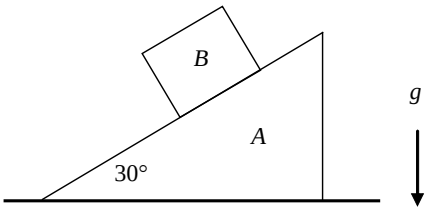
Department of Mechanical Engineering
University of California at Berkeley
ME 104 Engineering Mechanics II
Spring Semester 2010

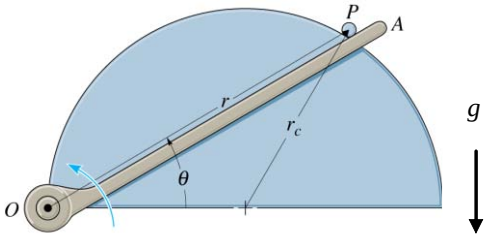
Instructor: F. Ma
Midterm Examination No. 1 Feb 26, 2010

The examination has a duration of 50 minutes.
Answer all questions.
All questions carry the same weight.

1. The 5-kg block *B* starts from rest and slides on the 10-kg wedge *A*, which rests on a horizontal surface. Neglecting friction, determine the acceleration of the wedge and the acceleration of the block relative to the wedge.



2. A particle *P* of mass *m* is guided along a smooth circular path of radius r_c by the rotating arm *OA*. If the arm has a constant angular velocity ω, determine the angle $\theta \le 45°$ at which the particle leaves the circular path. Some formulas that may be useful are: $a_t = \dot{v}$; $a_n = v^2/\rho$; $a_r = \ddot{r} - r\dot{\theta}^2$; $a_\theta = r\ddot{\theta} + 2\dot{r}\dot{\theta}$.



3. The force $P = 40\,\text{N}$ is applied to the system, which is initially at rest. Determine the speeds of *A* and *B* after *A* has moved 0.4 m.