

Lab03 Sample Calculation

I want you to follow through this derivation and include it in your lab writeup.

A mass m is on an inclined plane. The plane is inclined at an angle θ and the coefficient of kinetic friction between the mass and the plane is μ .

- (a) Draw a sketch of the problem, showing all forces.
- (b) Resolve the weight into a component along the plane and perpendicular to the plane.
- (c) Sketch a free body diagram. Here you can assume an acceleration will exist.
- (d) Write Newton's laws.
- (e) Apply Newton's laws to obtain 3 equations.
- (f) Solve for N , and f and then:
- (g) Show how you obtain the result: $a = g(\sin(\theta) - \mu \cos(\theta))$.
- (h) Now imagine the plane is tilted just enough so that $a=0$. Show that under this condition, $\mu = \tan(\theta)$.
- (i) Suppose that a material in contact with another material had a coefficient of $\mu=0.5$. At what angle would the plane need to be tilted so that the material would slide without acceleration?