PHYS 111
HOMEWORK #8

Due : 3 November 2016

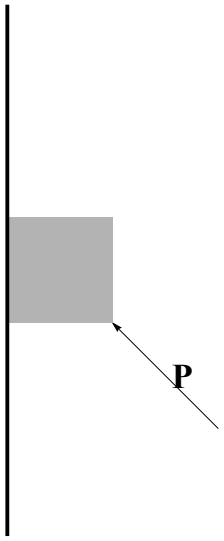
1. As we saw in class, an oscillating mass connected to a spring will have a period of oscillation that is determined by the mass of the object and the stiffness of the spring. In other words, the period of oscillation can be written as :

$P = c\,k^a\,m^b$

where c is a constant, k is the spring constant (units of N/m) and m is the mass (units of kg). Use the techniques of dimensional analysis to determine the coefficients a and b, and thus the equation for the period of an oscillating mass on a spring.

2. A block of mass m is held against a vertical wall by a force P (see diagram below). The coefficients of static and kinetic friction between the mass and wall are μ_s and μ_k respectively. P makes an angle θ with respect to the vertical. What value of P will cause the mass to move up the wall at a constant speed?

Out[56]=



3. A block slides down an inclined plane of angle θ at constant speed. It is then projected up the same plane with an initial speed of v_o. How far up the plane will it travel before coming to rest? (Your answer should be in terms of v_o, g and θ (but not μ)). Will it slide down again?

4. Problem 64, p. 151 text.

5. Problem 70, p. 151 text.

6. Read the bridging problem section on the bottom of p. 172. Draw a free body diagram for the mass if the cylinder is rotating. Answer the two questions posed in the write up (questions a) and b)). 20 points for this problem

7. Problem 4, p. 175 text.

8. Problem 5, p. 175 text.

9. Problem 8, p. 175 text.

10. Problem 10, p. 175 text.