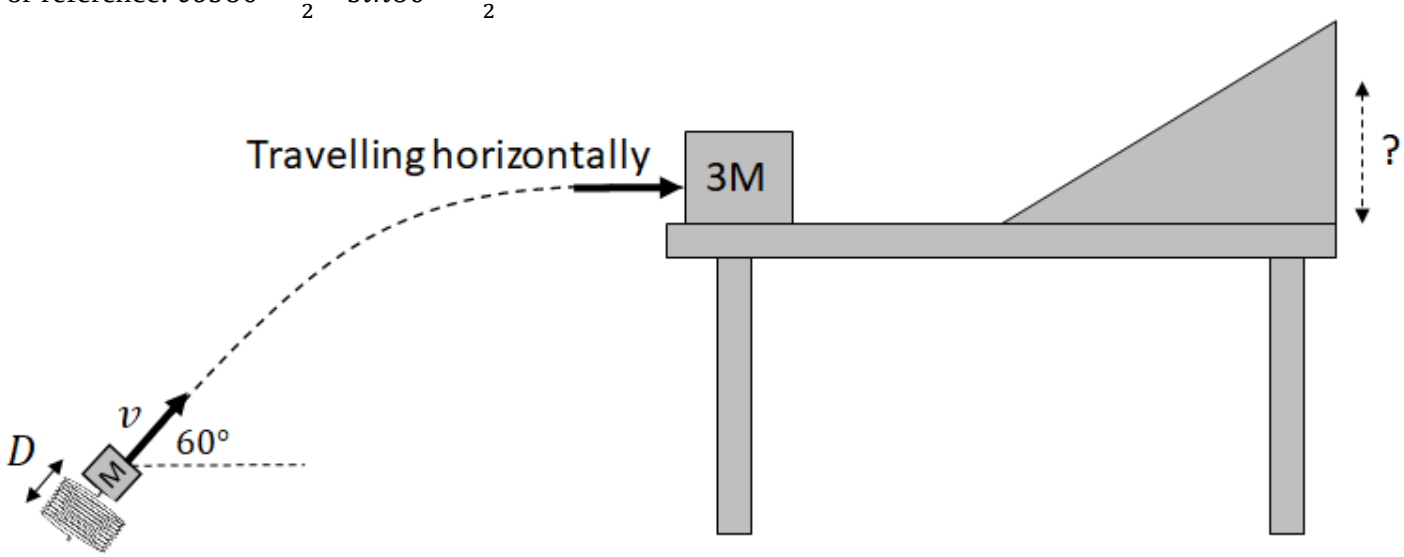
AP Physics 1
Unit 4 Quiz

Name: _____

For reference: $cos60 = \frac{1}{2}$ $sin60 = \frac{\sqrt{3}}{2}$



A block of mass M is pushed against a spring. The spring is compressed a distance of D from equilibrium. The block leaves the spring with a speed of v.

a) Determine an expression for the spring constant of the spring in terms of M, D, and v, as appropriate. Show your work.

The block leaves the spring traveling at a speed of v at an angle of 60° above the horizontal, as shown. When the block gets the top of its motion and is traveling *directly horizontally*, it collides and sticks to a block of mass 3M on a table.

b) Calculate the speed of the block of mass M right before it collides, when it is travelling horizontally at the apex of its motion. Answer in terms of v.

c) Calculate the speed of the combined blocks (4M) after they collide and stick together. Answer in terms of v. Show your work.

The combined blocks travel across the frictionless table, and encounter a frictionless incline.

d) Determine an expression for max height up the incline the blocks slide. Answer in terms of v *and* g. Show your work.