Name_____ Period _____ Date _____

Space Gravity

STEM Sims

Lesson 1: Drop the Ball

Any object that has mass exerts a gravitational force; the larger the mass, the greater the force of attraction. Objects placed near a large mass undergo acceleration, which is called gravitational acceleration (*g*). Can you pull off an experiment to determine the value of "*g*" on various astronomical objects?

Doing the Science

1. Start the Space Gravity Simulation by clicking on the "Sim" tab.
2. Note and record in Table 1 the ten-letter Location code.
3. Click on the Drop Button located below the blue ball in the right-hand part of the screen.
4. Note and record in Table 1 the length of time the ball took to drop and the distance the ball fell.
5. Use the following formula to calculate the *g* value. You will have to algebraically rearrange the equation to solve for *g*. Record your calculated *g* value in Table 1.

$$\textbf{distance dropped} = \tfrac{1}{2}g(\textbf{time to fall})^2$$

6. 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 1 in the column labeled "Identification."

Table 1.

Location ID	Time (s)	Distance (m)	*g* value (m/s^2)	Identification

7. Once you correctly identify a location, choose a Rocket Fuel and Launch your rocket. When you arrive at a new location, repeat steps 2 - 6 for the new location and complete Table 2.

Table 2.

Location ID	Time (s)	Distance (m)	*g* value (m/s^2)	Identification

Do You Understand?

1. Which space location of the two you investigated had the larger *g* value?

2. If a new space location had a *g* value larger than your answer to question #1, would the ball take a longer or a shorter time to fall 5 meters when dropped? Please explain your response.