Name:		Friday, November 25, 2011
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Answer the following questions using GRFS

1. A $50.00\,kg$ object is being pushed with an applied force of $35.00\,N$ along a rough surface. If the acceleration of the block is $0.5000\,m/s^2$: [18]
   a) Draw a free body diagram of the object (using a ruler) labelling all the forces acting on the system [3]
   b) Determine the net force acting of the system [2]
   c) Determine the weight of the object [2]
   d) Write the equations for X and Y components for the net force acting on the block. [4]
   e) Determine the force of friction acting on the block. [2]
   f) Derive an equation to determine the coefficient of friction(μ_k) in terms of "m" for mass, "a" for the acceleration of the block, "g" for the acceleration due to gravity. [4]
   g) Determine the coefficient of friction [1]

2. A 4.00 kg cart collides into a second cart of mass 1.60 kg that is initially at rest. If the first cart (Cart A) is moving at a velocity of 3.00 m/s [L] before the collision and at a velocity of 2.00 m/s [L] after the collision: [15]
   a) determine the acceleration of Cart A if the collision lasts for 0.025 s. [2]
   b) draw a free body diagram of Cart A that includes all the forces acting on the cart during the collision. (assume there is no friction) [2]
   c) determine the magnitude and direction of the "slowing force" that Cart A experienced during the collision. Explain where this "slowing force" comes from and name it using the notation demonstrated in class. [4]
   d) determine the acceleration of the second cart (Cart B). Include the FDB of Cart B don't forget to explain where all the forces come from and show all your steps. [5]
   e) determine the final speed of Cart B after the collision. [2]

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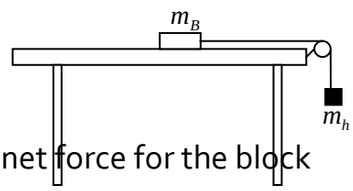
Application and Inquiry [22]

During the friction lab we performed a third set of trials where the system was accelerating. To determine the coefficient of friction in this case we had to derive a formula. Do the following



- Draw the FBD of the block [3]
- Draw the FBD of the hanging mass [2]
- Derive the equations for the X and Y components for the net force for the block (go as far as you can go. i.e. choose your directions) [6]
- Derive the equation for the net force for the hanging mass [3]
- Derive the equation for the coefficient of friction " μ " in terms of m_h, m_B, g, a [4]
- Explain how why we used $d = v_1 t + \frac{1}{2}at^2$ to find our acceleration for the equation we derived above. [4]