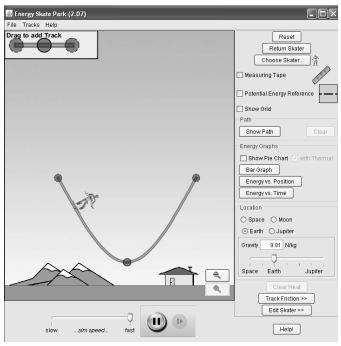
Name _____ Date _____

Honors Physics Energy WS #3H

Period _____ Mrs. Nadworny

Skate Park Energy

Directions: Follow the directions below to access a simulation that investigates the energy of a skater at a skate park. Use the information gathered to answer the questions.



1. Go to http://phet.colorado.edu/
2. Click on "Play with Sims" to access a list of simulations. From the left hand menu choose "Physics". Click on the icon for "Energy Skate Park". (Avoid clicking on the Basic Simulation)
   - Mac users – you may encounter a JAVA error. Use the Basic Simulation and follow the instructions as best as you can.
3. Click "Run Now!" to begin the simulation. Once it opens you should see a skater on a half pipe.
4. Grab the dot at the top of the right hill and drag it up so that it is higher than the left hill. Grab the skater and start him at the top of the left hill. Watch as he goes back and forth along the half pipe.
5. How high does the skater go on the right hill compared to where he started on the left hill?

   The skater only goes as high on the right hill as he started on the left hill.
6. Click "Reset" so that the hills are of equal height again. Grab the dot in the middle of the track and pull it down so that the center of the half pipe is on the ground. Start the skater at the top of the left hill and again watch him roll back and forth along the half pipe.
7. Select "Show Pie Chart". You should now see a pie chart (circle with changing colors) following the skater. Look at the key to determine which color is used for PE and which for KE. Watch what happens to the PE and KE as the skater rolls back and forth. You can slow him down using the "Sim Speed" slider on the bottom.
8. At which position(s) does the skater have the maximum amount of PE?

   The skater has the most PE at the top of the hills.
9. Describe the relationship between PE and height.

   The greater the height, the more PE the skater has.
10. At which position(s) does the skater have the maximum amount of KE?

    The skater has the most KE at the bottom of the hill.
11. At which position(s) does the skater have the maximum speed?

    The skater has the most speed at the bottom of the hill.
12. Describe the relationship between KE and speed.

    The greater the speed, the more KE the skater has.

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13. Describe the relationship between the amount of PE and the amount of KE the skater has as he rolls back and forth along the half pipe.

The PE transforms into KE and back again throughout the ride.

14. How is the total energy represented by the pie chart?

The pie chart represents the total energy because it is the PE + KE + Q.

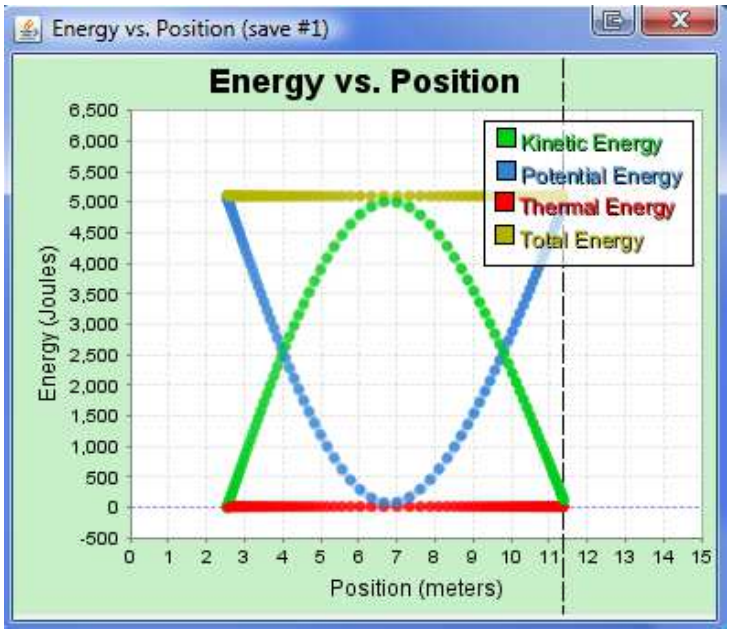
15. Describe how the amount of total energy changes as he skates.

The total energy remains the same.

16. Click on "Energy vs. Position" tab. This will create a graph that shows you how his energy varies as he rolls along the half pipe. Watch how the colors correspond to where he is on the half pipe. After he completes one complete cycle click on the "Copy" button which will duplicate the graph, allowing you to analyze the motion.

17. **Sketch** the four curves/lines **on the axes at right** for one complete cycle. **Label** the curves/lines appropriately.

18. Close the graph window. Click on "Track Friction" and set the "Coefficient of Friction" slider to halfway. Watch the pie chart for the KE, PE and thermal energy. Notice what happens to the PE and KE as the red slice for thermal energy increases.



19. Describe what happens to the skater's height as the thermal energy increases.

As the thermal energy increase, the height decreases.

20. Describe what happens to the skater's speed as the thermal energy increases.

As the thermal energy increase, the speed decreases.

21. Describe what is happening to the skater's PE and KE as the thermal energy increases.

As the thermal energy increase, the PE and KE both decrease.

22. Describe what happens to the amount of total energy as the thermal energy increases.

As the thermal energy increase, the total energy remains the same (it just transforms into thermal energy).