

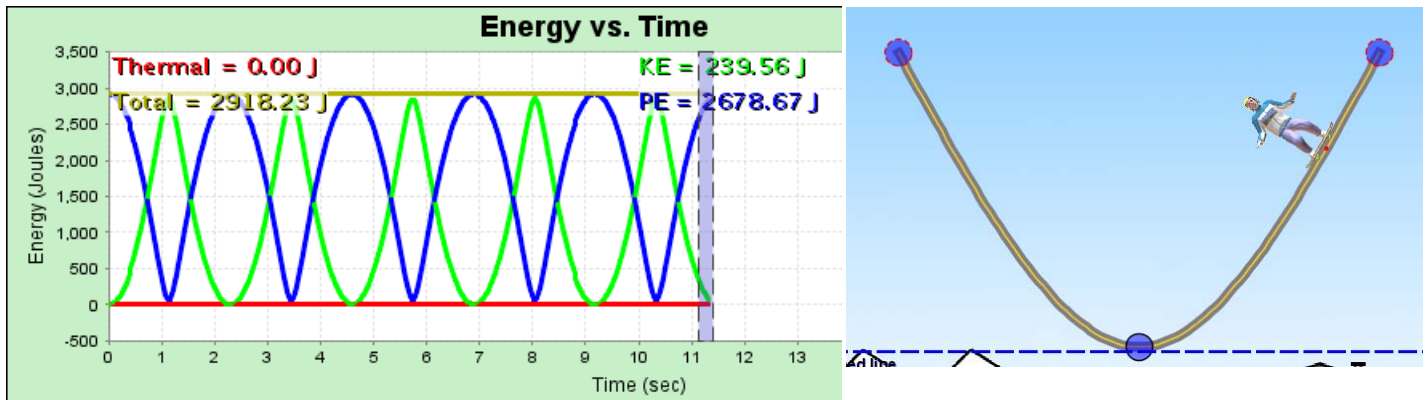
**Student directions *Energy Skate Park* activity 4:
Calculations with Conservation of Mechanical Energy using time graphs**

Learning Goals: Students will be able to use **Energy-Time** graphs to... at a given time.

- Estimate a location for the Skater on a track.
- Calculate the speed or height of the Skater
- Predict energy distribution for tracks with and without friction.

Directions:

1. This graph was made with the 75 kg Skater Guy riding on the track shown. Without using the simulation, talk with your partner to predict the answers to these questions. Record your predictions!



- a. Where was he at time zero? At 7 seconds? At 8 seconds? 5 seconds?
 - b. If his maximum height is 4 m, what is his height at time zero? At 7 seconds? At 8 seconds? 5 seconds?
 - c. What is his speed at time zero? At 7 seconds? At 8 seconds? 5 seconds?
 - d. Sketch what the graph would look like between 13 and 15 seconds.
2. Use the Skate Park simulation to check your answers and make corrections. *Show examples of calculations by giving the formula and substitution.*
 3. Without using the simulation, talk with your partner to predict the answers to these questions about the same Track, Skater and Starting point as #1. Record your predictions!
 - a. Sketch what the graph might look like between 0 and 9 seconds if the **Track Friction** was turned on.
 - b. How do you think his location will be affected? Think about both horizontal and vertical location.
 - c. How do you think his speed on the track will be affected?
 - d. Test your ideas using the simulation and make corrections to your predictions.
 4. Consider if the 60kg Skater Gal rode on the same Frictionless Track and Starting point.
 - a. How do you think her position, speed and energy will compare to the Guy's?
 - b. Sketch what the graph might look like between 0 and 5 seconds.
 - c. If you used the same amount of track friction, how would your answers to question three compare?
 - d. Test your ideas using the simulation and make corrections to your predictions.