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?

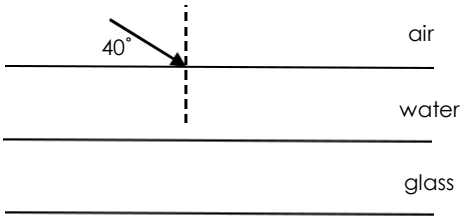
4. A transparent material has a refractive index of 1.27. What is the angle of incidence in air when the angle of refraction in the substance is 43˚?

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. $_r$ 26
2. n_r 1.53
3. $_r$ 4
4. $_i$ 60
5. n_r 1.19
6. $_r$ 24
7. n_r 1.41
8. $_r$ 31
9. $_c$ 24
10. $_c$ 42
11. n_i 1.27