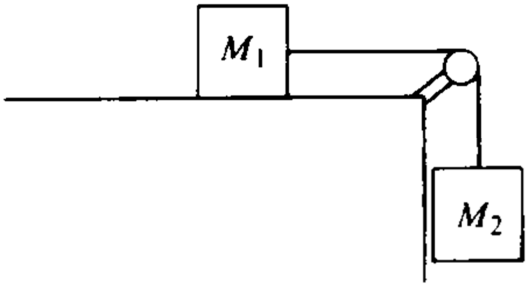
GP: Free Response Questions **Name:** _____

AP Physics 1 – McNutt Date: _____ Period: _____

LINEAR MOMENTUM PRACTICE

For each question, please highlight/underline the important information given, then organize your answers into coherent statements that are backed by equation-based evidence. You will need to identify and rearrange formulas to determine the correct answers.

1.) LINEAR MOMENTUM



In the system shown above, the block of mass M_1 is on a rough horizontal table. The string that attaches it to the block of mass M_2 passes over a frictionless pulley of negligible mass. The coefficient of kinetic friction μ_k between M_1 and the table is less than the coefficient of static friction μ_s.

a.) On the diagram below, draw and identify all the forces acting on the block of mass M_1.

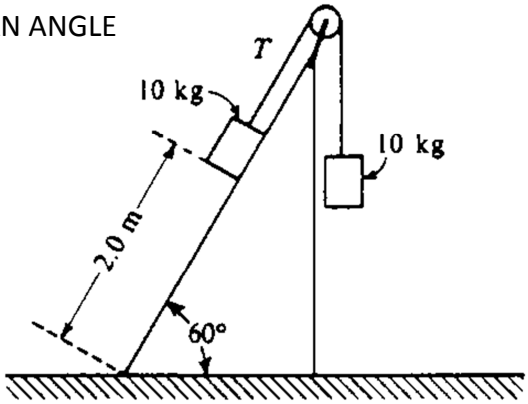
b.) In terms of M_1 and M_2 determine the minimum value of μ_s that will prevent the blocks from moving.

The blocks are set in motion by giving M_2 a momentary downward push. In terms of M_1, M_2, μ_k, and g, determine each of the following:

c.) The magnitude of the acceleration of M_1

d.) The tension in the string.

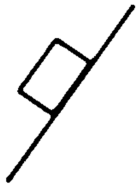
2.) LINEAR MOMENTUM AT AN ANGLE



Two 10-kilogram boxes are connected by a massless string that passes over a massless frictionless pulley as shown above. The boxes remain at rest, with the one on the right hanging vertically and the one on the left 2.0 meters from the bottom of an inclined plane that makes an angle of 60° with the horizontal. The coefficients of kinetic friction and static friction between the left-hand box and the plane are 0.15 and 0.30, respectively. You may use g = 10 m/s^2, sin 60° = 0.87, and cos 60° = 0.50.

a.) What is the tension T in the string?

b.) On the diagram below, draw and label all the forces acting on the box that is on the plane.



c.) Determine the magnitude of the frictional force acting on the box on the plane.