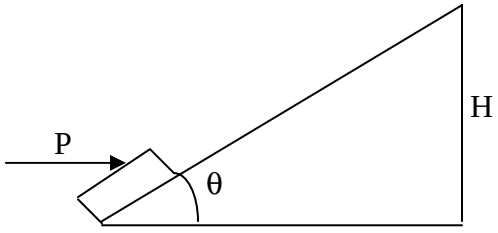
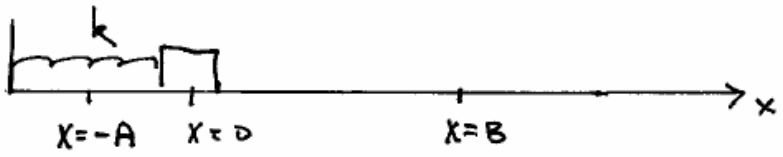
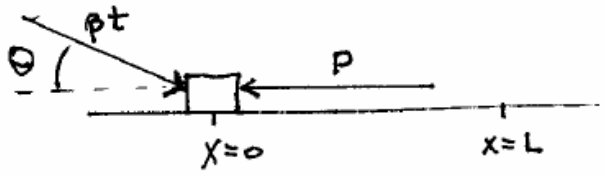
1. A block of mass m starts at rest at the bottom of an inclined plane with height H. Coefficient of friction is μ. In addition to other forces there is a horizontal force of magnitude P applied to the block. Use the Work-Energy Theorem to find the speed of the block at the top (assume that it is zero initially).



2. (25 points) A block of mass m is placed against a spring, spring constant k. The spring is compressed an amount A. After it is released from rest it moves on a surface which is frictionless until the point $x = B$. Starting at $x = B$ there is a coefficient of friction between the block and the surface which varies with x so that $\mu = \mu_0(1 + \frac{x}{c})$, where μ_0 and c are constants. How far will the block go before it stops? Note: Because the spring is not attached to the block it stops acting when the block reaches the point $x = 0$.



3. (25 points)A block of mass m is at rest on a frictionless table. A force is applied to the block at the **fixed** angle θ as shown. The magnitude of the force is a linearly increasing function of time, βt, with β a constant. A second force acts on the block with constant magnitude P as shown. What is the block's velocity after it has moved to the point L?



4. (25 points)This is a one-dimensional problem. You need not concern yourself with the y direction. Consider the force given by

$$F_x = \frac{a}{x^3} - \frac{b}{x^5}$$

where a and b are constants. Determine whether or not this is a conservative force.