29. **a.** 8.34 A
b. 119 V
35. 221 V
37. **a.** a step-down transformer
b. 1.2×10^3 *V*
43. 790 turns
45. **a.** a step-up transformer
b. 440 V
47. 171 : 1
49. 300 V

CHAPTER 21

Practice A, p. 755

1. 2.0 Hz
3. 1.2×10^{15} Hz

Practice B, p. 758

1. 4.83×10^{14} Hz
3. 2.36 eV

Practice C, p. 769

1. 4.56×10^{14} Hz; *Line 4*
3. 1.61×10^{15} Hz
5. E_6 to E_2; *Line 1*

Practice D, p. 774

1. 39.9 m/s
3. 8.84×10^{-27} m/s
5. 1.0×10^{-15} kg

21 Review, pp. 779–781

11. 4.8×10^{17} Hz
13. 1.2×10^{15} Hz
23. **a.** 2.46×10^{15} Hz
b. 2.92×10^{15} Hz
c. 3.09×10^{15} Hz
d. 3.16×10^{15} Hz
33. 1.4×10^7 m/s
35. 2.00 eV
37. 0.80 eV

CHAPTER 22

Practice A, p. 796

1. 160.65 MeV; 342.05 MeV
3. 7.933 MeV

Practice B, p. 802

1. ${}^{12}_{6}\mathrm{C}$
3. ${}^{14}_{6}\mathrm{C}$
5. ${}^{63}_{28}\mathrm{Ni} \rightarrow {}^{63}_{29}\mathrm{Cu} + {}^{0}_{-1}e + \overline{\nu}$

Practice C, p. 805

1. $4.23 \times 10^3\ \mathrm{s}^{-1}$, 0.23 Ci
3. $9.94 \times 10^{-7}\ \mathrm{s}^{-1}$, 6.7×10^{-7} Ci
5. **a.** about 5.0×10^7 atoms
b. about 3.5×10^8 atoms

22 Review, pp. 820–823

1. 79; 118; 79
7. 92.162 MeV
9. 8.2607 MeV/nucleon; 8.6974 MeV/nucleon
21. **a.** ${}^{4}_{2}\mathrm{He}$
b. ${}^{4}_{2}\mathrm{He}$
23. 560 days
27. **a.** $-e$
b. 0
33. 1.2×10^{-14}
35. 3.53 MeV
37. **a.** ${}^{1}_{0}n + {}^{197}_{79}\mathrm{Au} \rightarrow {}^{198}_{80}\mathrm{Hg} + {}^{0}_{-1}e + \overline{\nu}$
b. 7.885 MeV
39. ${}^{3}_{2}\mathrm{He}$
41. 2.6×10^{21} atoms
43. **a.** ${}^{8}_{4}\mathrm{Be}$
b. ${}^{12}_{6}\mathrm{C}$
45. 3.8×10^3 s
47. 1.1×10^{16} fission events

APPENDIX I

Additional Problems

1. 11.68 m
3. $6.4 \times 10^{-2}\ \mathrm{m}^3$
5. 6.7×10^{-5} ps
7. 2.80 h = 2 h, 48 min
9. 4.0×10^1 km/h
11. 48 m/h
13. +25.0 m/s = 25.0 m/s, upward
15. 44.8 m/s
17. $-21.5\ \mathrm{m/s^2} = 21.5\ \mathrm{m/s^2}$, backward
19. 38.5 m
21. 126 s
23. 1.27 s
25. 11 km/h
27. 2.74 s
29. 10.5 m, forward
31. 5.9 s
33. 8.3 s
35. 7.4 s
37. $-490\ \mathrm{m/s^2} = 490\ \mathrm{m/s^2}$, backward
39. 17.3 s
41. 7.0 m
43. 2.6 m/s
45. −11.4 m/s = 11.4 m/s, downward
47. 8.5° north of east
49. 5.0° south of west
51. 770 m
53. −33 km/h = 33 km/h, downward
55. 18.9 km, 76° north of west
57. 17.0 m
59. 52.0°
61. 79 s
63. 15.8 m, 55° below the horizontal
65. 0.290 m/s, east; 1.16 m/s, north
67. 2.6 km