Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**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.