Suggested problems
Chapter 08

The quiz questions will be same or very similar to the following text-book problems.
Refer to the course website for the latest version of this document.
You are encouraged to seek the help of your instructor during his office hours.

6. In Fig. 8-31, a small block of mass m = 0.032 kg can slide along the frictionless loop-the-loop, with loop radius R = 12 cm. The block is released from rest at point P, at height h = 5.0R above the bottom of the loop. How much work does the gravitational force do on the block as the block travels from point P to (a) point Q and (b) the top of the loop? If the gravitational potential energy of the block–Earth system is taken to be zero at the bottom of the loop, what is that potential energy when the block is (c) at point P, (d) at point Q, and (e) at the top of the loop? (f) If, instead of merely being released, the block is given some initial speed downward along the track, do the answers to (a) through (e) increase, decrease, or remain the same?

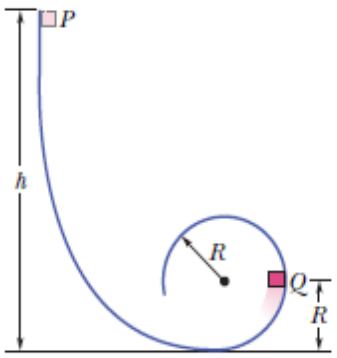

Fig. 8-31 Problems 6 and 17.

Answer: (a) 0.15 J ; (b) 0.11 J; (c) 0.19 J (d) 0.038 J (e) 0.07 J (f) unchanged

7. Figure 8-32 shows a thin rod, of length L = 2.00 m and negligible mass, that can pivot about one end to rotate in a vertical circle. A ball of mass m = 5.00 kg is attached to the other end. The rod is pulled aside to angle $\theta_0 = 30.0°$ and released with initial velocity $\vec{v}_0 = 0$. As the ball descends to its lowest point, (a) how much work does the gravitational force do on it and (b) what is the change in the gravitational potential energy of the ball–Earth system? (c) If the gravitational potential energy is taken to be zero at the lowest point, what is its value just as the ball is released? (d) Do the magnitudes of the answers to (a) through (c) increase, decrease, or remain the same if angle θ_0 is increased?

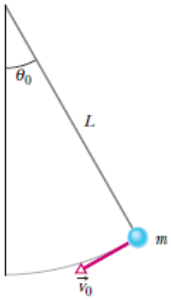

Fig. 8-32 Problems 7, 18, and 21.

Answer: (a) 13.1 J; (b) −13.1 J; (c) 13.1 J; (d) all increase

19. Figure 8-34 shows an 8.00 kg stone at rest on a spring.The spring is compressed 10.0 cm by the stone. (a) What is the spring constant? (b) The stone is pushed down an additional 30.0 cm and released.What is the elastic potential energy of the compressed spring just before that release? (c) What is the change in the gravitational potential energy of the stone–Earth system when the stone moves from the release point to its maximum height? (d) What is that maximum height, measured from the release point?

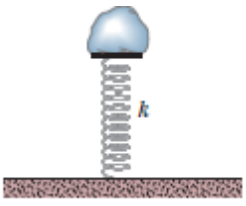

Fig. 8-34 Problem 19.

Answer: (a) 784 N/m (b)62.7 J (c) 62.7 J (d) 80.0 cm

31. A block with mass m = 2.00 kg is placed against a spring on a frictionless incline with angle θ = 30.0° (Fig. 8-42). (The block is not attached to the spring.) The spring, with spring constant k = 19.6 N/cm, is compressed 20.0 cm and then released. (a) What is the elastic potential energy of the compressed spring? (b) What is the change in the gravitational potential energy of the block – Earth system as the block moves from the release point to its highest point on the incline? (c) How far along the incline is the highest point from the release point?

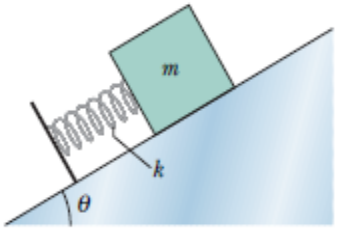

Fig. 8-42 Problem 31.

Answer: (a) 39.2 J; (b) 39.2 J (c) 4.00 m