Name _____ Date _____ Period _____

Virtual Roller Coaster

C O N C E P T U A L P H Y S I C S : E N E R G Y

Background: Looking at roller coasters is a great way to explore the relationship between potential and kinetic energy. In this activity, you will design a roller coaster and determine the points at which the roller coaster car has the greatest and/or least kinetic and potential energies.

Prediction: On a roller coaster where do you think kinetic energy is the greatest?

On a roller coaster where do you think potential energy is the greatest?

Procedure:

1. Sketch a roller coaster on a piece of newsprint and include the following:
    1. Form groups of **3 students** each and create on drawing.
    2. The roller coaster must have at least **7 Hills (label height in meters)**
    3. At least **7 Low areas** (dips) **(label height in meters)**
    4. Assume the roller coaster car has a **mass of 200 kg** and that there is no friction present.
    5. The locations where <u>only</u> **Kinetic Energy** must be labeled
    6. The locations where <u>only</u> **Potential Energy** must be labeled
    7. At least 3 locations where <u>both</u> **potential** energy and **kinetic** energy must be labeled
    8. The location where **potential** energy is the <u>greatest</u> must be identified.
    9. The location where **kinetic** energy is <u>greatest</u> must be identified
    10. Identify points where roller coaster is traveling the **slowest** and the **fastest**.
    11. Each student to answer questions on handout.

Questions:

1. Explain why the **Potential energy** was <u>greatest</u> in the location that you chose.

2. Explain why the **Kinetic Energy** was <u>greatest</u> in the location that you chose.

3. Explain what happened to **potential** and **kinetic** energy as a roller coaster car travels down a hill.

4. In real life friction is a force we need to consider. How would friction effect the transformation of potential energy to kinetic energy?

5. Was force powers a roller coaster once it has reached the top of the first hill?

6. In a traditional roller coaster the first hill is the highest hill. Why is this important?

7. Name at least **3** other forms of energy that are formed as a roller coaster travels.

8. Name **2** ways that you could create a higher potential and kinetic energy on your roller coaster without raising the height of the roller coaster.

9. How does a roller coaster describe the “Law of Conservation of Energy”?

10. What is your favorite roller coaster and explain why.