

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Period: \_\_\_\_\_

### Lab – Force & Acceleration

Question: How does acceleration change when the same force is applied to objects which have different masses?

Hypothesis (use the term directly or inversely proportional): \_\_\_\_\_

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Procedure:

1. Gather Materials: Triple Beam Balance, 4-wheeled cart, 1-meter string, 1 large ball bearing, 3 weights, plastic cup, meter stick, masking tape, stopwatch
2. Mass cart & Record: \_\_\_\_\_
3. Mass ball bearing & cup together, Record mass: \_\_\_\_\_
4. Mass one weight & record: \_\_\_\_\_
5. Tie string to cart and tape other end to cup
6. Set cart on table, run string across table so cup hangs over the end opposite cart.
7. Set a start & stop line one meter apart.
8. Place ball bearing in cup & release
9. Measure time for cart to cover 1 meter, Record.
10. Repeat 4 times.
11. Add one weight to cart & repeat procedure.
12. Repeat procedure with 2 weights on cart.
13. Repeat with 3 weights.

Data:

Cart with	Trial 1	Trial 2	Trial 3	Trial 4	Average time
0 weights					
1 weights					
2 weights					
3 weights					

Data Analysis:

If gravity pulls with an acceleration of  $9.8\text{m/s}^2$ , What force did the cup & ball bearing apply to the cart during each trial?

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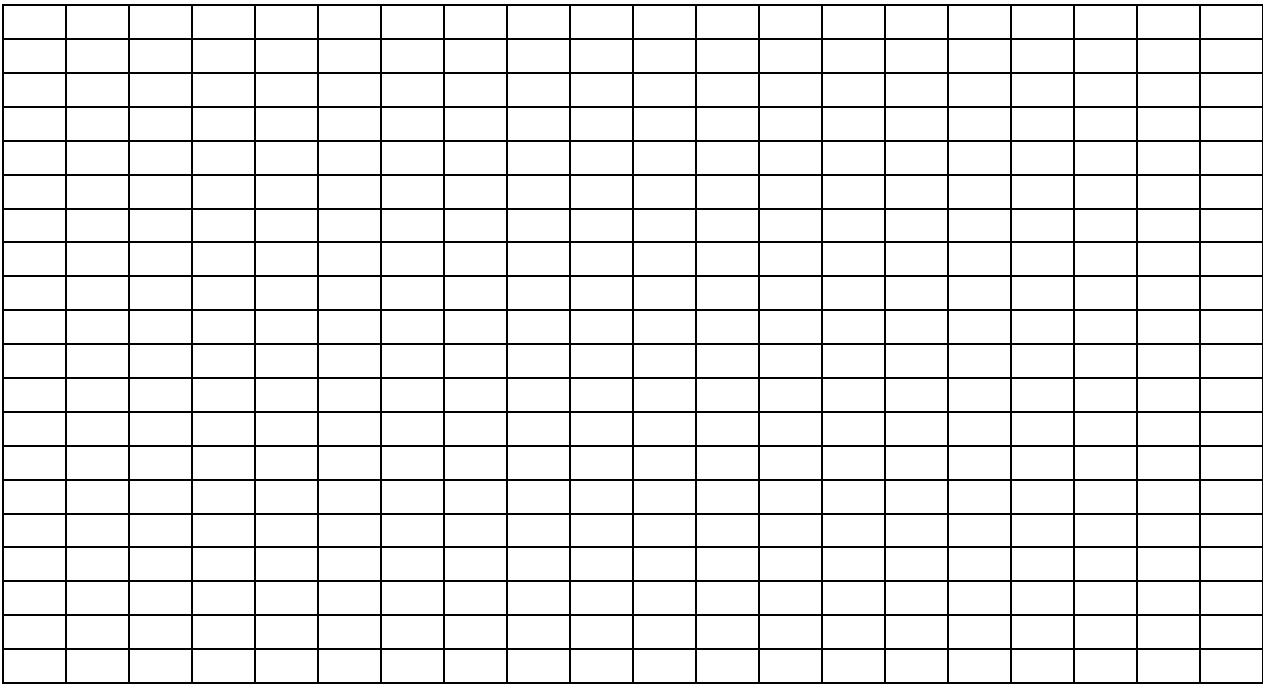
Data Analysis:

Cart with	Combined mass (Cart + weights)	Distance Traveled	Average Time (From Data)	Acceleration (see formula below)
0 weights		1 Meter		
1 weights				
2 weights				
3 weights				

Acceleration = distance ÷ (time x time)      or  $a = d/t^2$

Graph:

How does mass affect acceleration of an object when the force remains the same?



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#### Data Analysis:

Draw a best-fit line on the graph.

Calculate the slope of the line. Slope = rise over run or  $s = \Delta y / \Delta x$

Calculate the percent error of your line.

$$\% \text{ error} = (\text{your measured value} - \text{correct value}) \div \text{correct value} \times 100$$

#### Conclusions:

1. What could we have done during our experiment to make the percent error even smaller? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
2. How would this have made the error smaller? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. We now have confirmed that mass and acceleration are inversely proportional. What could we do to learn how air resistance affects the acceleration of an object? \_\_\_\_\_  
\_\_\_\_\_  
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