Virtual Lab: Force = Mass x Acceleration

Complete for 20 ec points

http://www.glencoe.com/sites/common_assets/science/virtual_labs/E25/E25.html

_____ is a push or pull on an object. _____ is the difference between two opposing forces. Newton's 2nd Law of Motion states that if a net force acts on an object, the object will _____ in the direction of the force. **Acceleration** is a change in _____. It can either be _____ (speeding up) or _____ (slowing down).

Mass is the amount of _____ contained in an object.
Mass does not change with changes in _____.

The acceleration of any object falling to the surface of Earth is _____ m/s^2. This means that at the first second the object will be falling with a speed of 9.8 m/s^2. At 2 seconds, the object will be falling at the rate of _____; at 3 seconds, it will be falling at the rate of _____, and so on.

Procedure

1. Click the arrow under Location 1 & select any planet. Click the arrow under Object 1 select the **Pumpkin**. Record the rate of acceleration for this location and the object's mass in the data table. Select another planet & the Pumpkin under Location 2 & Object 2. Record the information.
2. Click the drop button & observe the object's fall. The green lines indicate the *object's position at each second*.
3. Calculate the force of the objects (weight) using Force = Mass x Acceleration. Record.
4. **Tests 3 & 4:** Repeat steps 1-3 for the **Car**.
5. **Tests 5 & 6:** Repeat steps 1-3, but select the planet **Venus** for both locations and choose any object.
6. **Tests 7 & 8:** Repeat steps 1-3, selecting **Jupiter** for both locationes and choose any object.
7. **Tests 9 & 10:** Repeat steps 1-3, selecting any planet and any object.

Data Table: Gravitational Acceleration, Mass, & Weight

Test	Location	Object	Acceleration (m/s^2)	Mass of Object (kg)	FORCE or Weight (N)
1		Pumpkin			
2		Pumpkin			
3		Car			
4		Car			
5	Venus				
6	Venus				
7	Jupiter				
8	Jupiter				
9					
10					

Virtual Lab: Conclusion

1. How is Newton's Second Law related to gravity?

2. How does the force of gravity affect the rate of acceleration?

3. Describe what happens when *identical* objects are dropped on planets with *different* gravitational conditions.

4. Describe what happens when *different* objects are dropped under the *same* gravitational conditions.

5. Based on your data, how does mass affect weight?

6. What is the weight of a 24.52 kg Television dropped on Pluto (acceleration of 0.59 m/s^2)?

7. What is the weight of a 45.40 kg Barbell dropped on Earth?

8. **Challenge**: A hammer is dropped on Planet X. If the hammer has a mass of 3 kg and a weight of 9 N, what is the gravitational acceleration of Planet X and is it more or less than that of Earth?