Chapter 26

Problems & Exercises

1.

52.0 D

3.

(a) −0.233 mm

(b) The size of the rods and the cones is smaller than the image height, so we can distinguish letters on a page.

5.

(a) +62.5 D

(b) –0.250 mm

(c) –0.0800 mm

6.

2.00 m

8.

(a) ±0.45 D

(b) The person was nearsighted because the patient was myopic and the power was reduced.

10.

0.143 m

12.

1.00 m

14.

20.0 cm

16.

–5.00 D

18.

25.0 cm

20.

–0.198 D

22.

30.8 cm

24.

$-0.444\ D$

26.

(a) 4.00

(b) 1600

28.

(a) 0.501 cm

(b) Eyepiece should be 204 cm behind the objective lens.

30.

(a) +18.3 cm (on the eyepiece side of the objective lens)

(b) -60.0

(c) -11.3 cm (on the objective side of the eyepiece)

(d) +6.67

(e) -400

33.

-40.0

35.

-1.67

37.

+10.0 cm

39.

(a) 0.251 m

(b) Yes, this thickness implies that the shape of the cornea can be very finely controlled, producing normal distant vision in more than 90% of patients.

40.

$$\frac{1}{d_i} + \frac{1}{d_0} = \frac{1}{f}\frac{1}{d_i} = \frac{1}{f} - \frac{1}{d_0} = \frac{1}{4.00 \text{ mm}} - \frac{1}{6.00 \text{ mm}}$$

$$d_i = 12.0 \text{ mm}$$

$$m_0 = -\frac{d_i}{d_0} = -\frac{12.0}{6.00} = -2.00$$

$$\frac{1}{d'_i} + \frac{1}{d'_0} = \frac{1}{f}\frac{1}{d'_i} = \frac{1}{f} - \frac{1}{d'_0} = \frac{1}{50 \text{ mm}} - \frac{1}{13.0 \text{ mm}}$$

(a) $d'_i = -17.6 \text{ mm}$

$$m_e = -\frac{-17.6}{13} = 1.35$$

$$m = -2(1.35) = -2.70$$

$$\frac{1}{d_i} + \frac{1}{d_0} = \frac{1}{f}\frac{1}{d_i} = \frac{1}{f} - \frac{1}{d_0} = \frac{1}{4.00 \text{ mm}} - \frac{1}{5.00 \text{ mm}}$$

$$d_i = 20.0 \text{ mm}$$

$$m_0 = -\frac{d_i}{d_0} = -\frac{20.0}{5.00} = -4.00$$

$$\frac{1}{d'_i} + \frac{1}{d'_0} = \frac{1}{f}\frac{1}{d'_i} = \frac{1}{f} - \frac{1}{d'_0} = \frac{1}{50 \text{ mm}} - \frac{1}{5.00 \text{ mm}}$$

$$d'_i = -5.56 \text{ mm}$$

$$m_e = -\frac{-5.56}{5} = 1.11$$

$$m = -4(1.11) = -4.44$$

(b) It increased.

(c) The magnification should decrease.

(d) In both cases the image is inverted.