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**Graphing Kinetic and Potential Energy**

**Objective:** I can describe the relationship between mass, speed and kinetic energy using a graphical displays highlighting patterns over time.

# Step 1 Watch “eureka 9 kinetic energy” on YouTube, the link is on Ms. Murphy’s blog and answer the following questions.

1. What is kinetic energy?

2. What is a joule?

3. What is the Greek word for movement?

**Step 2:** Go to the Roller Coaster Simulator, the link can be found on Ms. Murphy’s blog.

1. Watch the simulation.

2. Click on the “step” button to display the different positions on the track.

3. Using knowledge from the video answer the following:

A. Which position do you think will have the greatest kinetic energy (traveling the fastest) and explain why?

B. Which position will have the least kinetic energy (traveling the slowest) and explain why.

C. At position two, will more riders give the car more kinetic energy or less, explain why.

**Step 3 Graphing**

1. Read the background information

2. The yellow and purple seats will graph Mass vs. KE. The red and green seats will graph Speed vs. KE, and the orange and blue seats gets to choose.

3. Use both graphs to answer the analysis questions

**Analysis Questions: Answer using complete sentences and a restate.**

***True or False***

1. Kinetic energy increases when mass increases

2. Kinetic energy decreases when speed increases.

3. A small object (small mass) can have the same kinetic energy as a large object (large mass) IF its velocity is large enough.

4. The shape of the mass vs. energy graph has a non-linear relationship.

5. The velocity vs. energy graph shows a non-linear relationship.

6. An increase in velocity of 100 m/s leads to a larger increase in kinetic energy than an increase of 100 kg.

***Written Response***

7. What happens to kinetic energy when you increase the mass?

8. What happens to the kinetic energy when you increase the speed?

9. How can a small object (small mass) have the same energy as a large object (large mass)?

10a. what is the shape of the mass vs. energy graph? Is in a linear relationship?

b. What happens when you double the mass?

11a. what is the shape of the velocity vs. energy graph? Is it linear relationship?

b. What happens if you double the velocity?

12. Based on your graphs, discuss the attributes of your future egg drop lander that should be considered in the design: mass of your lander? Or velocity of impact? Use specific evidence from the data to support your claims.