Student directions *Alpha Decay* Names_____

http://phet.colorado.edu

Learning Goals: Students will be able to:

- Explain alpha decay process.
- Explain what half-life means in terms of single particles and larger samples.

Directions: Open Alpha Decay

1. Investigating "Alpha Decay"
    a. Start on the **Single Atom** tab - observe the decay of Polonium -211. Use **Reset Nucleus** to watch the process repeatedly. Write a description of what happens in the alpha decay of an atom.

    b. Check your ideas with the "Custom" atom and reflect on your ideas.
    New ideas here:

    c. Did you find the graph helpful or not? Explain

    d. Verify your ideas by using the periodic table or other resources to determine what the differences are between Polonium with a mass number of 211 and Lead with a mass number of 207. Also, use other resources to see what "Alpha Decay" means and cite at least one valid source.
    Cites here:

    e. Practice using your ideas by predicting what would happen if the following undergo alpha decay:
        i. Radium-226 _____+ _____
        ii. Plutonuim-240 _____+ _____
        iii. Uranium-238 _____+ _____

2. Investigating "Half-life" - The **Multiple Atoms** tab may be helpful
    a. Use the Charts at the top of the sim to test ideas you might have about half-life. Make sure to use multiple samples and substances with a variety of half-lives. Make a data table that shows your tests.
    Data Table here:

    b. In your own words, describe what "half-life" means.

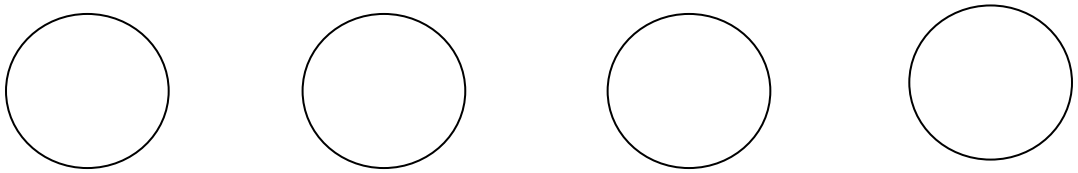
4/29/2012 Loeblein. Thanks to Phil Cook, chemteacherphil@gmail.com, for his ideas from activities on PhET Teaching Ideas: http://phet.colorado.edu/en/contributions/view/3221

Student directions *Alpha Decay* Names_____

http://phet.colorado.edu

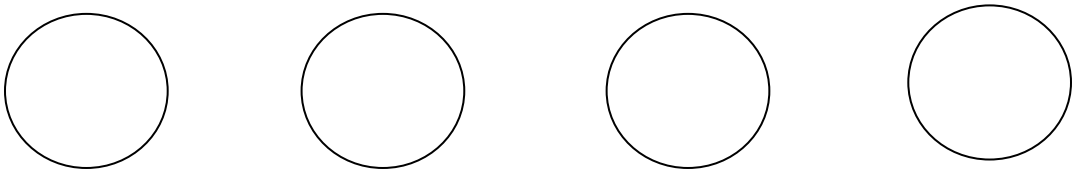
c. Check your ideas by drawing predictions **without** using the sim for the following scenario:

If you have a *substance* that has a half- life of 1.5 seconds make predictions of what will happen by sketching the pie graphs indicating the number of the *substance* and it's *decayed atoms* for a reaction starting with 40 total atoms.



t= 0.5s t=1.0s t=1.5s t=2s

d. Use the sim to test the scenario. Copy the graphs. (**Pause** and **Step** may help)



t= 0.5s t=1.0s t=1.5s t=2s

e. How do your predictions compare to the results shown in the sim?

f. Run the scenario repeatedly and compare the results of multiple trials. Use the Data table to show your results:

Time(s)	Trial 2	Trial 3	Trial 4	Trial 5
0				
0.5				
1.0				
1.5				
2.0				

g. What ideas do you have to explain the similarities and differences in the data and also your predictions?

h. Try another substance with a different half-life to see if your conclusions make sense. Describe your test, results, and conclusions.

i. Practice using your ideas: Is it reasonable to assume that if you start with 10 atoms of Polonium, that 0.5s later only 5 will remain? What if you start with 500 atoms? Explain.

4/29/2012 Loeblein. Thanks to Phil Cook, chemteacherphil@gmail.com, for his ideas from activities on PhET Teaching Ideas: http://phet.colorado.edu/en/contributions/view/3221