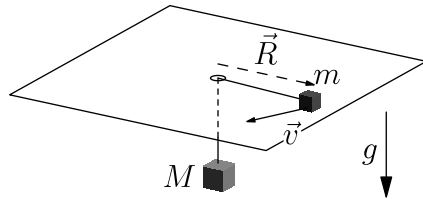


J10M.2 - Orbiting Mass on a String (J00M.3)

Problem



A hockey puck with mass m can move without friction or air resistance on the smooth horizontal surface of a table. A massless string attached to the puck passes through a hole in the table (through which it can slide without friction) and a mass M is suspended from its other end. Gravity acts uniformly in the downward direction. Treat the puck as a point mass.

- Given the masses m and M , plus the initial displacement \vec{R}_0 of the puck relative to the hole, and its initial velocity \vec{v}_0 in the plane of the table surface, find the equation that determines the maximum and minimum radial distances of the puck from the hole during its orbit. (Don't bother to solve this equation!)
- Find the frequency of oscillations of the radial distance when the orbit is close to being circular.