Chapter 41 Even Answers

2. 105 V

4. $\sim 10^2$ eV

6. 6.03 pm

8. (a) 0.250 m/s (b) 2.25 m

10. 3.79×10^{28} m, 190 times the diameter of the universe

12. The electron energy must be $\sim 100 mc^2$ or larger. The proton energy can be as small as $1.001 mc^2$, which is quite classical.

14. 1/2

16. (a) $n = 4$ (b) 6.03 eV

18. (a) 0.434 nm (b) 6.00 eV

20. $\sqrt{3h\lambda/8m_e c}$

22. 0.517 MeV, 3.31×10^{-20} kg · m/s

24. (a) $L/2$ (b) 5.26×10^{-5}

(c) 3.99×10^{-2} (d) See Figure 41.11(b)

26. 0.250

28. (a) 0.196 (b) 0.608 (c) classical probability = 1/3

30. See solution

32. $E = \mathrm{h}^2 k^2 / 2m$

34. (a) $U(x) = \dfrac{\mathrm{h}^2}{2mL^2}\left(\dfrac{4x^2}{L^2} - 6\right)$ (b) See solution

36. See solution

38. 1.03×10^{-3}

40. 1.35

44. 600 nm

48. (a) 2.00×10^{-10} m (b) 3.31×10^{-24} kg · m/s (c) 0.172 eV

50. (a) See solution (b) $R = 0.0920,\ T = 0.908$

52. (a) See Fig. 41.11 in the text (b) 0.200

(c) 0.351 (d) 0.377 eV, 1.51 eV

54. 2.81×10^{-8}

56. (a) E/h (b) hc/E (c) $\Delta E = h/4\pi T$

58. (a) $2/\sqrt{L}$ (b) 0.409

60. (a) 4.68×10^{-12} m (b) 2.34×10^{-10} m

62. (a) $\sqrt{\left(\frac{nhc}{2L}\right)^2 + m^2c^4} - mc^2 \quad n = 1,\ 2,\ 3,\ \ldots$

(b) 4.69×10^{-14} J; 28.6%

64. (a) $E = 3\hbar\omega/2$ (b) $x = 0$ (c) $x = \pm\sqrt{\hbar/m\omega}$

(d) $\left(4m^3\omega^3/\pi\hbar^3\right)^{1/4}$ (e) 0 (f) $8\delta\left(m\omega/\pi\hbar\right)^{1/2}e^{-4}$

66. 2.25