Phet Simulation: Energy Skate Park  
Follow the directions carefully before answering the following questions while using the Phet Simulation “Energy Skate Park”. <http://phet.colorado.edu/en/simulation/energy-skate-park>

1. Run the Simulation, *Keep all the default settings*, but select “Choose a Skater” and pick any one you want. Finally, click “edit Skater” to manipulate the mass of the skater. **Does mass have an impact?** Explain.
2. Click the Potential Energy Reference Check Box, then move the blue PE reference to the lowest point in the Track. Click “Bar Graph” to see the Conservation of Energy. **Is this realistic? Explain**.
3. With the Bar graph still shown, alter the Gravity. **What effect does gravity have on the KE, PE, and Total Mechanical E? Why?**
4. Reset the simulation, Adjust the PE level to the lowest point again, then click on “Energy vs Position” to view the Conservation of Energy. **Sketch three cycles of this graph.**
5. Clear the graph. Return the Skater. Adjust the track friction so that it is about a quarter higher than zero. Hit the play button then **sketch the “Energy vs Position Graph”.**
6. **At what point(s) in the cycle is the most Internal Energy gained? Why?**
7. **At what point(s) is there no increase in Internal Energy? Why?**
8. Hit Reset. Keep all defaults (you may change the skater) Click and drag track segments and/or the skater in order to build a track that causes the skater to go over two hills where the first hill is at least 5 meters. (note: every time you hit “return skater” he will return to wherever you last dragged and dropped him). **Once you are successful, sketch your relative track pattern here.**
9. Keep the track you had in 8. Repeat the prior objective, this time with a small amount of track friction. Once you are successful, *Show your instructor.* **What needs to be altered on your track? Why? Once more also create a sketch.**
10. Hit Reset. Keep all defaults (you may change the skater). Create a track that makes the skater do a loop upside down and *then* complete a jump to a new set of tracks. **Once you are successful, sketch your relative track pattern here.**
11. Keep the track you had in 10. Repeat the prior objective, this time with a small amount of track friction. Once you are successful, *Show your instructor.* **What needs to be altered on your track? Why? Once more create a sketch.**
12. **Explain how each of the first two laws of thermodynamics can be seen in this skate park.**