Energy Skate Park

<u>Vocabulary</u>

Potential Energy (PE) - the possible energy of an object or a system.

Kinetic Energy (KE) - the energy of movement and motion

<u>Gravitational Potential Energy</u> - the potential energy of an object due to the pull of gravity.

<u>Thermal Energy</u> - heat energy that is responsible for temperature. Heat is the flow of this energy when it is transferred to other objects.

<u>Transformation of Energy</u> - the process of energy changing from one form to another.

Part 1: Intro: Before you start the skater

Start on the Intro. Make sure that Bar Graph is clicked. You can also use the pie chart function if you want.

- 1. Before you start the skater, **<u>predict</u>** where the skater will have the most potential energy and the most kinetic energy.
 - a. Most potential -
 - b. Most kinetic -
- 2. Put the skater on the u-shaped track and test your predictions.
- 3. On the track below, <u>label</u> where there is all kinetic energy, all potential energy and about half of each. <u>Explain</u> your answers.



- 4. Where would the potential energy come from in a real skater on a real ramp?
- 5. Change the height of the skater. What happens to the potential energy as you increase and decrease the height of the skater?
- 6. How can you change the amount of kinetic energy in the system?

7. Change to the half-track.

8. How is the energy different in this system?

9. Change to the W shaped track.

- 10. Predict the potential and kinetic energy <u>ratio</u> for the <u>middle part</u> of the track.
- 11. Label the track below with your predictions.
- 12. Test your predictions on the track. Change any incorrect predictions.



- 13. Change back to the U-shaped track.
- 14. Drop the skater off of one end. Watch the bar graph to see what happens when the skater lands. What happens to the potential energy as the skater goes off of the end and hits the ground?
- 15. Drop the skater so it hits halfway down the ramp. What happens to the potential energy in the system?

Part 2: Friction

- 16. Change the view to **Friction**. Make sure the bar graph is checked. What is different between what you are seeing in this view and what you saw in *Intro* view?
- 17. Start the skater at the top of the ramp. What is happening to the potential energy in the system?
- 18. As the skater is moving on the ramp, the amount of [KINETIC ENERGY / THERMAL ENERGY] decreases.

19. Change the amount of friction in the system to see what happens. <u>Describe</u> how friction changes the energy <u>transformation</u> in the system.

Part 3: Mass and Energy

- 1. Mass also has an effect on the amount of energy in the system.
- 2. Go back through the intro and friction sections of Energy Skate Park.
- 3. Explore how mass changes the amounts of potential and kinetic energy.
- 4. Answer the questions:
 - a. What does a change in mass do to the potential energy in the system?
 - b. Why do you think the skater does not go higher if the potential energy increases?
 - c. If there were an object at the bottom of the track, how would a change in mass affect the impact between the skater and the object? Don't forget to discuss the energy involved.

Extension

- 1. Switch to the 'playground' tab. Make sure that friction is off.
- 2. Design your own track (not just a U or W) and draw it below.

- 3. Label the points on your track where *kinetic energy* is **high** with **"KH"**.
- 4. Label the points on your track where *kinetic energy* is **low** with **"KL"**.
- 5. Label the points on your track where *potential energy* is **high** with **PH**".
- 6. Label the points on your track where *potential energy* is **low** with "**PL**".

Highly Proficient	Proficient	Close to Proficient	Developing
 The connection of mass and energy is well understood. Answers show an advanced knowledge of energy. 	 Lab is complete. A strong knowledge of potential energy is shown. All of the energy in the system can be explained. 	 Lab is incomplete Answers lack enough detail and evidence to show strong understanding of potential and kinetic energy. 	 Little to no knowledge of energy is shown not attempted