11 Review, pp. 396–399

9. 580 N/m
11. $4A$
19. 9.7 m
21. a. 0.57 s
    b. 1.8 Hz
27. 1/3 s; 3 Hz
35. 0.0333 m
39. a. 0.0 cm
    b. 48 cm
43. a, b, and d ($\lambda = 0.5L$, L, and $2L$, respectively)
45. 1.7 N
47. 446 m
49. 9.70 m/s^2
51. 9:48 A.M.

CHAPTER 12

Practice A, p. 415

1. a. 8.0×10^{-4} W/m^2
   b. 1.6×10^{-3} W/m^2
   c. 6.4×10^{-3} W/m^2
3. 2.3×10^{-5} W
5. 4.8 m

Practice B, p. 427

1. 440 Hz
3. a. 82.1 Hz
   b. 115 Hz
   c. 144 Hz

12 Review, pp. 434–437

23. 7.96×10^{-2} W/m^2
25. a. 4.0 m
    b. 2.0 m
    c. 1.3 m
    d. 1.0 m
29. 3 Hz
35. 3.0×10^3 Hz
37. 5 beats per second
39. 0.20 s
41. $L_{closed} = 1.5 \ (L_{open})$

43. a. 5.0×10^4 W
    b. 2.8×10^{-3} W

CHAPTER 13

Practice A, p. 449

1. 1.0×10^{-13} m
3. 85.7 m–10.1 m; The wavelengths are shorter than those of the AM radio band.
5. 5.4×10^{14} Hz

Practice B, p. 462

1. $p = 10.0$ cm: no image (infinite q); $p = 5.00$ cm: $q = -10.0$ cm, $M = 2.00$; virtual, upright image
3. $R = 1.00 \times 10^2$ cm; $M = 2.00$; virtual image

Practice C, p. 466

1. $p = 46.0$ cm; $M = 0.500$; virtual, upright image; $h = 3.40$ cm
3. $p = 45$ cm; $h = 17$ cm; $M = 0.41$; virtual, upright image
5. $q = -1.31$ cm; $M = 0.125$; virtual, upright image

13 Review, pp. 476–480

7. 3.00×10^8 m/s
11. 1×10^{-6} m
13. 9.1×10^{-3} m (9.1 mm)
21. 1.2 m/s; The image moves toward the mirror's surface.
35. $q = 26$ cm; real, inverted; $M = -2.0$
47. inverted; $p = 6.1$ cm; $f = 2.6$ cm; real
49. $q_2 = 6.7$ cm; real; $M_1 = -0.57$, $M_2 = -0.27$; inverted

51. $p = 11.3$ cm
55. $R = -25.0$ cm
57. concave, $R = 48.1$ cm; $M = 2.00$; virtual

CHAPTER 14

Practice A, p. 493

1. 18.5°
3. 1.47

Practice B, p. 501

1. 20.0 cm, $M = -1.00$; real, inverted image
3. -6.67 cm, $M = 0.333$; virtual, upright image

Practice C, p. 508

1. 42.8°
3. 49.8°

14 Review, pp. 514–519

11. 26°
13. 30.0°, 19.5°, 19.5°, 30.0°
23. yes, because $n_{ice} > n_{air}$
25. 3.40; upright
37. a. 31.3°
    b. 44.2°
    c. 49.8°
39. 1.31
41. 1.62; carbon disulfide
43. 7.50 cm
45. a. 6.00 cm
    b. A diverging lens cannot form an image larger than the object.
47. a. 3.01 cm
    b. 2.05 cm
49. blue: 47.8°, red: 48.2°
51. 48.8°
53. 4.54 m
55. $\dfrac{10}{9}f$