Physical Science **Roller Coaster Lab**

KJHS Name___________________________**Date** **Period**

Objective: *Understand the terms kinetic and potential energy
*Create a diagram of your rollercoaster that clearly demonstrates your understanding of KE and PE

What makes a roller coaster work? What types of energy are involved?
Energy: the ability to do ________ or cause ___________
Gravity: a force that _________ objects toward the center of E_________
Potential energy: ____________ _________ that results from the _______________
Kinetic energy: __________ that an object has ______ to its ___________
Friction: the force that one __________ ___________ on another when the two
__________________ ____ ______________ _______ ________________
Acceleration: ________ at which _______________ __________________ with ________

At the top of the first hill the roller coaster has ___________________________. Once the roller coaster descends down the hill, this energy is now converted to ____________________________.
What other force helps the roller coaster go down the hill?_______________________

Part 1: Link: www.funderstanding.com/k12/coaster **Using the link follow these steps:**
1. Push the play button (triangle). Why does the cart not make it to the end?
____
You will have 3 minutes to try out the different buttons on the game to become familiar with how it works.
3. Click RESET. Adjust the settings so that the cart successfully makes it to the end without falling off. (after 4 minutes, the class may give each other hints on how to get this to work). What settings did you adjust? Did you increase or decrease their level?
____
4. Create a rollercoaster design that has 2 loops, 1 hill or 2 hills, 1 loop, or 3 loops, or 3 hills that works (no falling off carts). The initial hill does not count. Draw the working design:

Materials: 1 ball bearing, ______clear tubing, masking tape, stop watch
Part 2: 1. Design a roller coaster with no loops and calculate its speed.
2. Design a roller coaster with 1 loop and calculate its speed. Then do 2 loops.
(The ball must make it all the way to the end. Do NOT blow in tube to get ball out)

	no loops	1 loop	2 loops
Distance			
Time			
Speed= d/t			

What would you predict would happen to speed with 3 loops?

Part 3: Roller Coaster Design

Objective: To create a "roller coaster" that has 3 loops.
To correctly label potential and kinetic energy on a diagram of your roller coaster.

Procedure:

Your group is to create a roller coaster that has three loops. Your ball bearing or BB must start when dropped in the tube. **The ball bearing or BB must make it to the end of the tubing.** The goal is to have the most height in **centimeters** in your roller coaster. Height is calculated from the bottom of the tubing on the loop, to the top of the tubing at the highest point of the loop. All loops must rest on the table or on the floor. You add all three heights together. Your total height will be recorded on the whiteboard and a successful run might need to be seen by your teacher. **Do NOT blow in tube to get ball out.**

Data:

	Height of loop in cm				
Designs	**Loop 1**	**Loop 2**	**Loop 3**	**Total (cm)**	**Time**
A					
B					
C					

***Neatly* draw** the roller coaster with the **greatest** height from your designs.
Label where the kinetic energy (KE) and potential energy (PE) are on your roller coaster. There should be multiple spots for each. Put an * where each is greatest next to your label.

One per group NAMES____

Now your group is to create the following roller coasters for these challenges:

Challenge 1- Create and draw a roller coaster for SLOWEST speed. Label the KE and PE. Record the Time:_____

Challenge 2- Create and draw a roller coaster for FASTEST speed. Label the KE and PE. Record the Time:_____

Challenge 3- Create and draw a roller coaster for MAXIMUM NUMBER OF LOOPS or HILLS. Label the KE and PE. Record the Time:_____

Challenge 4-Create your own challenge:______________________________________
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