Name_____ Period _____ Date _____

Space Gravity

STEM Sims

Lesson 2: Bounce Back

Newton showed that force equals mass times acceleration, and Hooke demonstrated that the force on a spring is equal to the spring constant for that spring multiplied by the distance the spring compresses. Can you put these two equations together and find the *g* value for various space objects?

Doing the Science

1. Start the Space Gravity Simulation by clicking on the "Sim" tab.
2. Note and record above Table 1 the ten-letter Location code.
3. Note and record in Table 1 the spring constant (in N/m) and the original length (in meters) of the spring that are displayed on the far right-hand side of the screen.
4. Click and drag the 1-kg mass onto the spring.
5. Note and record in Table 1 the new length (in meters). Note the spring constant does not change during the entire experiment (symbolized by *k*).
6. Calculate and record in Table 1 the change in spring length (symbolized by *x*).
7. Combine Newton's law ($F = mg$) and Hooke's Law ($F = kx$) to solve for the value of *g*. Record your calculated g value in Table 2.
8. Remove the 1-kg from the spring and repeat steps 4 – 7 for the 2-kg mass.
9. Click the Identify button and choose the Space Location from the list that most closely matches your *g*-value. Record this Space Location in Table 2 in the column labeled "Identification."

Table 1. Location ID_____

Hanging Mass (*m*)	**Spring Constant (*k*) (in N/m)**	**Original Spring Length (m)**	**Final Spring Length (m)**	**Change in Spring Length (*x*) (in m)**
1-kg				
2-kg				

Table 2.

Hanging Mass	**g Value (in N/kg)**	**Identification**
1-kg		
2-kg		

Do You Understand?

1. For a given location, did changing from a 1-kg to a 2-kg mass affect the value of *g*? Please explain your response.

2. Discuss how the change in spring length would be different on a planet with a smaller *g* value.