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**Intro to Energy Lab**

Energy is a term used often in life, however, the definition of energy is very difficult to define. Additionally, there are no such things as “energometers” so measuring energy directly is not really possible. Rather, scientists use indicators to help us determine what type of energy is present in a system. By studying the changes in these indicators, we can learn more about how the energy is changing in a system. We are going to start by determining the indicators of the two following types of energy (keep in mind these are NOT the *only* types of energy that exist-there are many more):

1. Gravitational Potential Energy (PE):
2. Kinetic Energy (KE):
3. Total Mechanical Energy (TME):

**Set-up:** Go to <http://phet.colorado.edu/en/simulation/energy-skate-park-basics>. Click “Run Now”. Once it’s open, turn the “Bar Graph” on. Then, place your skater at the top of the half-pipe and let him go. Click the “slow-motion” option on the bottom to make things easier to follow.

**Part 1: No Friction**

1. Analyze the bar graph to answer the following questions.
   1. Draw a picture of the bar graph shown on the screen, labeling the energies correctly for when the skater is at the top of the ramp.
   2. Describe what is happening with the gravitational potential energy as the skater approaches the top of the ramp. Why does this happen?
   3. Describe what is happening with the kinetic energy as the skater approaches the top of the ramp. Why does this happen?
   4. Describe what is happening with the total energy as the skater approaches the top of the ramp. Why does this happen?
2. Analyze the bar graph to answer the following questions.
   1. Draw a picture of the bar graph shown on the screen, labeling the energies correctly for when the skater is at the bottom of the ramp (i.e. the vertex of the parabola).
   2. Describe what is happening with the gravitational potential energy as the skater approaches the bottom of the ramp. Why does this happen?
   3. Describe what is happening with the kinetic energy as the skater approaches the bottom of the ramp. Why does this happen?
   4. Describe what is happening with the total energy as the skater approaches the bottom of the ramp. Why does this happen?
3. Now, increase the mass of the skater to “Large”. Analyze the bar graph and describe how changing the mass affected…
   1. Gravitational potential energy
   2. Kinetic Energy
   3. Total Energy

**Part 2: Friction**

1. Now click the Friction tab at the top of the simulation. Check the bar graph option on the right of the simulation. Turn friction on and set the slider bar for the friction amount at roughly 25%. Click the slow-motion option at the bottom to make things easier to follow. Place the skateboarder on the track at the top of the half-pipe and let him go.
2. As the skateboarder rides back and forth, what happens to the following energies throughout the skater’s journey…
   1. Gravitational potential energy
   2. Kinetic Energy
   3. Thermal Energy
   4. Total Energy