Lab Worksheet: Newton's 2nd Law

Name: _____

Purpose:

Material: Board with pulley, cart, masses (1 – 100g & 2 – 200g), stopwatch, meter stick and string.

Procedure:

1. Mass the cart. Record.
2. Setup the board with the pulley attached to the end on the lab table so that the pulley is past the end of the table.
3. Get a piece of string long enough so that when the cart is at the end of the board away from the pulley the string hangs over the pulley. Attach the string to cart.
4. Record the total mass of the system. (Cart mass plus 500g)
5. For the first trial, you will use the weight of the 100g mass for the applied force to accelerate the system. The remaining 400g will be put in the cart.
6. Attach the 100g mass to the end of the string hanging over the pulley. Measure the distance from the 100g mass to the floor. Record this distance.
7. Release the mass and measure the time it takes for the 100g mass to hit the floor. Repeat this trial 5 times and find the average time for the trials. (Be sure to release the mass from the same height in each trial)
8. For the second trial, use 200g as the mass on the end of the string and 300g in the cart. Measure the distance from the 200g mass to the floor. Record this distance.
9. Release the mass and measure the time it takes for the 200g mass to hit the floor. Repeat this trial 5 times and find the average time for the trials. (Be sure to release the mass from the same height in each trial)
10. For the third trial, use 300g as the mass on the string and 200g as the mass in the cart. Repeat the procedures of measuring the distance and time.
11. For the fourth trial, use 400g as the mass on the string and 100g as the mass in the cart. Repeat the procedures of measuring the distance and time.
12. For the fifth trial, use 500g as the mass on the string and have no mass in the cart. Repeat the procedures of measuring the distance and time.
13. For each trial calculate the acceleration of the system using the distance traveled and time.
14. For each trial calculate the net force acting on system.
15. Using **F = ma** calculate the theoretical value of acceleration of the system. Compare the measured and theoretical values of acceleration for each trial using percent error.