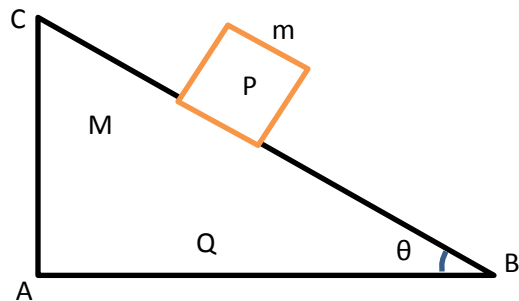


Answer on Question #77457, Physics -Mechanics -Relativity:

Question: A Block Q of mass M is placed on a horizontal frictionless surface AB and a body P of mass m is released on its frictionless slope. As P slides by a length L on this slope of inclination theta (θ) the block Q would slide by a distance -----.

Solution:



Here, mass of block Q = M

mass of block P = m

angle of inclination = θ

Since there is no external force in horizontal direction in block Q + mass system, so center of mass of block Q + mass system will not move.

Let, x_1 is the centre of mass of block Q from origin and x is the distance moved by block Q.

Now, initial centre of mass of the total system = $\frac{(Mx_1 + m L \cos \theta)}{(M+m)}$

And final centre of mass of the total system = $\frac{[M(x_1+x) + m x]}{(M+m)}$

So, $\frac{(Mx_1 + m L \cos \theta)}{(M+m)} = \frac{[M(x_1+x) + m x]}{(M+m)}$ [As the centre of mass not change]

Or, $x = \frac{m L \cos \theta}{(M+m)}$

Answer: Distance is $\frac{m L \cos \theta}{(M+m)}$.

Answer provided by <https://www.AssignmentExpert.com>