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.

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?

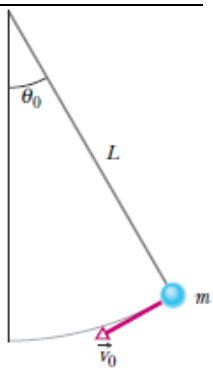

Fig. 8-32 Problems 7, 18, and 21.

Answer: (a) 13.1 J (b) –13.1 J (c) 13.1 J (d) increase

22. A 60 kg skier starts from rest at height H = 20 m above the end of a ski-jump ramp (Fig. 8-35) and leaves the ramp at angle θ = 28°. Neglect the effects of air resistance and assume the ramp is frictionless. (a) What is the maximum height h of his jump above the end of the ramp? (b) If he increased his weight by putting on a backpack, would h then be greater, less, or the same?

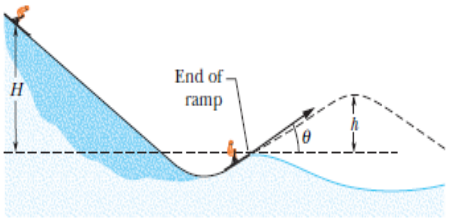

Fig. 8-35 Problem 22.

Answer: (a) 4.4 m (b) same

45. A rope is used to pull a 3.57 kg block at constant speed 4.06 m along a horizontal floor. The force on the block from the rope is 7.68 N and directed 15.0° above the horizontal.What are (a) the work done by the rope's force, (b) the increase in thermal energy of the block–floor system, and (c) the coefficient of kinetic friction between the block and floor?

Answer: (a) 30.1 J (b) 30.1 J (c) 0.225

56. You push a 2.0 kg block against a horizontal spring, compressing the spring by 15 cm. Then you release the block, and the spring sends it sliding across a tabletop. It stops 75 cm from where you released it. The spring constant is 200 N/m. What is the block–table coefficient of kinetic friction?

Answer: (a) 0.15

79. A 1500 kg car begins sliding down a 5.0° inclined road with a speed of 30 km/h. The engine is turned off, and the only forces acting on the car are a net frictional force from the road and the gravitational force. After the car has traveled 50 m along the road, its speed is 40 km/h. (a) How much is the mechanical energy of the car reduced because of the net frictional force? (b) What is the magnitude of that net frictional force?

Answer: (a) 2.4×10^4 J (b) 4.8×10^2 N

83. A 15 kg block is accelerated at 2.0 m/s^2 along a horizontal frictionless surface, with the speed increasing from 10 m/s to 30 m/s.What are (a) the change in the block's mechanical energy and (b) the average rate at which energy is transferred to the block? What is the instantaneous rate of that transfer when the block's speed is (c) 10 m/s and (d) 30 m/s?

Answer: (a) 6.0×10^3 J (b) 600 W (c) 300W (d) 900 W