Chapter 9 Even Answers

2. (a) 0 (b) 1.06 **j** kg · m / s
4. 31.0 m / s
6. (a) 6.00 m / s toward the left (b) 8.40 J
8. 364 kg·m / s, 438 N
10. (a) 5.40 N·s in direction of v_f (b) –27.0 J
12. (a) (9.05**i** + 6.12**j**) N · s (b) (377**i** + 255**j**) N
14. $\sim 10^3$ N
16. $\bar{F}$ = 3750 N, no broken bones
18. $\frac{4M}{m}\sqrt{gl}$
20. 15.6 m / s
22. (a) 2.50 m / s (b) ΔK = –37.5 kJ
24. 2.66 m / s
26. 0.556 m
28. 7.94 cm
30. v_{green} = 7.07 m / s, v_{blue} = 5.89 m / s
32. (a) $v_i / \sqrt{2}$ (b) ±45.0°
34. (a) 1.07 m / s at –29.7° (b) $\Delta K / K_i$ = –0.318
36. v_{orange} = 3.99 m / s, v_{yellow} = 3.01 m / s
38. (45.4**i** + 80.6**j**) m / s, or 92.5 m / s at 60.6°
40. $\mathbf{r}_{\text{cm}}$ = (0**i** + 1.00**j**) m
42. 4.67×10^6 m
44. See Instructor's Manual
46. (b) (–2.00**i** – 1.00**j**) m (c) (3.00**i** – 1.00**j**) m / s (d) (15.0**i** – 5.00**j**) kg · m / s
48. (a) (–0.189**i** + 0.566**j**) m / s (b) 0.596 m / s at 108° (c) $\mathbf{r}_{\text{CM}}$ = (–0.189**i** + 0.566**j**)t m
50. (a) v_{1f} = –0.780 m / s, v_{2f} = 1.12 m / s (b) 0.360**i** m / s
52. (a) 8000 kg / s (b) 6.91 km / s
54. (a) 430 kg (b) 14.3 s
56. 291 N
58. $\left(\frac{M+m}{m}\right)\sqrt{\frac{gd^2}{2h}}$
60. (a) –0.667 m / s (b) 0.952 m
62. 3.20×10^4 N, 7.13 MW
64. (a) 3.54 m / s (b) 1.77 m (c) 3.54×10^4 N
(d) No, the normal force of the rail contributes upward momentum to the system
66. (a) $v = \frac{m_1 v_1 + m_2 v_2}{m_1 + m_2}$ (b) $x_{\text{m}} = (v_1 - v_2)\sqrt{\frac{m_1 m_2}{k(m_1 + m_2)}}$
(c) $v_{1f} = \left(\frac{m_1 - m_2}{m_1 + m_2}\right) v_1 + \left(\frac{2m_2}{m_1 + m_2}\right) v_2$, $v_{2f} = \left(\frac{2m_1}{m_1 + m_2}\right) v_1 + \left(\frac{m_2 - m_1}{m_1 + m_2}\right) v_2$
68. See Instructor's Manual
70. (a) 6.30 m / s (b) 6.17 m / s
72. $2v_i$ and 0
74. (a) (20.0**i** + 7.00**j**) m / s (b) (4.00 **i**) m / s^2 (c) (4.00 **i**) m / s^2 (d) (50.0**i** + 35.0**j**) m
(e) 600 J (f) 674 J (g) 674 J