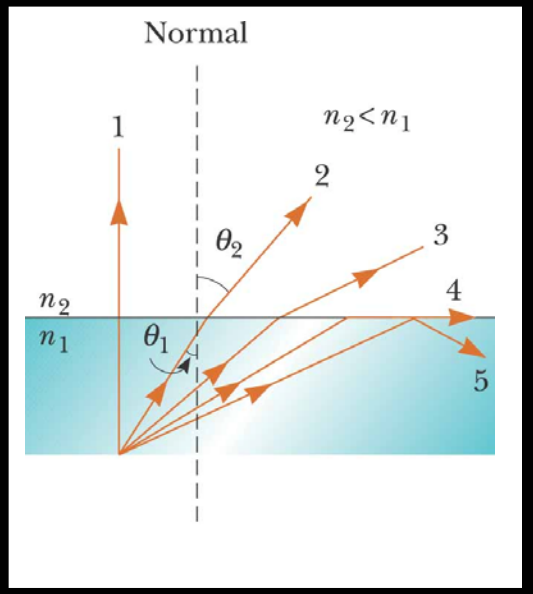
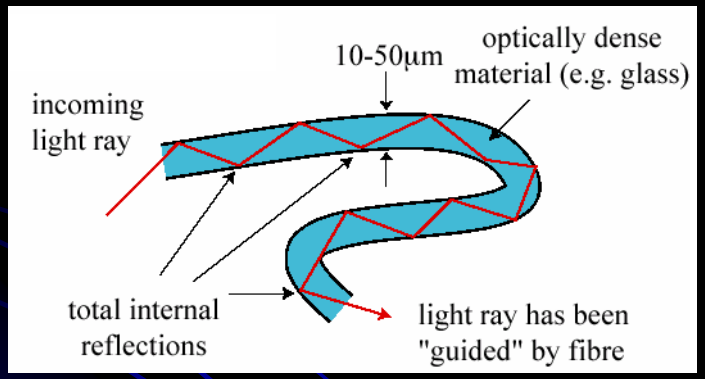
35.8 Total internal reflection

For angles of incidence larger than a critical angle, there is no refracted ray and all the light is reflected.

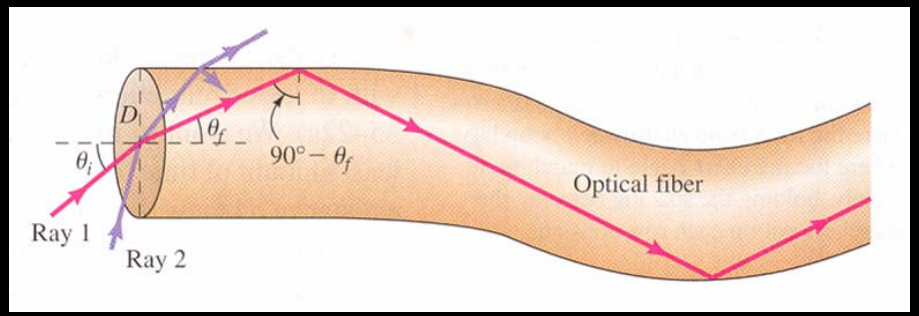
$$\theta_c = \sin^{-1}(n_2/n_1)$$



- **Applications :** Fiber optics



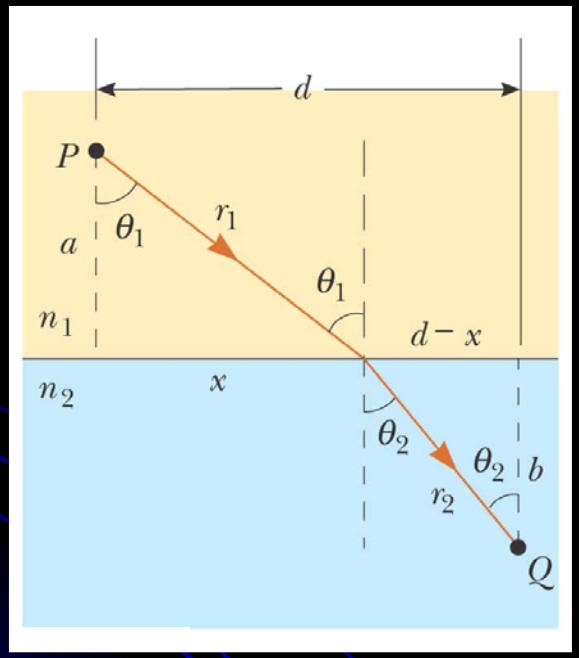
- Critical value of *n* for fiber optics :



35.9 Fermat's principle

Principle of least time : When a light ray travels between any two points, its path is the one that requires the least time.

- Derivation of Snell's law of refraction using Fermat's principle.



$$n_1 \sin\theta_1 = n_2 \sin\theta_2$$

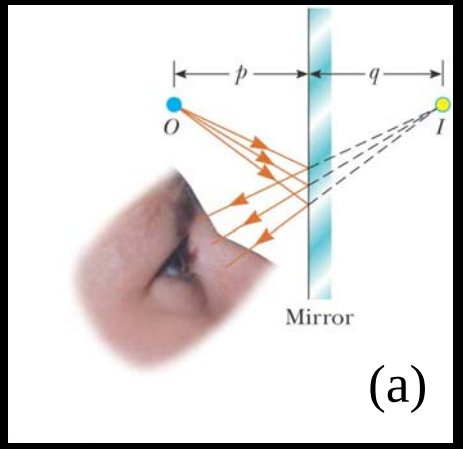
- Derivation of law of reflection : $\theta_1 = \theta_2$

Chapter 36 Image Formation (Geometric Optics)

36.1 Images formed by reflection from flat mirrors

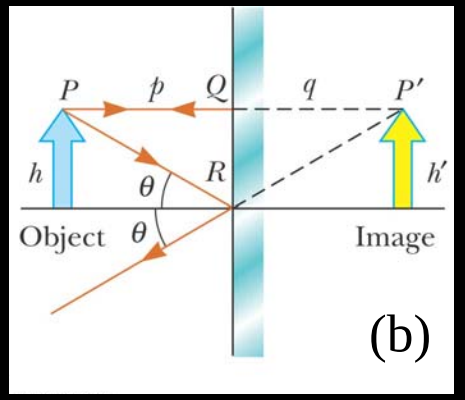
a) Image from point object

- Images are located by extending diverging rays back to a point from which they appear to diverge.
- *Virtual image* : formed when the light rays do not pass through the image point but appear to diverge from that point.



b) Image from extended object

Lateral magnification : $M = h'/h$



c) Multiple images

Example :

A student is 198 cm tall. How tall must a vertical mirror be if he is to be able to see his entire length in it ?