Problem 6.56

You put your little sister (mass m) on a swing whose chains have length L and pull slowly back until the swing makes an angle ϕ with the vertical.

Find the work that you do.

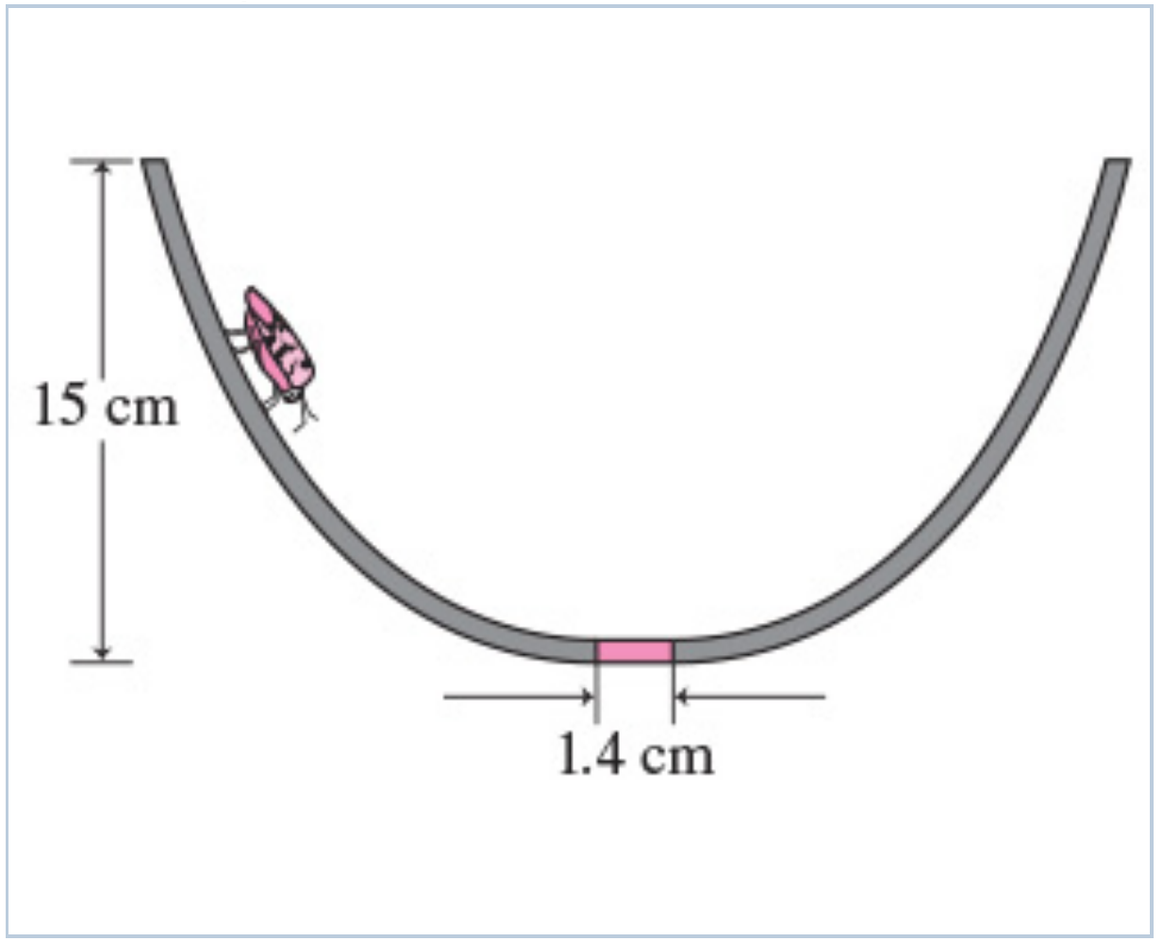
Problem 6.84

You push an object of mass m slowly, partway up a loop-the-loop track of radius R, starting from the bottom, where the normal force to the track is vertically upward, and ending at a point a height $h < R$ above the bottom. The coefficient of friction between the object and the track is a constant μ.

Find the work you do against friction

Problem 7.54

A bug slides back and forth in a bowl 15 cm deep, starting from rest at the top, as shown in . The bowl is frictionless except for a 1.4-cm-wide sticky patch on its flat bottom, where the coefficient of friction is 0.89.



How many times does the bug cross the sticky region?

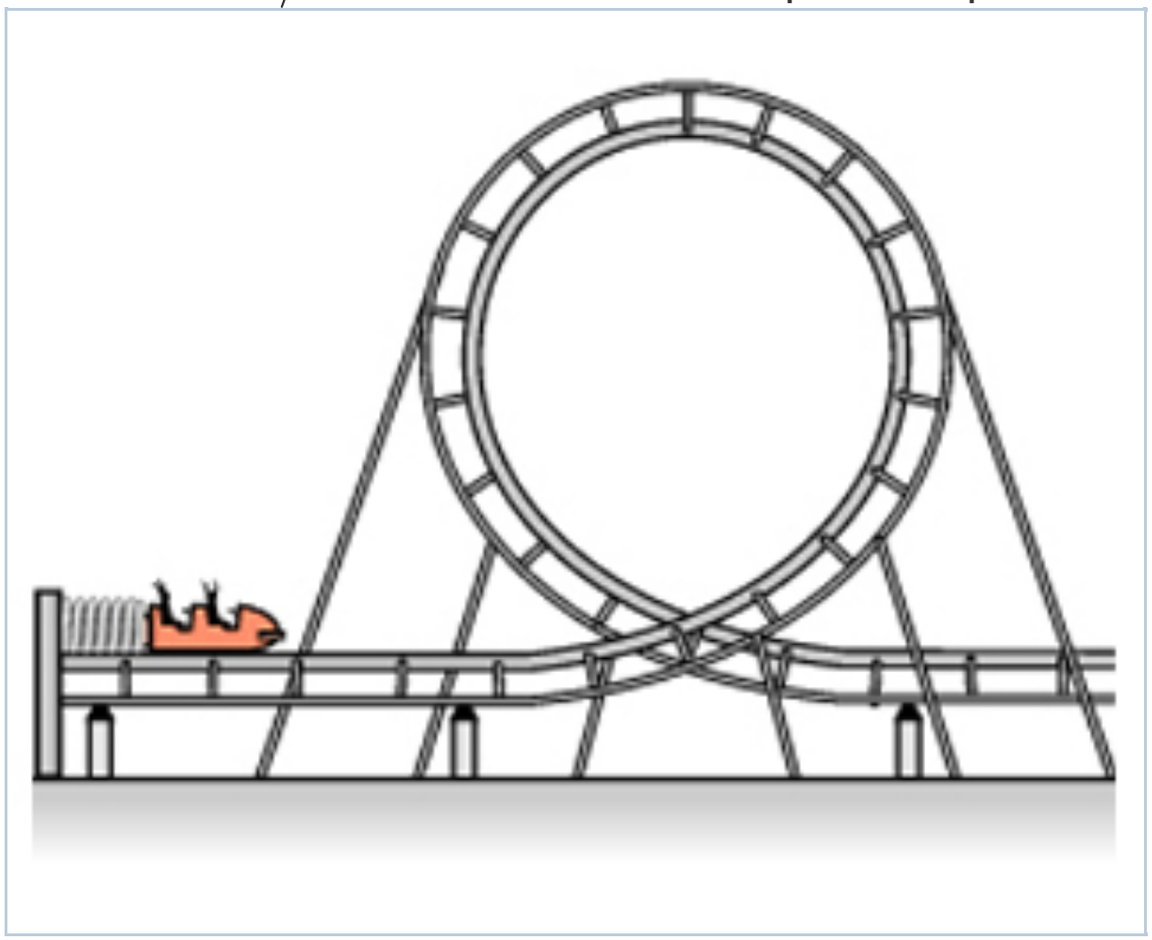
Problem 7.60

A bug lands on top of the frictionless, spherical head of a bald man. It begins to slide down his head (see the figure).

Show that the bug leaves the head when it has dropped a vertical distance one-third the radius of the head.

Problem 7.57

An 870 kg roller-coaster car is launched from a giant spring of constant 38 $\mathrm{kN/m}$ into a frictionless loop-the-loop track of radius 7.1 m , as shown in the figure.



What is the minimum amount that the spring must be compressed if the car is to stay on the track?