Name: _____ Date: _____

Constant Mass and Changing Force

Objective: To investigate the effect of increasing mass on an accelerating system.

Materials:

meterstick	paper clips	string
hooked mass	pulley with table clamp	masking tape
six 20 g slotted masses	cart	

Procedure:

1. Fasten clamp and pulley to the edge of the lab table. Record the mass of the hooked mass. Tie a piece of string to a hooked mass and hang it over the edge of the table.
2. Attach the other end to a cart containing six 20 g masses. Masking tape may be needed to hold the slotted masses in the cart. To offset frictional effects, make sure when the cart is tapped, is does not accelerate across the table.
3. Mark off a course with masking tape for the cart to travel. Make sure the cart will not crash into the pulley and that the cart travels in a straight line.
4. Place the cart in the starting position and gently tap it. Record the time it takes for the cart to accelerate to the end of the course. Repeat for three trials and compute the average.
5. For each successive trial, remove one slotted mass from the cart and attach it to the hanging mass. Repeat step four after completing this.

Data:

Distance cart travels: _____ m Hooked mass: _____ kg

Falling Mass (kg)	Time 1 (s)	Time 2 (s)	Time 3 (s)	Average Time (s)	Computed Accel (m/s^2)	Theor Accel (m/s^2)	% error

Analysis/Calculations:

1. Compute average acceleration for each set of trials and record.
2. Use Newton's Second Law to find the theoretical acceleration.
3. Determine % error for each trial.
4. Construct a graph of force vs. computed acceleration.

Conclusion:

1. Describe the proportionality (direct or inverse) of your graph. How does the shape of the graph reflect this?
2. For a constant system mass, how does increasing the force (weight) of a falling object affect its acceleration?
3. Why is the theoretical acceleration different from the measured acceleration?
4. What does the slope of your graph represent? You will need to construct the best-fit line, find two points on the line and compute the slope to do this.