Refraction III

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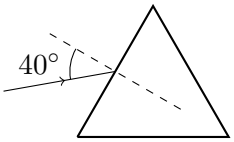
Take the refractive index of glass to be 1.50, and water to be 1.33.

1. Find the angle of refraction when...
   (a) ...a ray of light is travelling from air to glass at an angle of incidence of 40°.
   (b) ...a ray of light is travelling from glass to air at an angle of incidence of 20°.
2. A ray of light is incident on the surface of a glass block. The angle of incidence is 60°. Calculate the angle of refraction.
3. A ray of light is incident on a glass–water boundary. The angle of incidence is 50°. Calculate the angle of refraction.
4. A ray of light is incident on a flat surface of an ice block, at an angle of incidence of 24°. If the refractive index of ice is 1.31 , calculate
   (a) the angle of refraction of the ray,
   (b) the angle through which the ray is deviated upon entering the block.
5. Calculate the angle of refraction and the angle through which the ray is deviated when a light ray travels...
   (a) from air to water with an angle of incidence of 48°.
   (b) from water to glass at an angle of 24°.
6. *A narrow beam of white light strikes one face of an equilateral glass prism as shown in the diagram. The angle of incidence is 40°.



   The colours in the white light refract by different amounts. If the refractive index of red light is 1.53, and that of violet light is 1.55, calculate the angular separation of the red and violet rays in the spectrum produced by the prism.
7. **For light incident on the surface of e.g. glass or water, the Brewster angle θ_B is the angle of incidence for which the reflected ray is completely plane polarized horizontal to the surface. This occurs when the angle between the refracted ray and the reflected ray is 90°. Can you work out θ_B using Snell's law if you know the refractive indices n_1 and n_2? (*Hint:* Remember that $\sin(90° - \theta°) = \cos\theta°$.)