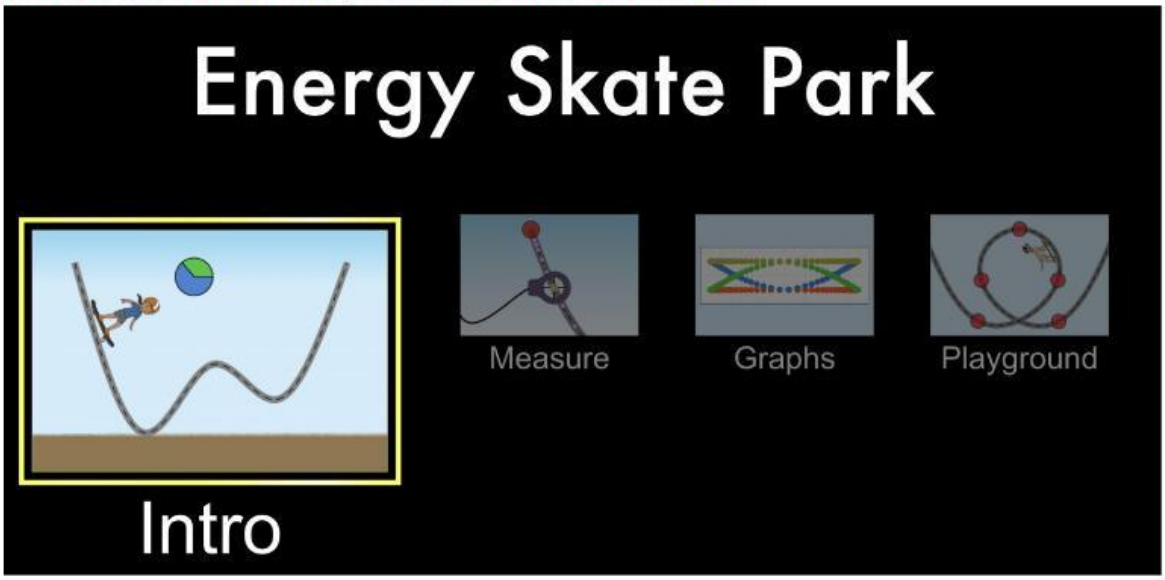
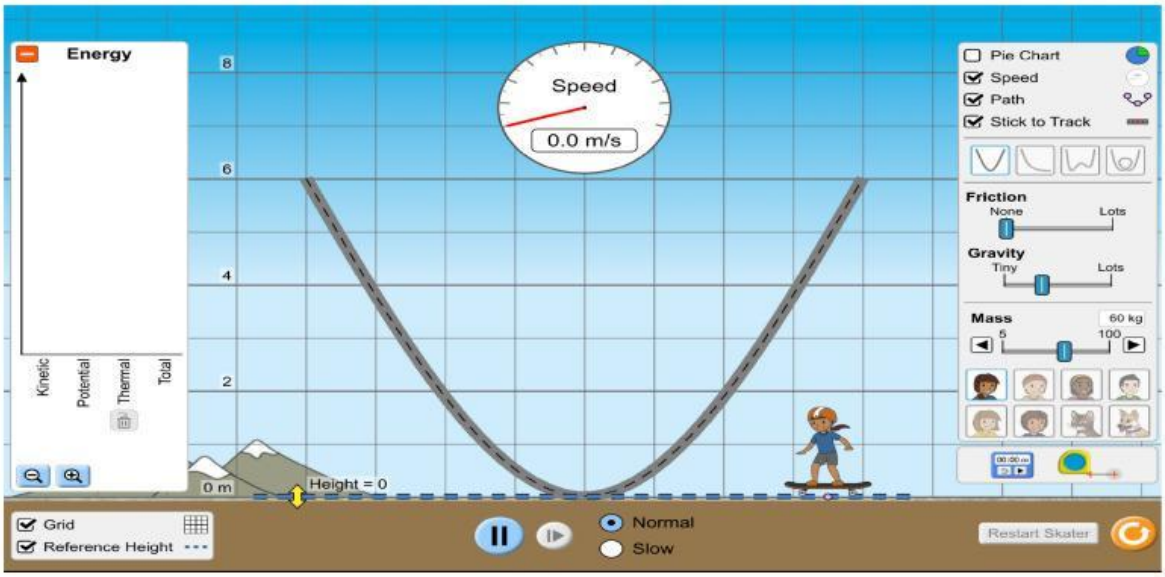
Click on the following link: Energy Skate park Simulation
Launch the simulation, then click on the intro tab



On this page, click on the following

- **Click on Energy tab in top left corner**
- **Click Grid and reference height checkboxes in the bottom left corner.**
- **Click on speed, path, and stick to path checkboxes in the upper right corner.**

Your page should now look like this!



Place the skater on the track at a height of 6 meters and then run the simulation. Watch how the kinetic energy, potential energy, total mechanical energy change as the skater moves back and forth along the track. Fill in the data table below based on your observations.

Height in meters	Speed in m/s	Height of Potential Energy Bar	Height of Kinetic Energy Bar	Height of Total Mechanical Energy bar
0				
2				
4				
6				

Now looking at the data table above and playing with the simulation, answer the following questions.

1. What happens to the amount of gravitational potential energy as the skater goes down the ramp (from 6 meter height to the 0 meter height).

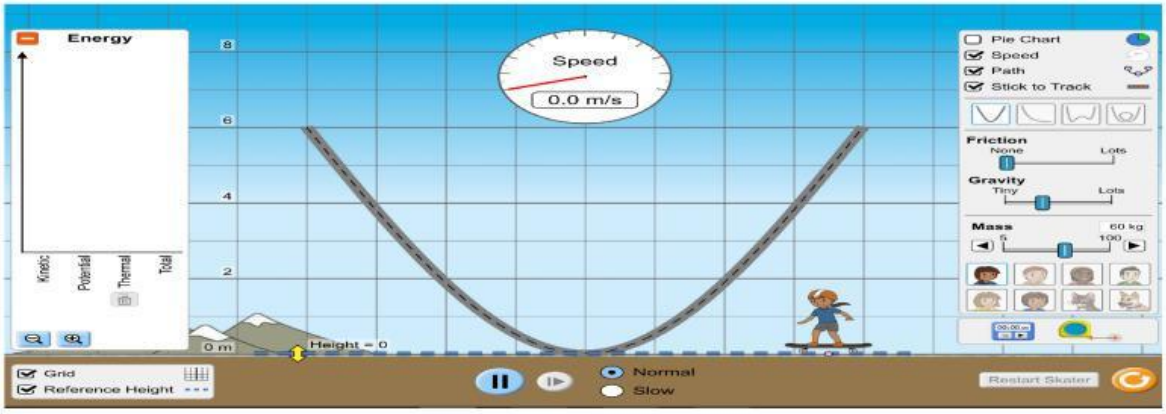
2. What happens to the amount of kinetic energy as the skater goes down the ramp (from 6 meter height to the 0 meter height).

3. What happens to the skater's height and speed as she goes down the ramp (from 6 meters to 0 meters).

4. What happens to the total amount of total mechanical energy as the skater goes down the ramp (from 6 meter height to the 0 meter height).

5. Looking at the data table and watching the skater move back and forth along the track, what can be stated about the height of the mechanical energy bar compared with the heights of the potential energy and kinetic energy bars?

Make sure the simulation is initially set up as shown for questions 6, 7, and 8. For each question, you will run this simulation, and compare what you see with the simulation rerun once a change is made.



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6. Set up the simulation as shown above and measure the gravitational potential energy, kinetic energy, and total mechanical energy of the skater when at a height of 2 meters. Rerun the simulation **after changing the skater's mass from 60 kg to 100 kg**. Determine if the amount of each energy increased, decreased, or remained the same.

Kinetic Energy: Potential Energy: Total Mechanical Energy:

7. Set up the simulation as shown above and measure the gravitational potential energy, kinetic energy, and total mechanical energy of the skater when at a height of 2 meters. Rerun the simulation **with gravitational pull increased**. Determine if the amount of each energy increased, decreased, or remained the same.

Kinetic Energy: Potential Energy: Total Mechanical Energy:

8. Set up the simulation as shown above and measure the gravitational potential energy, kinetic energy, and total mechanical energy of the skater when at a height of 2 meters. Rerun the simulation **with friction added.** Determine if the amount of each energy increased, decreased, or remained the same.

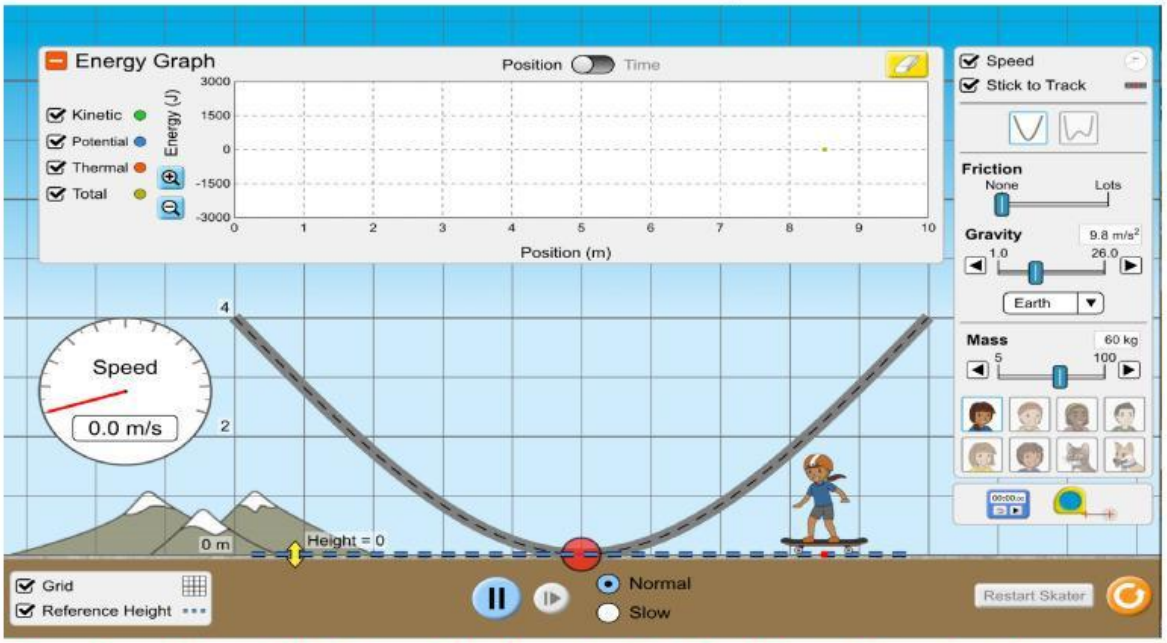
Kinetic Energy: Potential Energy: Total Mechanical Energy:

9. Set up the simulation as shown above and measure the gravitational potential energy, kinetic energy, and total mechanical energy of the skater when at a height of 2 meters. Rerun the simulation **after changing the ramp type to the one with the loop.** Determine if the amount of each energy increased, decreased, or remained the same.

Kinetic Energy: Potential Energy: Total Mechanical Energy:

10. Relaunch the simulation and click on the graph tab
https://phet.colorado.edu/sims/html/energy-skate-park/latest/energy-skate-park_all.html

Ensure that the simulation is set up as shown



Place the skater at the top of the 4 meter height without dropping the skater. Run the simulation. You may notice that you can click the checkmarks for each type of energy either one at a time or all at once.

10. What do you notice about each of the following types of energy as the simulation runs?

Gravitational Potential Energy:

Kinetic Energy:

Total Mechanical Energy:

Because total mechanical energy is conserved, we can say that

Gravitational potential energy _____ when Kinetic energy _____

11. While running the simulation, now add a little bit of friction. What happens to the total mechanical energy as friction is added.