**ME 230 - Dynamics** Your Name:_____
Tutorial 8 Section No.:_____

Partners:_____ _____ _____
_____ _____ _____

## 2-D Kinematics and Mass Moment of Inertia

**1)** A cylindrical shell (pipe) and a solid cylinder, each of mass $m$ and radius $R$, are released from rest on a surface inclined at angle $\theta$ and allowed to roll a distance of $D$ feet. Determine the time (in seconds) it takes for each to roll this distance.

Write two general equations for the translational and rotational motion.

If there is no slipping, what equations exist that relate the angular displacement, velocity, and acceleration to the translational displacement, velocity, and acceleration.

Construct a free body diagram for the system.

Write the general equations for the angular acceleration of the pipe and cylinder in terms of the appropriate moments of inertia $I$ and the other constants and variables.

Solve for the acceleration of the center of mass, $a$, for both the pipe and the cylinder by using appropriate equations for $I$.