1. Problems solved in the Student Solution Manual on WileyPlus:
   8-5, 8-29, 8-45, 8-69, 8-75, 8-122.

2. It’s been a great day of new, frictionless snow. Julie starts at the top of the 60° slope shown in the figure, 25 m above the ground level. At the bottom, a circular arc carries her through a 90° vertical turn (the arc is not symmetric with respect to vertical), and she then launches off a 3.0-m-high ramp. How far horizontally is her touchdown point from the end of the ramp?

3. A block of mass \( m \) slides down a frictionless track, then around the inside of a frictionless circular vertical loop-the-loop of radius \( R \). From what minimum height \( h \) must the block start in order to make it around the loop without falling off? Give your answer as a multiple of \( R \).

4. A pendulum consists of a ball of mass \( m \) and of a massless string of length \( L \). There is a peg at the height \( L/3 \) above the lowest point of the pendulum’s motion, see the figure. From what minimum angle \( \theta \) should the pendulum be released in order for the ball to go above the peg without the string going slack?

(a) Use energy conservation to find the velocity of the ball at its lowest point as a function of \( \theta \).

(b) Noting that from this point on the motion becomes circular, determine the minimum velocity that the ball must have at the point directly above the peg for the motion to remain circular at this point.

(b) Use again the energy conservation, now for the circular motion between the bottom and top points, to find the minimum value of \( \theta \).
5. A 10 kg box slides 4.0 m down the frictionless ramp shown in the figure, then collides with the spring whose spring constant is 250 N/m.

(a) What is the maximum compression of the spring?
(b) At what compression of the spring does the box have its maximum velocity? *Hint:* There is no force acting on the box at this instant, explain why.

6. A 10 g particle has the potential energy graph shown in the figure.

(a) Draw a force vs. position graph from $x = 0$ to $x = 8$ cm.
(b) How much work does the force do as the particle moves from $x = 2$ to $x = 6$ cm?
(c) What speed does the particle need at $x = 2$ cm to arrive at $x = 6$ with a speed of 10 m/s?

7. A 5.0 kg box slides down a 5.0 m high frictionless hill starting from rest. After reaching the bottom of the hill, it continues on a flat 2.0 m long rough horizontal surface where the coefficient of the kinetic friction between the box and the surface is 0.25. At the end of this surface, the box hits a horizontal spring with the spring constant of 500 N/m (the other end of the spring is anchored against a wall). The surface below the spring is again frictionless.

(a) What is the speed of the box just before reaching the rough surface?
(b) What is the speed of the box just before hitting the spring?
(c) How far is the spring compressed?
(d) Including the first crossings, how many *complete* trips across the rough surface will the box make before coming to rest?