Non-uniform motion lab about acceleration and different masses

Introduction The purpose of this experiment is to determine whether a change in mass affects the acceleration of the cart. The independent variable is the mass of the weight and the dependant variable is the acceleration. I do not think there is a control in the experiment because we do not know an absolute result with any of the masses of the weight.

Besides, if we used 0g as our control, the cart won't even move. Hypothesis Under these conditions I believe that the results shown in the distance vs. time graph will have a curve showing increasing speed or in other words, increasing velocity over time. Therefore, the results shown in the velocity vs.

time graph will have a positive linear slope. The acceleration vs. time graph will then have no slope and just a straight line because the change of velocity is relatively constant. In conclusion, when the mass of the weight increases, the acceleration won't and only the speed and velocity over time will change. Materials -Laptop computer -Smart pulley -Retort stand -Retort stand fastener -String -Dynamic cart -Device to connect smart pulley to computer -Ring clamp -Weights (100g, 200g, 300g) Method 1. Set up the retort stand.

Attach the fastener and ring clamp to the stand. Place the smart pulley to the ring clamp. 2. Set up the apparatus as illustrated above.

Attach the mass of 100g to the dynamics cart (not shown) using the string and position the string over the smart pulley so that it rotates as the mass falls to the tissue box on the ground (not shown) 3. Connect the smart pulley to the laptop using the USB device and launch the Data Studio Program.

Have the program graph distance vs. time, velocity vs. time and acceleration vs. time.

4. Position the mass over the pulley so the cart can move freely 5. Pull the cart as back the pulley as possible without making the string come out of the pulley. Click start on Data Studio and release the cart. Click stop as soon as the cart crashes into the pulley or when the mass hits the tissue box on the floor. 6.

Repeat steps 2 to 6 but with 200g and 300g 7. Examine your data and determine what parts of your data coincide with the final crash and any interference in the beginning. Delete this data from your tables using the strike data cells option under Edit. Re-scale the graphs so you can see all the points Note: I made my results rounded o 2 decimal places for easy calculations later on Analysis and Conclusion According to the distance vs. ime graph, the speeds of the carts with different weights are all increasing gradually. The carts tested with heavier weights increased faster than the carts tested with lighter weights.

The slopes of the lines in the velocity time graphs reflect the change in the speed of each cart over time. The faster the increase in speed in the distance time graphs, the steeper the slope of the corresponding line for the cart in the velocity vs. time graph. For example, the graph 2A showing distance vs. time for the cart tested with 300g had a smaller curved line than the curve line of the cart tested with 100g. Correspondingly, this difference can also be seen in the velocity vs.

time graph (2B). The line representing the velocity of the cart tested with 300g is clearly steeper than the line representing the velocity of the cart tested with 100g. While the distance vs. time graphs have curves showing gradual increase in speed or change in ratio of distance over time. The velocity vs.

time graphs has almost straight lines showing constant increase in velocity, but no change in the ratio of velocity over time. In other words, the speeds of the carts are increasing constantly. In conclusion, my hypothesis was correct. A change of mass doesn't affect ratio of acceleration over time but only velocity over time and speed will. Although there wasn't really an evident line showing the results in the acceleration vs.

time graphs. The scale I used was quite small for the y-axis (acceleration). So if I made the scale less specific, lines could be seen. You can tell if an object is accelerating at a uniform motion or not by looking at the graph.

The steeper the curve on the graph, the bigger the acceleration of the object. Looking at the graphs I drew by hand. The cart tested with 100g had a big and gradual curved line in the distance vs. time graph. Therefore, the acceleration of the same cart wasn't very evident. In fact, it was the least evident.

On the other hand, the cart test with 300g had the steepest curved line in the distance vs. time graph. At the same time, it had the most change in the acceleration vs. time graph. It's easy to tell if an object is accelerating at a uniform motion or not with an velocity-time graph.

If there is a curved line in the graph, there are constant changes in acceleration. If the line on the graph is linear, then that means that the change of velocity over time is constant. Therefore, there will be no acceleration. I think the algebraic equation to calculate variables for a non-uniform accelerating object would be use the line if its linear or a tangent line for curves and then use the equation y= mx+b to find what you need. I liked this experiment because I was amazed by how detailed the smart pulley can record the data so specifically and quickly. The original procedure on the sheet wasn’t accurate or detailed, causing much confusion along the way.

While we did the experiment, a lot had to be redone due to lack of understanding of what to do. For example, my group wasn’t even sure how to connect the smart pulley to the computer correctly. Therefore, the computer didn’t recognize the device, wasting a lot of time. If I did this lab again, the only thing I would want to change is to use better smart pulleys. Our pulley constantly broke down and it was a pain plugging and unplugging the device until the computer recognizes it.