**P8.2-4)** A pendulum consisting of a 0.5-kg sphere and a 0.5-kg rod is pinned at O. The system is released from rest in the vertical position. The pendulum is allowed to fall in the clockwise direction until it compresses a spring (k = 2000 N/m) and, momentarily, comes to rest. If the spring is originally 12 centimeters in length (l_o), determine the shortest compressed length of the spring (l). The length of the rod is L = 1 m and the radius of the sphere is r = 0.1 m.
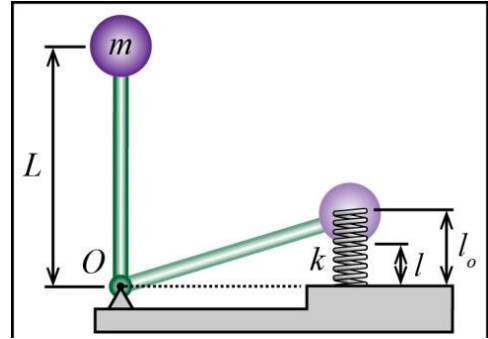
Given:

Find:

Solution:

Set up the problem.

Label your states on the figure.

Identify your zero gravitational potential energy on the figure.

Is this a conservative or non-conservative system?

Conservative   Non-conservative

What type of motion does each body experience? Indicate: **Pure translation**, **Pure rotation**, or **General planar** motion.

Sphere:

Rod:

Mass moment of Inertia

Calculate the appropriate mass moments.

$I_{sphere} = $ _____

$I_{rod} = $ _____

Work-energy balance

Write down in variable form, the work-energy balance equation that will be used to determine the compressed length of the spring.

WE.Eq: _____

l = 3.3 m