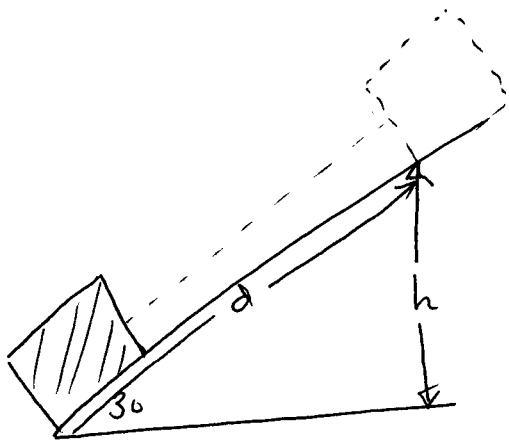
Physics 101
Quiz # 5
Chapter 8

Name : Solution Id : Sec. # :

1. A 4.0 kg block starts from the bottom of a 30° incline with an initial kinetic energy of 128 J. How far will the block slide up the incline if the coefficient of friction is 0.30?



Let block + incline + Earth to be the system.

The system is isolated

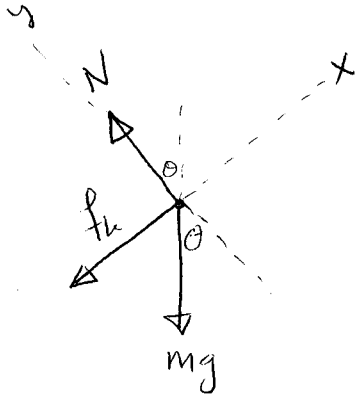
$\Rightarrow \Delta E_{tot} = 0$

$\Delta K + \Delta U + \Delta E_{int} = 0$

$\Delta K = K_f - K_i = 0 - 128 = -128\ J$

$\Delta U = mgh = mgd\sin\theta$

$\Delta E_{int} = f_k d$



But

$f_k = \mu_k N = \mu_k mg\cos\theta$

$\Rightarrow -128 + mgd\sin\theta + \mu_k mgd\cos\theta = 0$

$\Rightarrow d\left(mg\left[\sin\theta + \mu_k\cos\theta\right]\right) = 128$

$\Rightarrow d = \dfrac{128}{mg(\sin\theta + \mu_k\cos\theta)} = \dfrac{128}{4\times 9.8(\sin 30 + 0.3\times\cos 30)}$

$= 4.3\ m$