Energy Activity

Some helpful websites include:

Wikipedia Energy
http://en.wikipedia.org/wiki/Energy
Wikipedia Law of Conservation of Energy
http://en.wikipedia.org/wiki/Conservation_of_energy

In this activity you and your team members will investigate kinetic and potential energy and the Law of Conservation of Energy by dropping a sturdy, safe object from one level of the campus to another.

Potential energy can be expressed as: $PE = mgh$

where

m = mass of the object in *kg*
g = acceleration of gravity which is 9.80 m/s^2
h = height, or distance fallen by the object

Kinetic energy can be expressed as: $KE = \frac{1}{2}mv^2$

where

m = mass of the object in *kg*
v = velocity of the object in *m/s*

The object has the same amount of energy before you drop it, all potential, as it does the instant before it lands, all kinetic:

PE (before drop) = KE (immediately before landing)

By substitution and then canceling m from both sides:

$$mgh = \frac{1}{2}mv^2 \rightarrow \quad gh = \frac{1}{2}v^2$$

Then we can solve for v:

$$v^2 = 2gh \quad \rightarrow \quad v = \sqrt{2gh}$$

We also know from physics that:

$$h = \frac{1}{2}gt^2$$

and can solve this equation for t, where t is measured in seconds:

$$t^2 = \frac{2h}{g} \qquad \rightarrow \qquad t = \sqrt{\frac{2h}{g}}$$

You and your team members will:

- measure the distance that the object will fall
- drop the object and time how long it takes.
- use the formula $t = \sqrt{\frac{2h}{g}}$ to determine how long it should take to fall
- compare the calculated results with what you actually measured
- repeat this process at least three times
- answer the questions below.

1. What is energy?

2. What is the Law of Conservation of Energy?

3. What is potential energy?

4. What is kinetic energy?

5. How many meters did the object fall?

6. How many seconds did it take to hit the ground?

7. Calculate how many seconds it *should* have taken to hit the ground and show your work.

8. What is the difference, in seconds between the time on the stopwatch and the time you calculated using the formula?

9. If there is a difference, explain why.