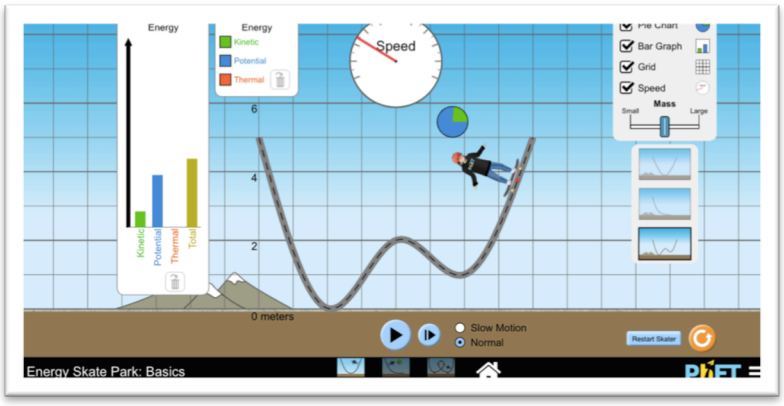
Energy Skate Park
APP1 Lab #1
Version 1.1



Before you begin the lab:

- ✓ Open the *Energy Skate Park* PhET simulation on your device.
  (Link is on Edmodo)

- ✓ Make sure you have *LoggerPro 3.0* on downloaded onto your computer.
  (It's free because you are my student. Link is on Edmodo.)

- ✓ Grab a timer.

Purpose

You are investigating the relationship between kinetic energy, potential energy, and total energy when only conservative forces are present and then again when non-conservative forces are present. The data will be analyzed graphically in order to provide a clear trend.

Directions

Part 1- Conservative Forces

1. Open *Energy Skate Park*. Choose *Intro*.

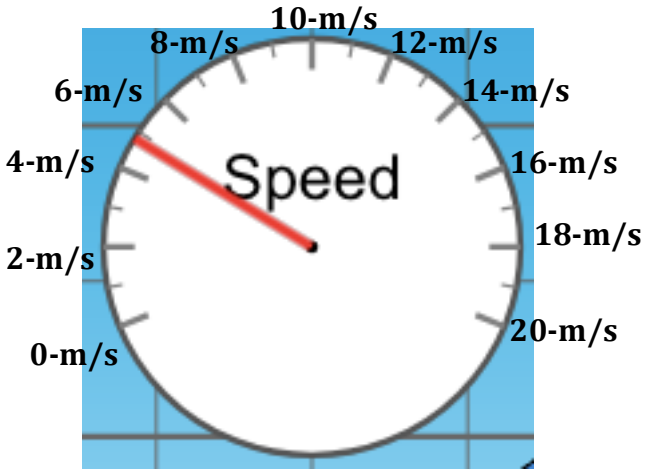
2. Take time to play around with the simulation. Make sure all boxes are checked.

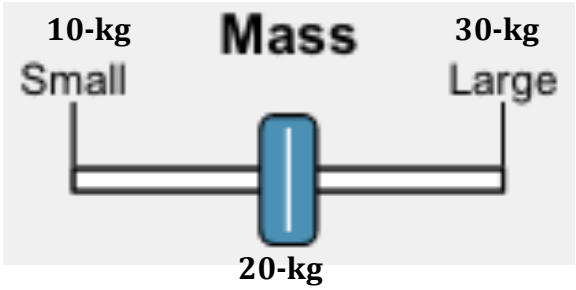
   - What do you notice about the total energy, kinetic energy, and potential energy in the bar graph?

   - What do you notice about the pie graph? What must you do in order to get the pie graph to be larger?

3. You are measuring the changes in energy- total, kinetic, and potential over time. To do this, we need to define our system. **This is a skater-earth system**.

4. We also need to establish numbers for mass and speed.





5. Choose "Slow Motion." Place the 20-kg skater at 6-m and start the timer when you hit play. Pause both timer and sim when the skater is at 4-m, 2-m, 0-m, and 6-m. Record the height, speed, and time in the table below. Continue recording until you've reached 30-s.

Time	Height	Velocity
0-s	6-m	0-m/s

6. Calculate the potential energy, kinetic energy, and total energy of the system using the data from #4. **Be sure to use 10 m/s^2 for g.**

Time (x-axis)	Potential Energy (y-axis)	Kinetic Energy (y-axis)	Total Energy (y-axis)

7. Graph the three data sets in #5 using Logger Pro. I have attached an instructional video to the assignment to help with this step.

Part 2- Non-conservative Forces

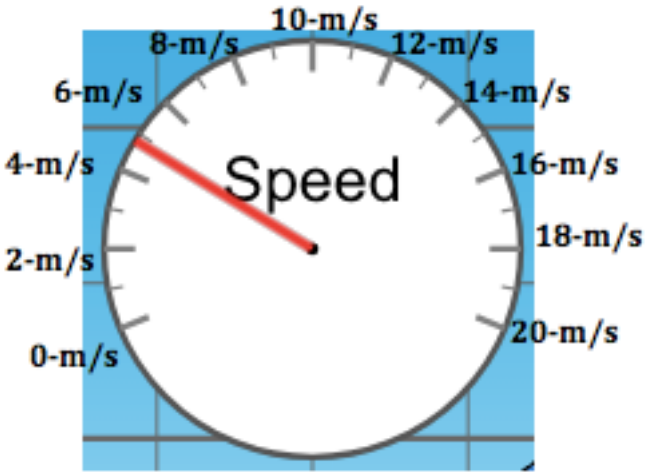
8. Click "Friction" at the bottom of the simulation.

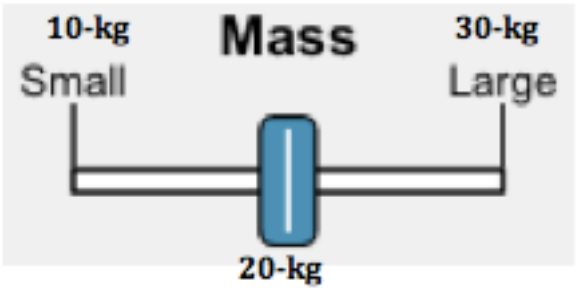
9. Take time to play around with this simulation. Make sure all boxes are checked.

   - What do you notice about the total energy, kinetic energy, and potential energy in the bar graph?

   - What do you notice about the final thermal energy & the total energy once the skater has stopped?

10. You are measuring the changes in energy- total, kinetic, and potential over time. To do this, we need to establish numbers for mass and speed as well as our system: This is a **skater-earth system**.





11. Choose “Slow Motion.” Place the 20-kg skater at 6-m and start the timer when you hit play. Pause both timer and sim when the skater is at 4-m, 2-m, 0-m, and 6-m. Record the height, speed, and time in the table below. Continue recording until you’ve reached 30-s.

Time	**Height**	**Velocity**
0-s	6-m	0-m/s

12. Calculate the potential energy, kinetic energy, and total energy of the system using the data from #10. **Be sure to use 10-m/s^2 for g.**

Time (x-axis)	Potential Energy (y-axis)	Kinetic Energy (y-axis)	Thermal Energy (y-axis)	Total Energy (y-axis)

13. Graph the four data sets in #11 using Logger Pro. Follow the same procedure as before. Make the thermal energy a linear fit.

14. You are now finished with the experiment itself. Now type a formal lab report to present this information. Be sure to follow the rubric for the lab report attached to this assignment.