

## Physics 10 2<sup>nd</sup> Test (100 pts) – Test #B

### T Th 1:00pm, Fall 2003

1. Various types of telescope, use a) visible light b) infrared radiation c) radio waves d) all of the preceding
2. In the late evening, no color is seen because of lack of stimulation of a) rods b) cones c) cornea d) crystalline lens
3. To 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) 6 N (b) 10 N (c) 3 N (d) 20 N
4. 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) 2.0 A (c) 0.75 A (d) 1.0 A
5. Using the equation Power = current • voltage, find the current drawn by a 1200-W hair dryer connected to 120 V. Then using the method you used in the previous problem, find the resistance of the hair dryer. (a) 10 A, 12  $\Omega$  (b) 12 A, 10  $\Omega$  (c) 120 A, 1200  $\Omega$  (d) 5 A, 6  $\Omega$
6. 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
7. 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
8. How far does the light travel in one year? This distance is known as a light-year and is commonly used length in astronomy. (a)  $2.592 \times 10^8$  km (b)  $2.592 \times 10^{10}$  km (c)  $2.592 \times 10^{13}$  km (d)  $2.592 \times 10^{15}$  km
9. Light in air is incident on a surface at an angle of  $60^\circ$ . What is its angle of refraction in glass? In water? (a)  $22^\circ$  (b)  $35.264^\circ$  (c)  $40^\circ$  (d)  $60^\circ$
10. Locate the image of an arrow placed 60 cm from a diverging lens with a focal length of 30 cm. (a) 20 cm (b) -20 cm (c) 60 cm (d) -60 cm
11. Over what range of positions can an object be located so that the image produced by a converging lens is real and smaller than the object? (a)  $d_o > 2f$  (b)  $d_o < 2f$  (c)  $d_o < f$  (d)  $d_o > f$
12. If it takes light 5ns to travel 1 m in an optical cable, what is the index of refraction in the cable? (a) 1.3333 (b) 1.5 (c) 2.0 (d) 3.0
13. The value of g at the Earth's surface is about 9.8 m/s<sup>2</sup>. What is the value of g at a distance from the Earth's center that is four times the Earth's radius? (a) 9.8 m/s<sup>2</sup> (b) 0.6125 m/s<sup>2</sup> (c) 2.45 m/s<sup>2</sup> (d) 0.6125 m
14. A ball is thrown horizontally from a cliff at a speed of 10 m/s. What is its speed 1 second later. (a) 10 m/sec (b) 9.8 m/sec (c) 14 m/sec (d) 20 m/sec
15. Gusts of wind make the Sears Building in Chicago sway back and forth at a vibration frequency of about 0.1 Hz. What is its period vibration? (a) 0.1 sec (b) 5 sec (c) 10 sec (d) 20 sec
16. 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
17. 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
18. What beat frequencies are possible with tuning forks of frequencies 256, 259, and 261 Hz? (a) 1 Hz (b) 2 Hz (c) 3 Hz (d) 4 Hz
19. What is the density of 1000 kg of water? (*The density of any amount of water is 1000 kg/m<sup>3</sup> or 1 g/cm<sup>3</sup>*) (a) 1000 kg/cm<sup>3</sup> (b) 1000 kg/m<sup>3</sup> (c) 1000 kg (d) 1000 g
20. Find the density of a 5-kg solid cylinder. The cylinder is 10 cm tall and has a radius of 3 cm. (a) 17.7 kg/m<sup>3</sup> (b) 17.7 g/cm<sup>3</sup> (c) 17.7 kg/cm<sup>3</sup> (d) 17.7 g/cm

21. Does Archimedes' principle tell us that if an immersed object displaces liquid weighing 10 N, what is the buoyant force? (a) 10 N (b) 5 N (c) 20 N (d) 30 N
22. The depth of water behind the Hoover Dam in Nevada is 220m. What is the water pressure at the base of this dam? (Neglect the pressure due to the atmosphere.) (a) 220 kPa (b) 2160 kPa (c) 220 kg (d) 220 N
23. The electric force between two charged particles a) is repulsive for unlike charges b) depends only on the magnitudes of the charges c) varies as  $1/r$  d) is much, much greater than the gravitational force
24. Electrostatic charging a) must be done with a conductor b) occurs best on dry days c) does not involve a transfer or movement of charge d) none of the preceding
25. Lightning rods prevent damage by making contact with a) streamers b) return strokes c) stepped leaders d) dart leaders
26. Electric fields are represented graphically by a) dots b) lines of forces c) arrows that points in the direction of the force on a negative charge d) series of straight lines
27. Electric potential energy is given by a) Coulomb's law b) the law of charges c) electric field lines d) charge time voltage
28. Electrostatic charges can be placed on an object by a) friction b) contact c) induction d) all of these
29. White light is a) fluorescent b) ultraviolet c) polychromatic d) waves with only magnetic field
30. What is "destroyed" in destructive interference? a) Wave form b) Electric and magnetic fields c) Energy d) All of the preceding
31. Which type of wave would be diffracted by a door opening? a) Sound waves b) AM radio waves c) FM radio waves d) all of these
32. The dual nature of light refers to the a) quantum properties of light b) wave and particle characteristic properties of light c) frequency and wavelength properties of light d) none of these
33. Light in which the electric field is in only one direction is a) monochromatic b) produced by interference c) polarized d) not an electromagnetic wave
34. What type of diffraction is observed in everyday activities a) sound b) light c) electron d) X-ray
35. A light ray is a line drawn perpendicular to a) a wavelength b) a beam c) a wave front d) none of the preceding
36. A refracted ray is bent away from the normal when entering which type of medium? a) less optically dense b) air to water c) more optically dense d) all of these
37. In most transparent materials, which color of light has the greatest angle of refraction from the incident ray direction? a) red b) green c) yellow d) blue
38. Lens aberrations give rise to a) external reflection b) internal reflections c) a diamond's brilliance d) blurred images
39. Ray optics is a convenient way to represent a) interference b) reflection c) diffraction d) wavelength
40. The "beam" of a flashlight is seen as a result of a) refraction b) diffuse reflection c) dispersion d) internal reflection
41. A visual defect that occurs naturally with age is a) color blindness b) astigmatism c) nearsightedness d) not being able to see near objects clearly
42. Which of the following is not a subtractive primary color? a) Cyan b) Green c) Magenta d) Yellow
43. A simple microscope magnifies by a) internal reflection b) reducing the accommodation c) refractively widening the angle of view d) affecting the rod cells in the retina
44. Rayleigh scattering explains a) color vision b) the blueness of the sky c) additive color production d) subtractive color production