Name_____ Period _____ Date _____

Space Gravity

STEM Sims

Lesson 7: Kinetic Energy

Energy associated with a moving object is called kinetic energy (KE). Kinetic energy depends on two factors: the mass of an object and the speed of the object squared. Can you find the kinetic energy of a falling ball on various astronomical objects?

Doing the Science

1. You must have completed Lesson 4: Advanced Ball Drop and have those data available to complete this activity.
2. Record your data from Lesson 4 in the appropriate places in Table 1 below.
3. Use the following formula to calculate and record in Table 1 the average speed of the falling ball.

   Average speed = total distance/total time

4. Use the following formula to calculate and record in Table 1 the final speed of the falling ball the instant before it hit the ground.

   Final speed = 2(Average speed)

5. Assume the ball has a mass of 1-kilogram.
6. Use the following formula to calculate the KE of the falling ball the instant before it hit the ground in each of the five locations and record your calculation in Table 2.

$$KE = \frac{1}{2} (Mass) \times (Final\ speed)^2$$

Table 1.

Trial	Location ID	Time (s)	Distance (m)	Average speed (m/s)	Final speed (m/s)
1					
2					
3					
4					
5					

Table 2.

Trial	Location ID	Mass (kg)	Final speed (m/s)	KE (joules)
1		**1**		
2		**1**		
3		**1**		
4		**1**		
5		**1**		

Do You Understand?

1. In which space location of the five you investigated did the ball have the largest KE the instant before it hit the ground?

2. At the instant before the ball started its fall, about how much KE did the ball have?

3. For a given location, did the ball have the same KE at all points during its fall to the ground? Please explain your response.

4. Since energy cannot be lost or created, how was the ball gaining KE during its fall?

5. If you completed Lesson 5: Gravitational Potential Energy, discuss how the ball's KE at the bottom of its fall compared to its GPE at the start of its fall. Explain why this does or does not make sense in terms of the Law of Conservation of Energy.