Mass vs Weight Lab (Adapted from www.cpalms.org) name_____ per____

When we check our 'weight' on Earth, what we are really checking is our mass. Mass is a property that doesn't change no *matter* where in the universe you are. In physics, weight is considered a force and is measured in Newtons (N). The real weight of something changes depending on where in the universe the object is and the gravity that is acting on it.
The formula to find weight is really pretty simple. It is basically Newton's second law (f=ma) using gravity as the acceleration. You just need to know the mass of the object and the force of gravity that is working on it.

Force = mass x gravity (of the location)

MATERIALS
Each group will receive:

- 1 Milky Way
- 1 Oreo Cookie
- 1 Graham Cracker
- Electronic balance scale
- Calculator

PROCEDURE

<u>Part A: Measure the Mass</u>

1. Balance the scale to zero. Place the 1st item on scale.
2. Convert grams to kilograms. $Kilograms = \frac{grams}{1{,}000}$
3. Record the mass in Data Table 1 in kg.
4. Repeat the same procedures for the remaining two snacks. You can eat them now.

<u>Part B: Calculate the Weight</u>

1. Use the formula next to "Weight" to calculate the weight for each snack.
2. Enter the weight in Newtons (N) next to each snack.

<u>Part C: Graph Your Results</u>

1. Create a bar graph showing the weight of each snack on the three planets.
    a. Graph the weight of each snack on the three planets. Use a different color for each planet
    b. Remember to label the title, x axis, and y axis.
    c. Repeat the same procedure for graphing the weight of the remaining two snacks.

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DATA TABLE 1	
Type of snack	**Mass (kg)**
Milky Way	0.0168 kg
Oreo	0.0131 kg
Graham Cracker	0.0077 kg

*Remember to convert grams to kilograms

DATA TABLE 2				
Planet	**Force of Gravity**	**Weight = Mass x Force of Gravity**		
		Milky Way	**Oreo**	**graham cracker**
Mars	3.8 (N/kg)	N	N	N
Earth	9.8 (N/kg)	N	N	N
Jupiter	25 (N/kg)	N	N	N

Title: _____

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ANALYSIS QUESTIONS

1. What happened to the weight of your snacks as the force of gravity increased from planet to planet? Use actual data in your answer.

2. Why do you think your snacks weigh more on Jupiter? Think about the properties of planets and what affects the force of gravity.

3. Venus has a mass that is 82% of Earth and a diameter that is 96% of Earth.

What would happen to the weight AND mass of your snacks on Venus compared to the other planets? Explain your answer.

Mass vs Weight Lab (Adapted from www.cpalms.org) name_____ per____

Highly Proficient

- Use your knowledge of gravity, mass and weight to answer the solve the following problem.
- Please show all of your work, explain your process and use detail.
- Draw a diagram as part of your explanation.

On Earth, Tom weighs 620 Newtons. Use the information in the table below to figure out what his weight would be on Saturn.

Planet	Mass	Surface Gravity	Diameter	Density
Earth	5.97×10^{24}	$9.8\ m/s^2$	12,756 km	$5{,}514\ kg/m^3$
Saturn	5.68×10^{26}	$10.44\ m/s^2$	120,536 km	$687\ kg/m^3$

Due Wednesday 4/10.

Gravity is an attractive force that is dependent on mass and distance

4 Highly Proficient	**3** Proficient	**2** Close to Proficient	**1** Developing
❏ I can correctly apply my knowledge of gravity, mass and weight to the HP problem. ❏ My answers include detail.	❏ The lab is complete and mostly correct. ❏ The graph represents the data well. ❏ The HP question attempted but is either incorrect or not explained (not required for PR)	❏ My answers need more detail. ❏ Some information is incorrect. ❏ My work is incomplete.	❏ Not attempted or mostly incomplete.

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