

Physics 10 2nd Test (100 pts) – Test #A

T Th 5:35pm, Fall 2003

1. Electric charge a) is not a fundamental property b) always experiences an attractive force c) is given an arbitrary sign designation d) is found associated only with electrons
2. An insulator may be electrostatically charged by a) contact b) friction c) induction d) all of these
3. Lightning takes place by a) cloud-to-cloud discharges b) intracloud discharges c) could to ground discharges d) all of these
4. 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
5. Electric charge is measured in units of a) coulombs b) volts c) newtons d) de Graaffs
6. Electric fields are represented graphically by a) lines of force b) dots c) arrows that point in the direction of the force on a negative charge d) a series of straight lines
7. The process of an atom absorbing radiation of one wavelength and emitting another is called a) interference b) incandescence c) fluorescence d) polarization
8. When two waves interfere in phase, the result is a) fluorescence b) destructive interference c) decreased wave amplitude d) none of the preceding
9. Light may be polarized by a) absorption b) reflection c) scattering d) all of these
10. What type of light can be coherent? a) Monochromatic and in phase b) Spontaneous emission c) Monochromatic only d) Narrow beam divergence
11. The excited mercury vapor in a fluorescent lamp emits what type of radiation? a) Ultraviolet b) Infrared c) Visible d) Heat
12. The bending of waves around corners is called a) interference b) diffraction c) reflection d) polarization
13. The law of reflection applies for a) specular reflection b) irregular reflection c) diffuse reflection d) all of these
14. In refraction, which of the following wave properties is unchanged? a) frequency b) wavelength c) speed d) all of these
15. Total internal reflection could occur for light in which of the following media transitions? a) water to air b) vacuum to glass c) glass to water d) both (b) and (c)
16. A spherical converging lens a) is free of aberrations b) cannot form images on a screen c) is thicker at its center than at its periphery
17. Fiber optics is based on a) dispersion b) diffuse reflection c) total internal reflection d) diverging mirrors
18. Dispersion is responsible for a) a diamond's brilliance b) diffuse reflection c) spherical aberration d) chromatic aberration
19. Color vision results from photosensitive cells called a) pupils b) rods c) cones d) none of these
20. Which of the following is not an additive primary color? a) Red b) Green c) Yellow d) Blue
21. An upright image is seen when looking through a) a terrestrial telescope b) an astronomical telescope c) a Galilean telescope d) both (a) and (c)
22. The sky appears blue as a result of a) selective absorption b) selective transmission c) selective reflection d) preferential scattering
23. The film of a camera corresponds to what part of the eye? a) retina b) aperture c) cornea d) iris
24. Rayleigh scattering explains a) color vision b) additive color production c) the blueness of the sky d) subtractive color production
25. 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. (What can you answer this problem without knowing the magnitudes of the charges?) (a) 6 N (b) 5 N (c) 12 N (d) 20 N

26. 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
27. Rearrange the equation Current = voltage/resistance to express resistance in terms of current and voltage. Then solve the following: A certain device in a 120-V circuit has a current rating of 20 A. What is the resistance of the device (how many ohms)? (a) 20Ω (b) 120Ω (c) 6Ω (d) 10Ω
28. 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
29. What is the wavelength of a 340-Hz tone in air? What is the wavelength of a 34,000 Hz ultrasonic wave in air? (a) 340 m (b) 1 m (c) 10 m (d) 100 m
30. A 6-cm-tall object is placed 60 cm from a concave mirror with a focal length of 20 cm. Find the location and size of the image. (a) 20 cm (b) 60 cm (c) 30 cm (d) 120 cm
31. If light in air is incident at 30° , at what angle is it refracted in water? In glass? (a) 22° (b) 44° (c) 12° (d) 41.8°
32. Light from the bottom of a swimming pool is incident on the surface at an angle of 30 degrees. What is the angle of refraction? (a) 30° (b) 60° (c) 41.8° (d) 20°
33. The focal length of a converging lens is 30 cm. Locate the image of an object placed 60 cm from the center of this lens. (a) 30 cm (b) 60 cm (c) 90 cm (d) 15 cm
34. How many diopters are there for a converging lens with a focal length of 0.4 cm? (a) 100 diopter (b) 200 diopter (c) 250 diopter (d) 300 diopter
35. What is the tangential speed of a passenger on a Ferris wheel that has a radius of 10 m and rotates once in 10 seconds. (a) 3.1416 m/sec (b) 6.283 m/sec (c) 3.1416 m (d) 6.283 m
36. Calculate the force of gravity between the Earth (mass = $6 \cdot 10^{24}$ kg) and the sun (mass = $2 \cdot 10^{30}$ kg, distance = $1.5 \cdot 10^{11}$ m) (a) 35.573×10^{21} N (b) 35.573×10^{18} N (c) 35.573 kg (d) 71.146×10^{21} N
37. 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
38. 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
39. 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
40. 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? (speed of sound in air = 340 m/s) (a) 340 m/sec (b) 680 m/sec (c) 1020 m (d) 680 m
41. How much more intense than the threshold of hearing is a sound of 10 dB? 30 dB?, 60 dB? (a) 10 times (b) 100 times (c) 1000 times (d) 3 times
42. 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^3 (b) 17.7 g/cm^3 (c) 17.7 kg/cm^3 (d) 17.7 g/cm
43. What is the weight of a cubic meter of cork? (For the density of cork, use 400 kg/m³.) (a) 220 lb (b) 440 lb (c) 660 lb (d) 880 lb
44. A 1-liter container completely filled with lead has a mass of 11.3 kg and is submerged in water. What is the buoyant force acting on it? (The buoyant force = the weight of the liter of water) (a) 11.3 N (b) 1000 N (c) 9.8 N (d) 9.8 kg