Homework H4.U

Given: Particle P (having a mass of m) is released on a rough incline (coefficient of kinetic friction of μ_k) at x = 0 with a downward speed of v.

Find: You are asked to determine the speed of the block at it has moved a distance of d down the incline.

- (a) Draw a free body diagram (FBD) of P.
- (b) Write down Newton's second law for P in terms of its x-coordinate.
- (c) Note that through the chain rule, you can write: $a = \ddot{x} = (dv/dx)(dx/dt) = v(dv/dx)$. Substitute this expression for a into your result from (a) above.
- (d) Use separation of variables and integration to determine the speed v of the block in terms of x. Substitute in the numerical values for the parameters to determine the speed at x = d.



Leave your answers in terms of, at most: m = 2 kg, v = 25 m/s, $\theta = 53.13^{\circ}$, d = 3 m and $\mu_k = 0.1$.