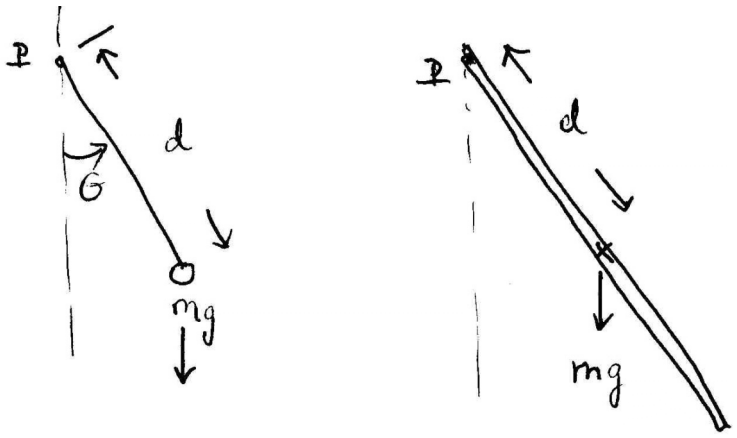
Simple Harmonic Oscillators and Torque
Concept Questions

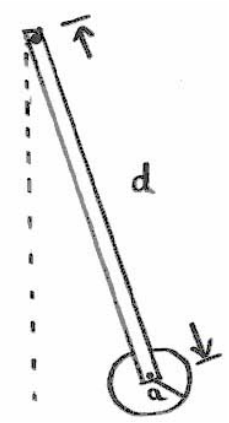
Question 1: The center of gravity of a simple pendulum of mass m and length d is located at the position of the pendulum bob, a distance d from the pivot point. The center of gravity of a uniform rod of mass m and length $2d$ pivoted at one end is also a distance d from the pivot point. How does the period of this uniform rod compare to the period of the simple pendulum for small oscillations?



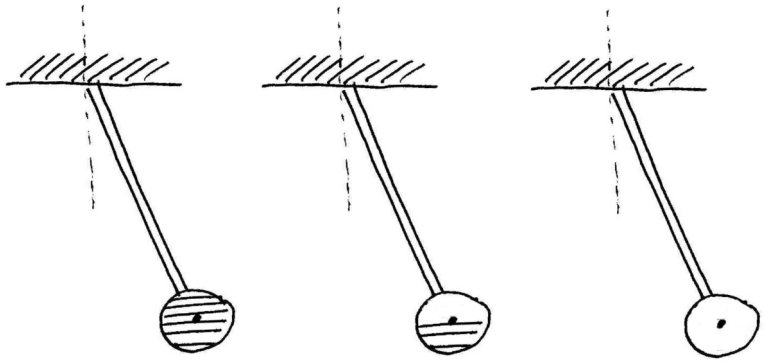
1. The rod has a longer period;
2. the rod has a shorter period;
3. the rod has the same period.

Question2 Physical Pendulum A physical pendulum consists of a uniform rod of length d and mass m pivoted at one end. A disk of mass m_1 and radius a is fixed to the other end. Suppose the disk is now mounted to the rod by a frictionless bearing so that is perfectly free to spin. Does the period of the pendulum

1. increase?
2. stay the same?
3. decrease?



Question 3 A physical pendulum consists of a rod and bob that is completely filled with water. As the pendulum oscillates through a very small angle, the water leaks out until the bob is empty. Describe how the angular frequency changes as the water is leaking out. You may treat the rod as massless.



8.01SC Physics I: Classical Mechanics