AP-1 Things on a Slope III (Energy)

An object that SLIDES down or up a slope is going through a VERTICAL HEIGHT and therefore the CONSERVATION OF ENERGY is a powerful tool in your problem solving arsenal.

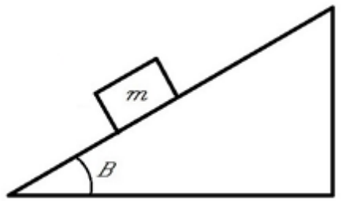
BASIC STUFF:

What energy does the block have at the top of the slope?

What energy does it have at the bottom of the slope?

Simple Case – no friction

This works both ways – in the case of a block sliding up the slope until it stops or from rest down the slope. If there is no external force applied then the GPE → KE.



Let m = 2 kg, angle B = 30° and the vertical height h = 3 m. Therefore the speed of the block at the bottom of the slope given the following scenarios:

a) The block starts from rest.

b) The block was given an initial speed of 0.5 m/s at the top of the slope.

Question: How does the speed of the block in scenario a) compare with one that was simply dropped from the same height?

Question: How would the time taken to reach the bottom compare – and why?

Harder Case - friction

When friction is present some of the energy of the block is lost to heat. Therefore, the conservation of energy 'statement of physics' is:

What happens to the speed of the block at the bottom, compared with before?

a) Use the same data as before and calculate the work done by the block on the slope – let the coefficient of kinetic friction be 0.1 and the angle of the slope at 30°. Remember that *work = force x distance*.

b) What is the final speed at the bottom of the slope?