Chapter 13 Even Answers

2. (b) 1.82 s (c) No, the force is not in the form of Hooke's law.
4. (a) 4.33 cm (b) –5.00 cm / s (c) –17.3 cm / s^2 (d) 3.14 s, 5.00 cm
8. (a) 2.40 s (b) 0.417 Hz (c) 2.62 rad / s
10. (a) 1.26 s (b) 0.150 m / s, 0.750 m / s^2
(c) $x = -3.00\cos(5.00t)$ cm, $v = 15.0\sin(5.00t)$ cm / s, $a = 75.0\cos(5.00t)$ cm / s^2
12. (a) 0.542 kg (b) 1.81 s (c) 1.20 m / s^2
14. (a) $\frac{v}{\omega}$ (b) $x = -\left(\frac{v}{\omega}\right)\sin\omega t$
16. (a) 126 N / m (b) 0.178 m
18. (a) 0.153 J (b) 0.784 m / s (c) 17.5 m / s^2
20. (a) 100 N / m (b) 1.13 Hz (c) 1.41 m / s (d) 10.0 m / s^2
(e) 2.00 J (f) 1.33 m / s (g) 3.33 m / s^2
22. (a) E increases by a factor of 4 (b) v_{max} is doubled
(c) a_{max} also doubles (d) period is unchanged
24. (a) 0.218 s and 1.09 s (b) 14.6 mW
26. $\frac{g_{\text{Cambridge}}}{g_{\text{Tokyo}}} = 1.0015$
28. 1.42 s, 0.499 m
30. (a) 3.65 s (b) 6.41 s (c) 4.24 s
32. (a) $L = 1.00$ m, $T = 1.996$ s; $L = 0.750$ m, $T = 1.732$ s; $L = 0.500$ m, $T = 1.422$ s
(b) 9.85 m / s^2 (c) % difference ≈ 0.5%
34. (a) 2.09 s (b) 4.08%
36. $203\mu\text{N}\cdot\text{m}$
38. (b) 0.628 s
44. (a) 1.00 s (b) 5.09 cm
46. 318 N
48. 1.74 Hz
50. 1.57 s
52. (a) 0.500 m / s (b) 8.56 cm
54. $\frac{\mu_s g}{4\pi^2 f^2}$
58. (a) $4\pi^2 m / T^2$ (b) $m(T' / T)^2$
60. (b) 1.23 Hz
62. (a) 15.8 rad / s (b) 5.23 cm (c) 1.31 cm, π radians
64. ~10^1 m
66. (a) $\frac{1}{2}\left(M + \frac{m}{3}\right)v^2$ (b) $2\pi\sqrt{\frac{M + m/3}{k}}$
68. (a) 1.74 N / m ± 6% (b) 1.82 N / m ± 3% (c) 8 grams ± 12%
70. (a) 5.20 s (b) 2.60 s
72. For $\theta_{max} = 5.00°$: precise agreement
For $\theta_{max} = 100°$: large differences,
period is 23% greater than small-angle period