

### Answer on Question #68536 Physics / Other

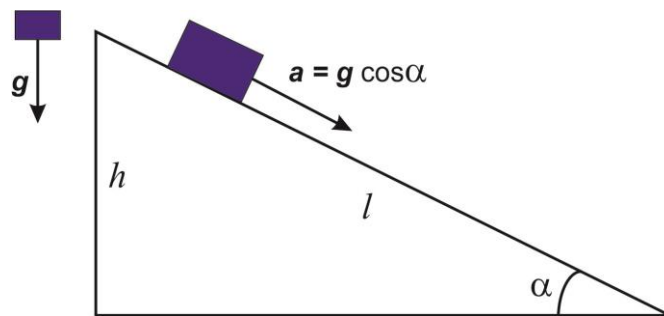
2 blocks are released from rest at the same time from a vertical height  $h$  above the ground level. Block one has mass  $M$  and falls straight down. Whereas block 2 has mass  $2M$  and slides down a frictionless incline. Assume that air resistance is negligible.

A) Which block reaches the ground level first?

B) when the blocks reach the ground level, which one will have a greater kinetic energy ?

**Solution:**

A)



Let the  $t_1$  and  $t_2$  are falling time for the block 1 and block 2 respectively. Thus

$$h = \frac{gt_1^2}{2}, \quad t_1 = \sqrt{\frac{2h}{g}}$$

$$l = \frac{at_2^2}{2}, \quad t_2 = \sqrt{\frac{2l}{a}}$$

$$a = g \sin \alpha, \quad l = \frac{h}{\sin \alpha}$$

$$t_2 = \sqrt{\frac{2l}{g \sin \alpha}}, \quad t_2 = \sqrt{\frac{2h}{g \sin^2 \alpha}} = \frac{t_1}{\sin \alpha}$$

Because  $0 < \sin \alpha < 1$ , thus  $t_2 > t_1$

B) From the conservation energy law

$$K_1 = Mgh$$

and

$$K_2 = 2Mgh$$

So

$$K_2 > K_1.$$

**Answer:** A) the block 1 reaches the ground level first. B) the block 2 will have a greater kinetic energy.