Physics 100
Energy Notes

Name: Key

What is energy? The capacity for doing work.

Units for energy: Joules (J) But also kilowatt-hours, Amp-hours, BTUs

Kinetic Energy: Energy of motion

Kinetic Energy Formula: $KE = \frac{1}{2} m v^2$ (m: mass, v: velocity)

How much kinetic energy does 40kg person have if she is moving at a speed of 3m/s?

$KE = \frac{1}{2}(40\,kg)(3\,m/s)^2 = 180\,J$

Potential Energy: Stored Energy

Some types of potential energy: Gravitational, Chemical, Electrical, nuclear...

Gravitational Potential Energy Formula:

$PE = mgh$ (m: mass, g: $10\,m/s^2$, h: height)

How much potential energy does 50kg person gain if he climbs to the top of a 4m ladder?

$PE = 50\,kg\,(10\,m/s^2)(4\,m) = 200\,J$

Thermal Energy:

Heat energy; energy something has due to its temperature

Law of Conservation of Energy:

The total amount of energy in a closed system remains constant.

PhET Energy Skate Park Questions:

1. Go to the "Intro" tab. Turn on the energy graphs. Leave friction set to none. Place the skater on the half pipe and release her. Describe what happens to her potential energy, kinetic energy, and total energy as she passes through the half pipe.

Total energy stays the same. Potential is high when she is at the top, and low at the bottom. KE is opposite.

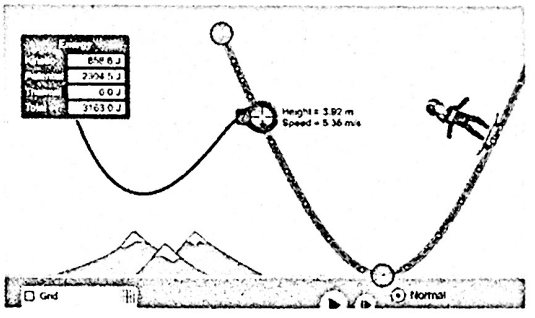
2. Provide an explanation for number 1.

This demonstrates the Law of Conservation of energy. Energy can change form, but the total stays the same.

3. Reset and add some friction. Describe what happens to the skater's potential energy, kinetic energy, thermal energy, and total energy as she passes through the half pipe.

Same as above, except that friction slowly turns KE and PE into thermal energy.

4. Open the "measure" tab. Release the skater from some height, and pause while the purple dots are visible. Use the measure tool to find the skater's height and speed at one of those dots. Then use that height and speed (along with the skater's mass – which you can find on the screen), to calculate the skater's kinetic and potential energies at that point. Enter your data below, and show your work.



Height = 3.92m Speed = 5.36m/s

Mass = 60kg

Kinetic Energy = 862J Potential Energy = 2,352J

$KE = \frac{1}{2}(60kg)(5.36m/s)^2$

$= 862J$

$PE = mgh$

$= 60kg(10m/s^2)(3.92m)$

$= 2,352J$