Roller Coaster Physics Webquest

Your job in this webquest is to find out how roller coasters work and use this information to design a roller coaster using a simulator. You will learn about roller coaster design, laws of motion, and about velocity and acceleration. You will design virtual roller coaster tracks and see what happens to the roller coaster when you change variables such as height of hills, length of track, mass of the coaster, and speed of the coaster. Once you have designed your coaster, you will report your results. You will use various websites, as provided on Mr. Lerner's website, to complete this webquest. You may have to navigate around the sites to find your answer.

Use the "How Roller Coasters Work" page for the following questions.

1. As you are climbing to the top of the first hill, what type of energy is slowly increasing? _____
2. At what point on the hill is this type of energy at its greatest level? _____
3. Why do you think that the mechanism that gets the coaster up the first hill is not necessary to get the coaster up the second hill? _____

   _____
4. How do the roles of potential and kinetic energy differ between the newer catapult-launched coasters and the older style of roller coasters? _____

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5. What is so unusual about the breaking system on a roller coaster? _____

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6. How do gravity and potential energy work together to give you a great ride on a roller coaster? _____

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7. How does potential energy become kinetic energy during your ride? _____

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8. Click "Play" on the "How Roller Coasters Work" simulation. At what point is potential energy the greatest?

   _____
9. Click "Continue" on the simulation. At what point is kinetic energy the greatest?

   _____
10. Click "Continue" on the simulation. When the coaster is at the top of the second hill, what is the relationship between kinetic energy and potential energy? _____

    _____
11. Click "Continue" on the simulation. Why is it necessary to have so much kinetic energy heading into the loop? _____

    _____

    _____

12. Click “Continue” on the simulation, what is the relationship between kinetic energy and potential energy at the top of the loop? _____

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13. Click “Continue” on the simulation. What is higher, the kinetic energy at point F or the kinetic energy at point b? Click “Continue” and reset the simulation if you need to see the reading at point B again. _____
14. What role do the tracks play in the performance of the coaster? _____

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15. How do the tracks and gravity work together to ensure that you have a sweet ride on the coaster? _____

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16. What role does Newton’s First law play in the explanation of why a roller coaster is able to keep moving even though it does not have a motor powering it? _____

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17. As the coaster ride progresses, why do the sizes of hills get smaller? _____

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18. Summarize how inertia, gravity, and acceleration all work together to give you a thrilling ride on a roller coaster.

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Once you have completed this portion of the Webquest, please click the link on Mr. Lerner’s website for the Coaster Creator! Design a roller coaster that is thrilling, but also can make it back to the loading area safely. Draw a sketch of your successful coaster design in the space below!