Sliding down a Sliding Plane

Consider the case of a particle of mass $\mathtt{m}$ sliding down a smooth inclined plane of mass $\mathtt{M}$ which is, itself, free to slide on a smooth horizontal surface, as shown in Figure 34. This is a two degree of freedom system, so we need two coordinates to specify the configuration. Let us choose $\mathtt{x}$, the horizontal distance of the plane from some reference point, and $\mathtt{x'}$, the parallel displacement of the particle from some reference point on the plane.

What are the accelerations of M and m?

Show that the total energy of the system at the beginning is equal to the total energy of the system when the particle reaches the bottom.

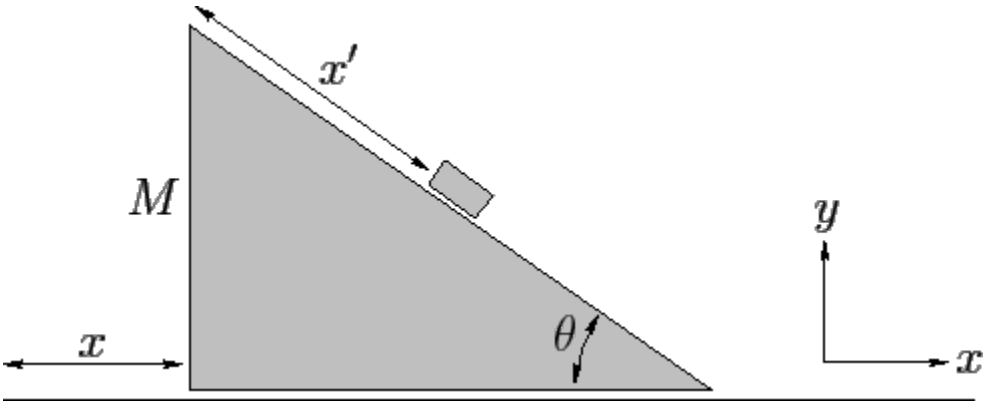

Figure 34: *A sliding plane.*