Chapter 11 Even Answers

2. 44.8 J

4. $v_{\text{disk}} = \sqrt{\frac{4gh}{3}}$, $v_{\text{ring}} = \sqrt{gh}$, the disk

6. $x_{\max} = 3.19$ m

8. (a) 2.38 m / s (b) 4.31 m / s (c) The ball does not reach the top of the loop.

10. (a) 740 cm^2 (b) 59.5 cm

12. (a) 168° (b) 11.9° (c) Only the first method gives unambiguous results.

14. No; the cross product vector must be perpendicular to the known vector.

16. (a) $-7.00\mathbf{k}$ N · m (b) $11.0\mathbf{k}$ N · m

18. $F_3 = F_1 + F_2$, No

20. $-22.0\mathbf{k}$ kg · m^2 / s

24. (a) 3.14 N·m (b) $0.400v$ (c) 7.85 m/s^2

26. (a) 9.03×10^9 kg · m^2 / s (south) (b) No (c) zero

28. 103 N·m

30. (a) 0.360 kg · m^2 / s (b) 0.540 kg · m^2 / s

32. 1.20 kg · m^2 / s

34. 7.14 rev / min

36. (a) 9.20 rad / s (b) 9.20 rad / s

38. (a) 7.20×10^{-3} kg · m^2 / s (b) 9.47 rad / s

40. 12.3 m/s^2

42. ~10^{-13} rad / s

44. (a) $\frac{7}{3}md^2$ (b) $(mgd)\mathbf{k}$ (c) $\frac{3g}{7d}$ counterclockwise (d) $\frac{2g}{7}$ upward
(e) mgd (f) $\sqrt{\frac{6g}{7d}}$ (g) $m\sqrt{\frac{14gd^3}{3}}$ (h) $\sqrt{\frac{2gd}{21}}$

46. (a) (0.00589 W)t (b) 2.59 N · m (c) (0.0925 W / s)t (d) 40.7 W
(e) (3.70 N / s)t (f) 8.96 kJ (g) –4.48 kJ (h) 4.48 kJ

48. 0.910 km / s

50. (a) zero (b) The monkey and the bananas move upward with the same speed. He will not reach the bananas.

52. (a) $7.35\mathbf{i}$ N (b) $-3.68\mathbf{i}$ N (c) 0.827 m from the top

54. (a) $\frac{6mv_i}{(M + 3m)d}$ (b) $\frac{M}{M + m}$

56. ~10^1 m

58. (a) $\sqrt{\frac{3gh}{4}}$ (b) $\sqrt{\frac{3gh}{4}}$

60. (a) Mvd (b) Mv^2 (c) Mvd (d) $2v$ (e) $4Mv^2$ (f) $3Mv^2$

62. (a) $\sqrt{\frac{4g(R^3 - r^3)}{3r^2}}$ (b) 5.31×10^4 m / s (c) It goes into internal energy.

64. (a) $\frac{\omega_i}{3}$ (b) $\frac{2}{3}$

66. $4\left[\frac{ga(\sqrt{2} - 1)}{3}\right]^{1/2}$

68. F_1 clockwise torque, F_2 zero torque, F_3 and F_4 counterclockwise torque