Mechanical Energy Explorations with Energy Skatepark
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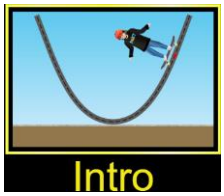
Student guide: Name:_____

Start: Google Phet Energy Skate Park basics

1. Click on the first link
2. Click on the  button.
3. Select "Intro" from the three options. 

Time to explore potential energy, kinetic energy and conservation of energy.

4. Then make your screen look like the picture by
   - clicking the box next to bar graph
   - clicking the box next to pie chart
   - Dragging the skater to the top of the ramp
   - Releasing the skater.

   a. Discuss the changes in the bar graph as the skater moves on the track
   b. Use the symbols to fill in the data table:

(↑ increases, ↓ decreases, S for stays the same)

Skater's movement		Potential energy (↑ ↓ S)	Kinetic energy (↓ ↑ S)	Total energy (↑ ↓ S)
Down the hill				
Up the hill				

Discuss any patterns you see for the energy data table.

5. What happens if you drop the skater onto the track from above the track? Why?

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6. **Add symbols (↓ ↑ S)** to complete the observation statements:

As an object moves **down the track**, the kinetic energy _____ and the potential energy _____. When the object moves **up the track** the kinetic energy _____ and the potential energy _____.

7. Look at your data table and focus on the **Total energy** column. Write a complete sentence about the "total energy" of the object moving up and down the track.

Time to explore friction!

1. At the bottom, click "Friction"
   a) Click the box next to bar graph
   b) Click the box next to pie chart
   c) Move the slider to change the friction


Discuss the changes in the bar graph as the skater moves up and down on the track.

2. Use the symbols to fill in the data table.
   (↑ increases, ↓ decreases, S stays the same)

Skater's movement	Potential energy (↑ ↓ S)	Kinetic energy (↓ ↑ S)	Total energy (↑ ↓ S)	_____ (↑ ↓ S)
Down hill				
Up the hill				


Discuss any patterns you see in the data table.

Add arrows the complete the following observations. **(↑ ↓ S)**

- As an object **moves down** the track, the kinetic energy _____ and the potential energy _____. The total energy _____.

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- After watching the bar graph while the object is moving, especially with **"lots"** of friction, **write a title for the last column**. Use the symbols to fill in the last column.

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-complete the observation statement:

As the skater moves with friction, the **kinetic energy** and **potential energy** both ___, the **thermal energy**_____ and the **total energy** _____.

Write a possible explanation for this. _____

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- Discuss **what changed** and **what stayed the same** when friction added to the skate park .

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- Which situation, with friction or without friction, is more similar to your everyday experience on a skateboard or bicycle? Write at least 2 sentences to explain your answer.

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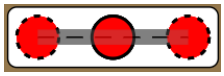
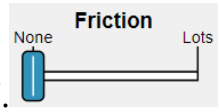
Finally, click "Playground" at the bottom: 

Create a track with at least one loop. Drag segments  to make loops.
Draw a diagram of your track here.

Slide friction to "None". 

Release your skater from below the top of the loop. Write a complete sentence explaining what happens.

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Release your skater from above the loop. Explain what happens, **using the words Kinetic Energy, Potential Energy, AND Total energy!**

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Now slide "Friction" to the right a little bit. What happens to the skater?

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Based on what you just learned, how must roller coasters be designed so that they will go through loops successfully? **Use the words Potential Energy, Total Energy, and Friction!**

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