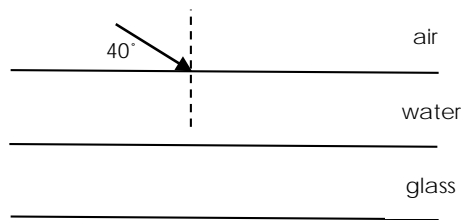


Snell's Law and Critical Angles

1. A light wave traveling in air passes into the water in a swimming pool at an angle of incidence of 35° . Calculate the angle of refraction of the light in water.
2. Light entering a block of glass at an angle of incidence of 18.5° leaves the boundary between the air and the glass at an angle of 12.0° . What is the index of refraction of this type of glass?
3. Light is incident on diamond at an angle of 10.0° . At what angle will it refract?
4. A transparent material has a refractive index of 1.27. What is the angle of incidence in air when the angle of refraction in the substance is 43° ?
5. What is the index of refraction of a material if the angle of incidence in air is 50° and the angle of refraction in the material is 40° ?
6. A ray of light passes from water into carbon disulphide ($n_r = 1.63$) with an angle of incidence of 30° . What is the angle of refraction in the carbon disulphide?
7. Green light traveling in air has an angle of incidence of 50° as it passes into a certain glass. The refracted angle in the glass is 33° . What is the index of refraction for this type of glass?
8. A ray of light travels from air into water then into glass ($n = 1.50$) as shown in the diagram. Find the angle of refraction in the glass.



For questions 9 – 11, assume the other medium is air.

9. Calculate the critical angle for diamond.
10. What is the critical angle for a glass that has an index of refraction of 1.500?
11. A certain material has a critical angle of 52.0° . What is its index of refraction?

Answers:

1. $\theta_r = 26^\circ$
2. $n_r = 1.53$
3. $\theta_r = 4^\circ$
4. $\theta_i = 60^\circ$
5. $n_r = 1.19$
6. $\theta_r = 24^\circ$
7. $n_r = 1.41$
8. $\theta_r = 31^\circ$
9. $\theta_c = 24^\circ$
10. $\theta_c = 42^\circ$
11. $n_i = 1.27$