**Energy Skate Park**

**APP1 Lab #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?
1. 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**.
2. We also need to establish numbers for mass and speed.

**0-m/s**

**2-m/s**

**4-m/s**

**6-m/s**

**8-m/s**

**10-m/s**

**12-m/s**

**14-m/s**

**16-m/s**

**18-m/s**

**20-m/s**

 

**5-kg**

**10-kg**

**15-kg**

1. Place the 10-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 45-s.

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

1. Calculate the potential energy, kinetic energy, and total energy of the system using the data from #4.

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

1. 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*

1. Click “Friction” at the bottom of the simulation.
2. 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?
1. 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**.

**0-m/s**

**2-m/s**

**4-m/s**

**6-m/s**

**8-m/s**

**10-m/s**

**12-m/s**

**14-m/s**

**16-m/s**

**18-m/s**

**20-m/s**

 

**5-kg**

**10-kg**

**15-kg**

1. Place the 10-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 45-s.

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

1. Calculate the potential energy, kinetic energy, and total energy of the system using the data from #10.

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

1. Graph the four data sets in #11 using Logger Pro. Follow the same procedure as before. Make the thermal energy a linear fit.
2. 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.