Physics LAB: Gravitational Force and Mass

Name _____
Mod_____ Date: _____

Purpose: The purpose is to investigate the relationship between the gravitational force (or weight) of an object and it its mass.

Materials: Several objects Spring scale Balance

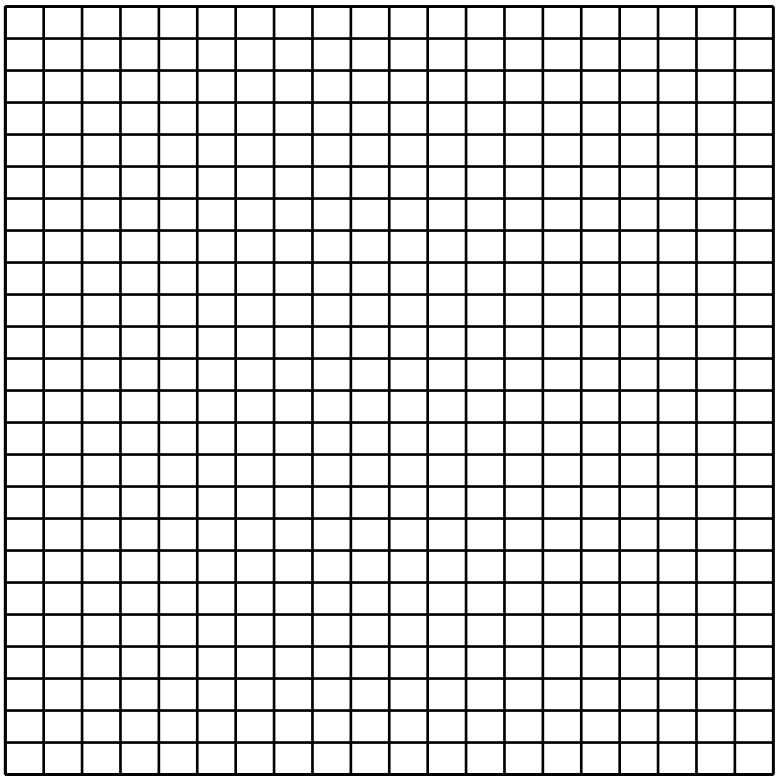
Procedure:

1. Select one object from your set of materials.
2. Use the balance to measure the mass of the object in grams. Record the mass in the data chart.
3. Convert the mass in grams (g) to kilograms (kg):

   Mass in ~~grams~~ x $\frac{1\ kg}{1000\ ~~g~~}$
4. Zero the spring scale following the instructions shown in class. Gently suspend the object from the spring scale and record the gravitational force, F_g, in the data table.
5. Repeat the process for seven objects.
6. Prepare a graph of Gravitational Force vs. Mass on the graph grid provided.

Object	Mass, m (g)	Mass, m (kg)	Gravitational Force F_g (N)

Graph:



Analysis:
Just like with position graphs, where the slope was the velocity, the slope of this graph is also meaningful. It is the strength of the Earth's gravitational field (how much force per kilogram the Earth exerts) Pick two points on your best-fit line and determine the slope.

Slope = $\frac{\text{Rise}}{\text{Run}}$ =

Questions: Answer the following in complete sentences.

1. The accepted value for the Earth's gravitational field strength is 9.8N/kg. How close was the value of the slope from your experiment? Find your answer in percent error.

2. Using your graph from the lab:
   A. Find the mass of the object when its weight is 4.5N_____

   B. Find the weight of the object when its mass is .21kg _____

3. What is the common name for gravitational force? _____
4. Circle the correct term.

a.	Symbol is F_g	Gravitational Force	Mass
b.	Symbol is m	Gravitational Force	Mass
c.	Does not change unless you change the object.	Gravitational Force	Mass