

Roller Coaster Physics

Directions: Design a roller coaster with at least three hills. Draw your coaster design out to scale and share your drawing with the class. Correct any safety standards violations in your design. As a class, we will find out which roller coaster is the safest and has the most exciting design. **This assignment is due 4/8.**

Questions for all groups:

1. What do you think affects the amount of potential energy the roller coaster will have?
2. What do you think is the safest way to travel down from the first hill?
3. How do you think the coaster should come over the second hill?
4. How high should the each consecutive hill be compared to the one before it?
5. How high should the previous hill be if a loop is to be on the coaster?
6. What would the safest shape of a loop be (circular or elliptical)?

Group 1

1. How does the height of the roller coaster at the beginning affect the available kinetic energy later on?
2. How can you use the properties of kinetic and potential energy to make a more exciting roller coaster?
3. Why should the concepts of potential and kinetic energy matter to you?
4. How do you react to the various coasters you've ridden? Aren't some more exciting than others? Can certain coasters be too exciting?
5. How do you know if you've properly applied your knowledge of potential and kinetic energy to the roller coaster you designed?
6. Given a constant ratio of the height of the coaster to its valleys and peaks, can the coaster be too large or too small?

Group 2

1. Define kinetic and potential energy.
2. Give examples of situations where there is an object that displays kinetic energy and an object that has potential energy.
3. Construct a chart or graph that displays the change in potential energy of a ball rolling down a hill.
4. Create a diagram or drawing that compares and contrasts the basic differences between kinetic and potential energy.
5. Compose a plan for an experiment that would prove the concepts of potential and kinetic energy.
6. Describe how you would explain potential and kinetic energy to a younger sibling.

Group 3

1. Diagram how stored potential energy affects kinetic energy when it is released.
2. Based on your own experience, explain how the concept of potential energy can be used.
3. Use unusual materials to explain potential and kinetic energy.
4. Identify the key parts of potential and kinetic energy.
5. Demonstrate how someone uses the concept of potential and kinetic energy in their life or work.
6. Become a spring and use your new perspective to help us think about potential energy.

RUBRIC

CATEGORY	4	3	2	1
Participation in Coaster Design	Used time well in class and focused attention on the coaster design.	Used time pretty well. Stayed focused on the coaster design most of the time.	Did the coaster design but did not appear very interested. Focus was lost on several occasions.	Participation was minimal OR student was hostile about participating.
Understanding of Discussion and Material	Report illustrates an accurate and thorough understanding of scientific concepts underlying the coaster design.	Report illustrates an accurate understanding of most scientific concepts underlying the coaster design.	Report illustrates a limited understanding of scientific concepts underlying the coaster design.	Report illustrates inaccurate understanding of scientific concepts underlying the coaster design.