

Your Name: _____

Your Group Members' Names: _____

Purpose: The goal of this short lab is to verify Newton's 2nd Law, $a = F_{\text{net}} / m$. When a constant force is applied to an object, how does an increase in mass affect the object's acceleration?

Procedure:

- *Step 1*: Measure the weight of the fan cart using the force probe and use the weight to determine the cart's mass. Record the value of the cart's mass in Table 1.
- *Step 2*: The fan can generate two constant forces, designated "LOW" or "HIGH." Choose "HIGH" and measure the force from the fan using the force probe. Record the value of this force in Table 1.
- *Step 3*: Place the fan cart on a track **on the ground** and place obstacles (i.e. books) at each end of the track to prevent the fan cart from driving off. Also, please **DO NOT** put anything into the fan like a pencil or your finger. The wooden blades and motors are quite delicate, so treat these carts with care. Setup a range finder at one end of the track to measure the cart's acceleration.
- *Step 4*: Before making any measurements, predict the value for the cart's acceleration using Newton's 2nd Law. Record this value in Table 2. Show your work neatly in the space under the tables.
- *Step 5*: Turn the fan cart on the HIGH setting, and use the range finder and Logger Pro software to measure the acceleration of the fan car. Record this value in Table 2 and print and attach any relevant graphs you made on Logger Pro. Show any calculations you made neatly in the space under the tables.
- *Step 6*: Increase the mass of the fan cart by placing brass weights on the top.
- *Step 7*: Repeat steps 4 – 6 using the new mass.
- *Step 8*: Calculate the percent difference between your predicted values and your observed values and record them in Table 2. Show your work neatly in the space under the tables.

Results & Calculations:

Table 1

Mass of Cart (kg)	Force from the fan on "HIGH" (N)

Table 2

Mass of Cart (kg)	Predicted Acceleration (m/s^2)	Measured Acceleration (m/s^2)	Percent Difference

Conclusion: In the space below, discuss what you conclude about this lab based only on your results. Be sure to discuss whether your results did or did not verify Newton's 2nd law and use concepts from our unit (i.e. inertia, net force) in your discussion.