ACTIVITY 4
Half Life Simulation Activity and Preview of iLab

Driving Question:
Can something radiate forever?

Activity Guide:

1) Each coin will represent at atom of a radioisotope.

2) Count the total number of atoms (coins) and record on your data sheet.

3) Every student will then flip their atom (coin).

4) Those atoms (coins) landing with “heads” showing are still "radioactive". Those that have landed “tails” have "decayed" and should be removed. These students will then sit down. Count the number of "radioactive atoms" that remain (heads/standing students), and record the values in the data table.

5) Every standing student with a “heads” penny will then flip their coin (representing a still radioactive atom).

6) Again, remove the decayed atoms (coins with “tails” showing), and then count the number of radioactive atoms (coins) with “heads” still showing. Those that had “tails” will sit while those with “heads” remain standing. Record and continue the process until no radioactive atoms remain and all students are seated.

Questions and Analysis:

1. Using your data from the activity, make a graph of the number of people left standing after each 'half-life' (y-axis) versus the number of coin flip (x-axis). You may wish to use Excel to make the graph and to determine the best fit for the graph. Is the shape of your graph linear, a power law, or exponential, based on what you see?

2. The half-life for carbon-14 (this is an isotope of normal carbon-12; it just has two extra neutrons that make it radioactive) is about 5700 years. What does half-life mean if you have a sample of 1000 carbon-14 atoms? What does half-life mean if you have a single carbon-14 atom?

3. Make a graph of the number of carbon-14 atoms (suppose you have an initial sample of 1000 atoms) as a function of time, knowing the half-life is 5700 years. For an initial sample of 1000 carbon-14 atoms, approximately how long would it take to have only 700 carbon-14 atoms remaining from the original sample? How long would it take to have only 100 carbon-14 atoms from the original sample? Make approximations from your graph.

4. Describe the process of how scientists can use carbon-14 as a way of measuring the age of bones. Would you trust carbon-14 dating for objects that may be millions of years old? Why or why not?

5. Research how geologists determine the age of the first rocks that formed on Earth. How can scientists determine the age of objects that are several *billion* years old?