PHYSICS 2204

Unit 2: Dynamics

Core Lab #1: Newton's Second Law

STUDENT NAME:_____

DATE:_____

GROUP MEMBERS:

_____ _____

PURPOSE: The purpose of this activity is to investigate the variables that affect the acceleration of an object and the manner in which those variables affect the acceleration.

BACKGROUND:

When forces are unbalanced, objects accelerate. But what exactly affects the acceleration of the object? You will explore this question by running a collection of simulations in the absence of friction. Set the friction value to 0.00 and run the following trials. Collect sufficient velocity-time information (fifth column) for determining the acceleration in the last column.

PROCEDURE:

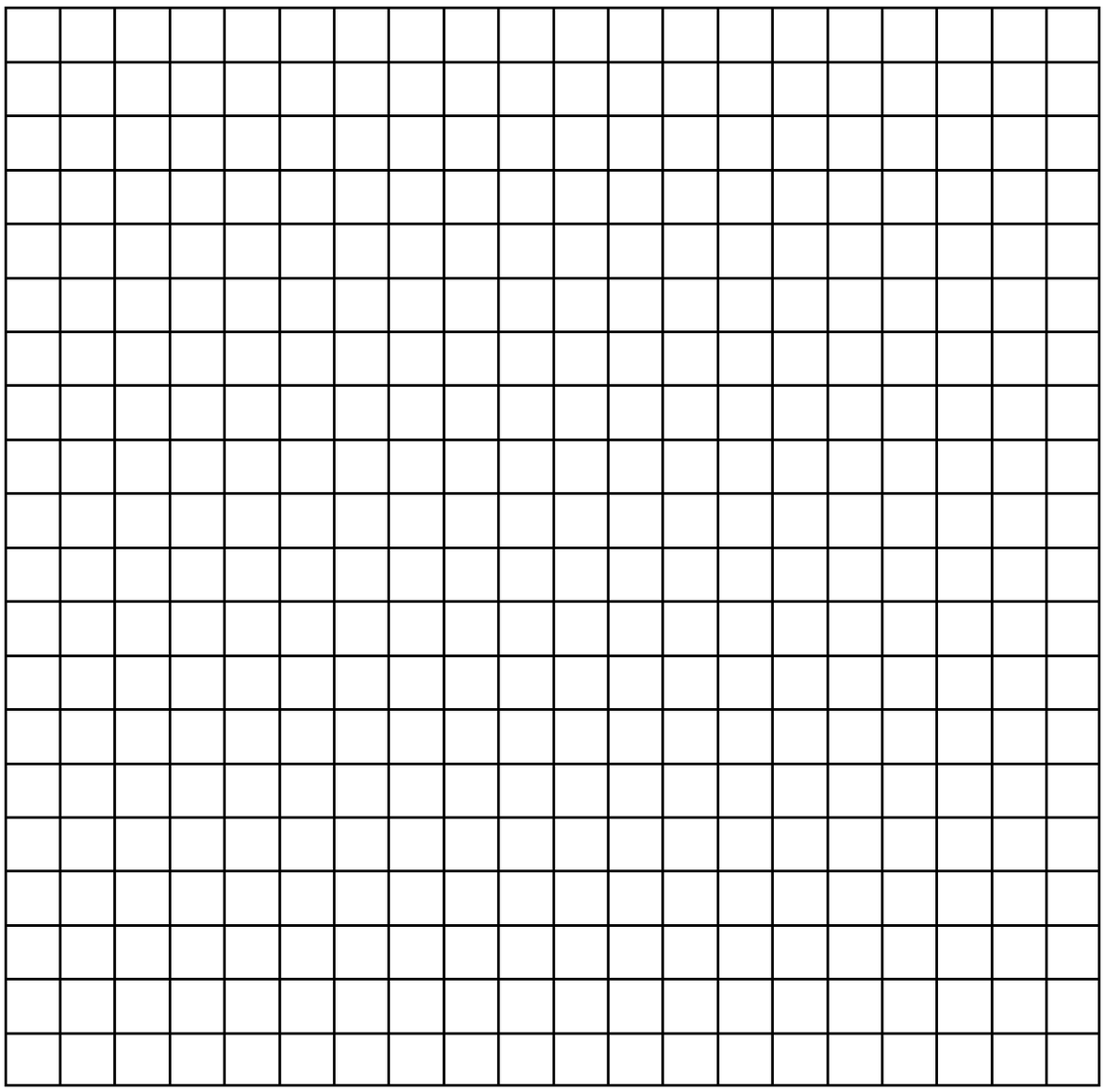
You need to click on the link in the dynamics section found on Mr Fifield's Corner

DATA/ CALCULATIONS:

PART 1: Constant mass, vary applied force, measure acceleration.

Trial	Applied Force(N)	Mass (kg)	Net Force (N)	Velocity-time Information	Acceleration (m/s^2)
1	10.0	2.0			
2	20.0	2.0			
3	40.0	2.0			
4	60.0	2.0			
5	80.0	2.0			
6	100.0	2.0			

Plot a graph of the results. Even though acceleration was the dependent variable place it on the horizontal axis.



Explain whether the data are linear. If so, construct a line of best fit.

Find the slope of the line of best fit.

Compare the slope to the total mass. What do you notice?

ART 2: Constant force, vary mass, measure acceleration

Trial	Applied Force(N)	Mass (kg)	Net Force (N)	Velocity-time Information	Acceleration (m/s^2)
7	**40.0**	**1.0**			
8	**40.0**	**3.0**			
9	**40.0**	**4.0**			
10	**40.0**	**5.0**			

Plot a graph of the results. Even though acceleration was the dependent variable place it on the horizontal axis.

Describe, in general terms the relation. Go something like this: As the mass (increases/decreases/whatever) the acceleration (increases/decreases/whatever)

State whether or not the data suggest that acceleration is inversely proportional to the mass.

DISCUSSION/ANALYSIS:

1. What affect does a doubling of the net force have upon the acceleration of the object? Be quantitative. (Don't just say it decreases or increases; indicate the factor by which acceleration decreases or increases.)

2. Identify a set of two trials that support your answer for question 1:

3. What affect does a tripling of the net force have upon the acceleration of the object? Be quantitative.

4. Identify a set of two trials that support your answer for question 3:

5. What affect does a doubling of the mass have upon the acceleration of the object? Be quantitative.

6. Identify a set of two trials that support your answer in question 5:

7. What affect does a quadrupling of the mass have upon the acceleration of the of the object? Be quantitative.

8. Identify a set of two trials that support your answer in question 7:

9. Lab partners Vera and Bill Confuzzens attempted to use Trials 5 and 8 to show the affect that a doubling of force has upon the acceleration. Explain why these two trials cannot be used to show the affect of force upon acceleration.

CONCLUSION: