PH201 LBCC **Pre Lab3 Exercise for Acceleration along an incline** Name________________________

Lab Section________________________

In this weeks lab we will determine the numerical value for g, the gravitational acceleration of a freely falling body on earth. This will introduce us to two dimensional motion. A cart rolling down a slope might look like one-dimensional motion at first. I hope you will agree though that the acceleration of a freely falling apple is not the same direction as the cart that rolls down the slope. We need to understand two dimensional motion, and particularly vector algebra to understand Galileo's clever experiment, and to be successful in the rest of the class (sorry the real world has more than one dimension. To make sure you are prepared for this lab, the prelab this week consists of two parts. 1) Do a few vector exercises on Mastering Physics and 2) derive the one equation you will need for this lab.

1. See Mastering Physics for extra vector practice (3 extra points towards your Mastering Physics score)
2. Draw a cart on a slope with an angle of θ=30 degrees to the horizontal. Draw a 4cm long acceleration vector **a** on that cart, assuming the cart was just let go and accelerates down the track. Now do a Gedankenexperiment (thought experiment): Assume that the track is removed, but the cart is still held at the same initial position. In the same picture and in the correct relative size draw a dashed line acceleration vector on the cart assuming it was just let go (dropped without a track). Can you graphically derive and show a relationship between the two vectors **g** and **a**? How much longer is that **g** vector versus the **a** vector? After you have done your detailed picture showing all relevant angles measure with a ruler the length of that vector? Use your trigonometry skills to derive an equation for the magnitude of **a** as a function of the magnitude of **g**. and θ. You will see that in our experiment g will be determined as the slope of a graph that has sinθ on the horizontal axis and the measured acceleration of the vertical (dependent) axis. This information might help you in your derivation.