

Problem 8.41 The curved face of a planar convex lens has a radius of curvature of 3 cm and the index of refraction of the lens material is 1.5. Determine the focal length of the lens when:

- (a) the planar surface of the lens faces the light, and
- (b) the convex surface of the lens faces the light.

Solution:

(a)

$$\frac{1}{f} = (n - 1) \left(\frac{1}{R_1} - \frac{1}{R_2} \right) = (1.5 - 1) \left(\frac{1}{\infty} - \frac{1}{-3} \right) = \frac{0.5}{3},$$
$$f = 6 \text{ cm.}$$

(b)

$$\frac{1}{f} = (1.5 - 1) \left(\frac{1}{3} - \frac{1}{\infty} \right) = \frac{0.5}{3},$$
$$f = 6 \text{ cm.}$$

Thus, f of a planar convex lens is positive regardless which side faces the incident light.