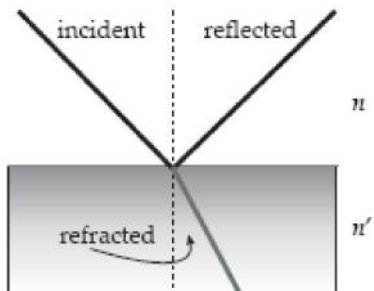


AP Physics 2 - Chapter 22 Practice**Multiple Choice**

Identify the choice that best completes the statement or answers the question.

- _____ 1. A light ray is incident on the surface of water ($n = 1.33$) at an angle of 60° relative to the normal to the surface. The angle of the reflected wave is
a. 80° b. 40° c. 20° d. 60° e. 30°
- _____ 2. A light ray whose frequency is 6.00×10^{14} Hz in vacuum is incident on water ($n = 1.33$). The wavelength of the light after it enters the water is (in nm)
a. 798 b. 500 c. 665 d. 376 e. 266
- _____ 3. The speed of light changes when it goes from ethyl alcohol ($n = 1.36$) to carbon tetrachloride ($n = 1.46$). The ratio of the speed in carbon tetrachloride to the speed in ethyl alcohol, v_2/v_1 , is
a. 1.99 b. 1.07 c. 0.932 d. 0.511 e. 0.760
- _____ 4. Light is refracted through a diamond. If the angle of incidence is 30° , and the angle of refraction is 12° , what is the index of refraction?
a. 1.3 b. 2.4 c. 2.6 d. 1.8 e. 0.4
- _____ 5. A diver shines light up to the surface of a flat glass-bottomed boat at an angle of 30° relative to the normal. If the index of refraction of water and glass are 1.33 and 1.5, respectively, at what angle (in degrees) does the light leave the glass (relative to its normal)?
a. 26 b. 35 c. 42 d. 22 e. 48
- _____ 6. A person looks horizontally at the edge of a swimming pool. If its length is 5 m, and the pool is filled to the surface, to what depth (in m) could the observer see? (n for water is 1.33)
a. 3.2 b. 4.4 c. 2.1 d. 1.0 e. 0.3

- _____ 7. Light strikes a diamond ($n = 2.42$) at an angle of 60° relative to the normal to the surface. What is the angle of refraction?
 a. 21° b. 30° c. 38° d. 69° e. 71°
- _____ 8. A layer of ethyl alcohol ($n = 1.361$) is on top of water ($n = 1.333$). To the nearest degree, at what angle relative to the normal to the interface of the two liquids is light totally reflected?
 a. 78° c. 68° e. critical angle undefined
 b. 88° d. 49°
- _____ 9. A monochromatic (single frequency, single wavelength) light ray in air ($n = 1$) enters a glass prism ($n = 1.5$). In the glass prism
 a. both the frequency and the wavelength are the same as in air
 b. the frequency is the same, but the wavelength is greater than in air.
 c. the frequency is the same, but the wavelength is smaller than in air.
 d. the wavelength is the same, but the frequency is greater than in air.
 e. the wavelength is the same, but the frequency is smaller than in air.
- _____ 10. A light ray is partially reflected and partially refracted at a boundary between two media, the upper one having index of refraction n , the lower one having index of refraction n' , as shown in the figure. The reflected ray is perpendicular to the refracted ray when



- a. $n' = n \tan \theta_{\text{incident}}$ c. $n' = n \frac{\sin \theta_{\text{incident}}}{\sin \theta_{\text{reflection}}}$ e. $n' = n \sec \theta_{\text{incident}}$
 b. $n' = n \cot \theta_{\text{incident}}$ d. $n' = n \frac{\sin \theta_{\text{reflection}}}{\sin \theta_{\text{incident}}}$

**AP Physics 2 - Chapter 22 Practice
Answer Section**

MULTIPLE CHOICE

1. D
2. D
3. C
4. B
5. C
6. B
7. A
8. A
9. C
10. A