that the high temperature for the next day is expected to be 15° C. How should you dress to go to class tomorrow? (What is the Fahrenheit temperature?) (a) 15°F (b) 30°F (c) 59°F (d) 50°F
40. A strict user of the SI tells you that the temperature that day is 288 K. What is the temperature on the Fahrenheit? (a) 15°F (b) 59°F (c) 30°F (d) 30°C
41. 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) 31.4°C (b) 22.1°C (c) 22.1°F (d) 22.1°K
42. A heat engine does 125 J of work each cycle while receiving 375 J of heat per cycle. What is the engine's thermal efficiency? (a) 20% (b) 33% (c) 40% (d) 60%
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 cal (b) 3000 Joule (c) 4000 Joule (d) 4000 cal
44. A droplet of ink in an industrial ink-jet printer carries a charge of $1.6 \cdot 10^{-10}$ C and deflected onto paper by a force of $3.2 \cdot 10^{-4}$ N. Find the strength of the electric field to produce this force. (a) 2.0×10^6 N/C (b) 3.2×10^6 N/C (c) 2.0×10^6 N (d) 3.2×10^6 N
45. How much does it cost to operate a 100-W lamp continuously for 1 week if the power utility rate is 15 cents/kWh. (a) \$15.00 (b) \$2.52 (c) 5.00 (d) 10.00
46. If the coils of a heater have a resistance of 10 Ω when hot, what current does the heater require? (a) 10 amp (b) 12 amp (c) 20 amp (d) 24 amp
47. 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
48. 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