Problems

16.1 Reflection 12.

Some telephoto cameras use a mirror rather than a lens. What radius of curvature is needed for a concave mirror to replace a 0.800 -m focal-length telephoto lens?

a. 0.400 m
b. 1.60 m
c. 4.00 m
d. 16.0 m

13.

What is the focal length of a makeup mirror that produces a magnification of 2.00 when a person's face is 8.00 cm away?

a. –16 cm
b. –5.3 cm
c. 5.3 cm
d. 16 cm

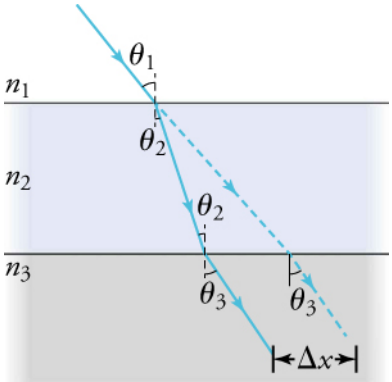
16.2 Refraction 14.

An optical fiber uses flint glass ($n = 1.66$) clad with crown glass ($n = 1.52$) . What is the critical angle?

a. 33.2°
b. 23.7°
c. 0.92 rad
d. 1.16 rad

15.

Suppose this figure represents a ray of light going from air ($n = 1.0003$) through crown glass ($n = 1.52$) into water, similar to a beam of light going into a fish tank.



Calculate the amount the ray is displaced by the glass (Δx), given that the incident angle is 40.0° and the glass is 1.00 cm thick.

a. 0.839 cm
b. 0.619 cm
c. 0.466 cm
d. 0.373 cm

16.3 Lenses 16.

A camera's zoom lens has an adjustable focal length ranging from 80.0 to 200 mm . What is its range of powers?

a. The lowest power is 0.05 D and the highest power is 0.125 D.
b. The lowest power is 0.08 D and the highest power is 0.20 D.
c. The lowest power is 5.00 D and the highest power is 12.5 D.
d. The lowest power is 80 D and the highest power is 200 D.

17.

Suppose a telephoto lens with a focal length of 200 mm is being used to photograph mountains 10.0 km away. (a) Where is the image? (b) What is the height of the image of a 1,000-m-high cliff on one of the mountains?

a. (a) The image is 0.200 m on the same side of the lens. (b) The height of the image is – 2.00 cm.
b. (a) The image is 0.200 m on the opposite side of the lens. (b) The height of the image is – 2.00 cm.
c. (a) The image is 0.200 m on the opposite side of the lens. (b) The height of the image is +2.00 cm.
d. (a) The image is 0.100 m on the same side of the lens. (b) The height of the image is +2.00 cm.