FLINN SCIENTIFIC

Name_____

Newton's First Law Worksheet

Data Table and Observations

	Newton's First Law of Motion
Velocity of one puck (step 4)	
Non-accelerated puck (step 7)	
One puck colliding with a stationary puck (step 9)	
Stationary weighted puck collision (step 11)	

Post-Lab Questions

A1. In your own words, define the following terms.

a. Force

b. Inertia

c. Acceleration.

A2. How can you tell whether or not all the forces acting on the non-accelerated puck in step 7 are balanced?

A3. Imagine an air puck with a limitless air supply—i.e., a level air table of infinite length.

a. Once the puck was pushed, would it continue to travel forever?

b. Why or why not?

A4. List three more examples of Newton's first law in action in everyday life.

Newton's Second Law Worksheet

Data Table

Distance _____ m Mass of cart _____ g

Hanging Mass (g)	Trial 1 (s)	Trial 2 (s)	Average Time (s)	Acceleration (m/s^2)

Post-Lab Analysis and Questions

B1. Using Equation 2 and the average time recorded for each hanging mass, calculate the acceleration of the cart for each hanging mass used and record in the data table.

B2. Plot a graph of the hanging mass vs. acceleration.

B3. A heavy box and a light box are accelerated to the same speed and then released. Ignoring friction, which mass will require more force to bring it to a stop?

B4. *(Advanced)* Using the free body diagram from the *Pre-Lab Question*, solve for the acceleration of the cart. Assume the pulley is weightless, and the system is without friction. Prove that the acceleration of the system is given by Equation 3.

$$a = m_{hanging}\, g \,/\, (m_{hanging} + m_{cart}) \qquad \textit{Equation 3}$$

Hint: Start by totaling the forces on the hanging weight, then totaling the forces on the cart.

B5a. *(Advanced)* Based on Equation 3, what constant must be compared to the acceleration to show a directly proportional relationship? Calculate the appropriate relationship, and plot this data.

B5b. Calculate the slope of the "best-fit" line. Select two points—(x_1, y_1) and (x_2, y_2)—that are closest to the actual line. The slope (m) is calculated using Equation 4. *Show all of your work!* What are the units of the slope? What is represented by the slope ?

$$m = \frac{(y_2 - y_1)}{(x_2 - x_1)} \qquad \textit{Equation 4}$$

B6. *(Advanced)* A heavy box and a light box are accelerated over the same distance using the same force. Ignoring friction, which mass will require more force to bring it to a stop?

Newton's Third Law Worksheet

Observations and Results

Launch No.	Results of Launch	Possible Solutions If Problems Were Encountered
1		
2		
3		
4		
5		

Post-Lab Questions

C1. Why does the balloon move when it is blown up and the pressure inside the balloon is released?

C2. Why is the air pushed out of the balloon?

C3. List some suggestions that might improve the performance of the balloon rocket.