

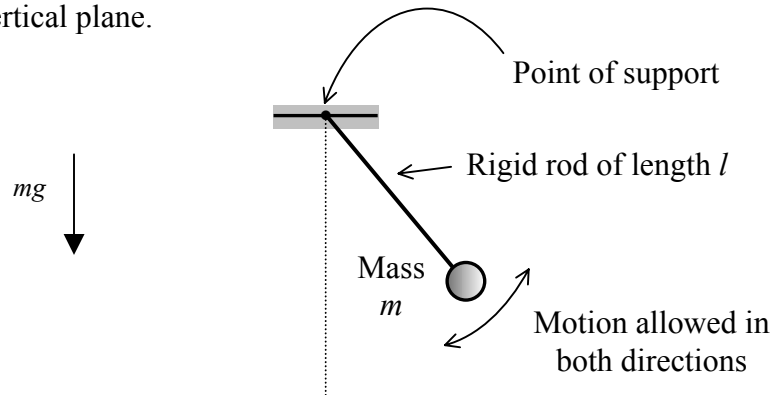
The University of Alabama at Birmingham (UAB)
Department of Physics

PH 461/561 – Classical Mechanics I – Fall 2005

Assignment # 9 Due: **Thursday, November 10**
(Turn in for credit!)

Activities in preparation for Nov. 10 lecture:

A pendulum is made by attaching a mass m to a massless rod of length l as shown in the figure. The pendulum is subject to gravity and can pivot about its point of support without friction. The support mechanism constrains the pendulum to move only on a fixed vertical plane.



1. Determine the number of degrees of freedom for the motion of the pendulum.
2. Provide mathematical expressions for any obvious constraints for its motion.
3. Describe qualitatively how you expect the pendulum to move.
4. Choose a suitable coordinate system for a detailed study of the motion of the pendulum.
5. Find expressions for the components of the net force in the chosen coordinate system.
6. Write the component equations of Newton's 2nd Law in the chosen coordinates.
7. Simplify the above equations as much as possible using any constraints for the motion.
8. Calculate $\nabla \times \vec{F}$ in the chosen coordinates. Is this system conservative?
9. Solve the equations of motion.