Chapter 25

Problems & Exercises

1.

Top 1.715 m from floor, bottom 0.825 m from floor. Height of mirror is 0.890 m, or precisely one-half the height of the person.

5.

2.25×10^8 m/s in water

2.04×10^8 m/s in glycerine

7.

1.490, polystyrene

9.

1.28 s

11.

1.03 ns

13.

$n = 1.46$, fused quartz

17.

(a) 0.898

(b) Can't have $n < 1.00$ since this would imply a speed greater than c.

(c) Refracted angle is too big relative to the angle of incidence.

19.

(a) $\frac{c}{5.00}$

(b) Speed of light too slow, since index is much greater than that of diamond.

(c) Angle of refraction is unreasonable relative to the angle of incidence.

22.

66.3

24.

> 1.414

26.

1.50, benzene

29.

46.5, red; 46.0, violet

31.

(a) 0.043^{o}

(b) 1.33 m

33.

71.3^{o}

35.

53.5^{o}, red; 55.2^{o}, violet

37.

5.00 to 12.5 D

39.

$-0.222\ m$

41.

(a) 3.43 m

(b) 0.800 by 1.20 m

42.

(a) −1.35 m (on the object side of the lens).

(b) +10.0

(c) 5.00 cm

43.

44.4 cm

45.

(a) 6.60 cm

(b) –0.500

47.

(a) +7.50 cm

(b) 13.3 D

(c) Much greater

49.

(a) +6.67

(b) +20.0

(c) The magnification increases without limit (to infinity) as the object distance increases to the limit of the focal distance.

51.

-0.933 mm

53.

$+0.667$ m

55.

(a) -1.5×10^{-2} m

(b)$-66.7\ D$

57.

$+0.360$ m (concave)

59.

(a) +0.111

(b) -0.334 cm (behind “mirror”)

(c) 0.752cm

61.

$m = \frac{h_\text{i}}{h_\text{o}} = -\frac{d_\text{i}}{d_\text{o}} = -\frac{-d_\text{o}}{d_\text{o}} = \frac{d_\text{o}}{d_\text{o}} = 1 \Rightarrow h_\text{i} = h_\text{o}$

63.

6.82 kW/m^2

65.

$v_{610} = \frac{3.00\times10^8}{1.530}\text{m/s}$, $v_{410} = \frac{3.00\times10^8}{1.514}\text{m/s}$

(a) $3.00 \times 10^8\left(\frac{1}{1.514} - \frac{1}{1.530}\right)\text{m/s} = 2.07 \times 10^6$ m/s

(b) No.

(c) No.

(d) Yes.