Start:  

1. Click on the first link

2. Click on the button.

3. Explore the simulation with your partner and complete the following checklist:

- Move the dots on the track and run the skater.
- Try out different locations.
- Try different skaters. (not available using HTML5 version)
- Try the different energy graphs.
- Add friction to a track.

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

4. Reset the simulation. Then make your screen look like the picture by
   - clicking to open the bar graph
   - dragging the graph closer to the track.
   - ask if you need help

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)

<table>
<thead>
<tr>
<th>Skater's movement</th>
<th>Skater</th>
<th>Potential energy (↑↓S)</th>
<th>Kinetic energy (↓↑S)</th>
<th>Total energy (↑↓S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down the hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up the hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. **Change the skater** (not available using HTML5 version) or just the mass of the skater (Small/Medium/Large) and repeat #4. 

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

<table>
<thead>
<tr>
<th>Skater's movement</th>
<th>Skater</th>
<th>Potential energy (↑↓S)</th>
<th>Kinetic energy (↓↑S)</th>
<th>Total energy (↑↓S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down the hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up the hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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 statement or two about the “total energy” of the object moving up and down the track.

---

**Time to explore friction!**

1. Reset the simulation.
   a) Open the bar graph again
   b) Click **Track Friction**.
   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)=

<table>
<thead>
<tr>
<th>Skater's movement</th>
<th>Potential energy (↑↓S)</th>
<th>Kinetic energy (↓↑S)</th>
<th>Total energy (↑↓S)</th>
<th>_______ (↑↓S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up the hill</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. **Change the skater and repeat this part of the activity.**

<table>
<thead>
<tr>
<th>Skater’s movement</th>
<th>Potential energy</th>
<th>Kinetic energy</th>
<th>Total energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down hill</td>
<td>(↑↓S)</td>
<td>(↓↑S)</td>
<td>(↑↓S)</td>
</tr>
<tr>
<td>Up the hill</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. **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 ____________________.

6. 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.

7. 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. ______________________________________________________

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

   / Write a possible explanation for this. ______________________________________________________

9. 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.

   / Write a possible explanation for this. ______________________________________________________