Chapter 7 Answers to Problems

1. 0 **2.** 3.5×10^4 kg·m/s south **4.** 4.2 m/s **5.** 3 kg·m/s north **6.** (a) 3.00 (b) 9.00 **7.** 20 kg·m/s in the $-x$-direction **8.** 1.0×10^2 kg·m/s downward **9.** 1.0×10^2 kg·m/s downward **10.** 7.5 N in the direction of the sled's velocity **11.** 320 s **12.** (a) 3.8 kg·m/s at 37º above the horizontal direction opposite $\mathbf{v}_i$ (b) 75 N in the same direction as $\Delta\mathbf{p}$ **13.** 6.0×10^3 N opposite the car's direction of motion **14.** (a) 25 m/s at 37º north of east (b) 60 kg·m/s east **15.** (a) 750 kg·m/s upward (b) 990 N·s downward (c) 2500 N downward **16.** 29 m/s **17.** (a) 11 m/s (b) 1300 N **18.** 1.8 m/s **19.** (a) 33 m/s (b) 0.94 N down **20.** 0.010 m/s **21.** 2.6×10^5 m/s **22.** 100 m/s (224 mph), Dash will not succeed **23.** 0.30 m/s **24.** 4.8 m **25.** 0.10 m/s **26.** 1500 kg **27.** (8.0 cm, 20 cm) **28.** (4.2 cm, 0) **29.** 4.0 cm in the positive x-direction **30.** (1.9 m, 1.4 m) **31.** (0.900 m, −2.15 m) **32.** (27 cm, −5.8 cm) **33.** 21 cm **34.** 98.0 m/s downward **35.** (6 m/s, −4 m/s) **36.** 5 m/s west **37.** (a) (−0.13 m/s, −4.1 m/s) (b) the center of mass of the system remains at the origin after the explosion **39.** 270 m/s to the right **40.** −0.15 m/s **41.** (a) 0.20 m/s (b) 0.25 m/s **42.** 3.0 m/s east **43.** 5.0 m/s **44.** 350 m/s **45.** 2.0 kg·m/s to the right **46.** 0.066 m/s **47.** 43 m/s **48.** 2.50 m/s in the $+x$-direction, 2.50 m/s in the $-x$-direction **49.** 3.0 m/s **50.** 4.8 m/s **51.** 0.20 kg **52.** (a) 0.30 m/s to the left (b) The final kinetic energy is greater than the initial kinetic energy. The extra kinetic energy comes from the elastic potential energy stored in the spring. **53.** 0.49 m **55.** 5.0 m/s **57.** 170 m/s **58.** 5.4 m/s **59.** (a) $-1.00m_1v_i$, $0.751m_1v_i$ (b) m_1v_i, $-0.751m_1v_i$, The momentum changes for each mass are equal and opposite. **60.** 0.27 m/s at 53º to the left **61.** $1.73v_{1f}$ **62.** 4.0 m/s **63.** 8.7 kg·m/s **64.** (a) 11 m/s at 47° S of E (b) 210 kJ **65.** 6.0 m/s at 21° S of E **66.** $(v_i/2,-v_i/(2\sqrt{3}))$ **67.** 1.7 m/s at 30° below the x-axis **68.** 0.64 m/s at 73° above the $+x$-axis **69.** 20 m/s at 18° W of N **70.** 0.83 m/s **71.** 10.2 m/s **72.** 37 m/s in the $+x$-direction **73.** 5.0×10^9 kg·m/s **74.** (a) 11 kg·m/s (b) 11 kg·m/s (c) 3.8 kN **75.** 34 N **76.** (5.00 cm, 6.67 cm) **77.** (2.0 in, 0.75 in, 0.25 in) **78.** 410 N **79.** 5000 N, 500 N **80.** (a) 0.01 kg·km/h opposite the car's motion (b) 0.01 kg·km/h along the car's velocity (c) 10^5 flies **81.** (a) 5.3 kg·m/s opposite the ball's direction of motion (b) 5.3 kg·m/s opposite the ball's direction of motion (c) 1.8 kN opposite the ball's direction of motion **82.** 2.8 m/s **83.** (a) 148.6º CCW from the electron's direction (b) 9.60×10^{-19} kg m/s in the direction found in (a) **84.** (a) 2.5 m (b) 4.0 m **85.** the lighter car was speeding **86.** 740 m/s **87.** 10^{-18} N **88.** 1/3 89. $h/9$ **90.** (0.50 cm, 0) **91.** 10 m/s **92.** After the collision, glider 1 is stationary and glider 2 has a velocity of 0.20 m/s in the direction of glider 1's initial velocity. **93.** (a) 111/2 (b) 1 (c) 111/2