Name:_____ Per: ___ Date: _____

Radioactive Dating Game Activity

Radioactive Dating Game

1.) Go to this website:
http://phet.colorado.edu/en/simulation/radioactive-dating-game
2.) Click on play button
3.) Click RUN CHEERPJ BROWSER-COMPATIBLE VERSION

Purpose: Students will use radioactive decay rate and original daughter element ratios of Carbon-14 and Uranium-238 to determine ages of different objects.

Materials: Computer web site

RADIOACTIVE DATING GAME DIRECTIONS

Now that we understand radioactive decay and half-lives, we can use them to determine how old rocks or fossils are.

1. Click the "Dating Game" tab at the top of the screen. 

2. You can drag the probe to different items on or below the surface of the earth. The probe tells you how much of the original element is still in the rock or fossil. You can measure C-14 or U-238, whichever works better for the item you are measuring.

3. You can use the graph to match the percent of element remaining, and then use the time shown to estimate the age of the rock or fossil.

4. Let's do an example:
    a. Drag the probe to the dead tree to the right of the house.
    b. Look at the probe reading: it tells you that there is 97.4% of the original C-14 remaining in the dead tree.
    c. Now find the green arrows on the graph at the top of the screen. Drag those arrows right or left until the top line tells you that the C-14 percentage is 97.4%, the reading from the probe.
    d. When you get the graph to read 97.4%, it tells you that the time has been 231 years.
    e. Type this number into the box for "Estimate age of dead tree" and click "Check Estimate".
    f. You should get a green smiley face, indicating that you have correctly figured out the age of the dead tree.

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Repeat the above process for all the other items. Fill in the table below.

Item	Age	Element Used
Animal Skull		
House		
Living Tree		
Distant Living Tree		
Bone		
Wooden Cup		
Human Skull		
Fish Bones		
Rock 1		
Rock 2		
Rock 3		
Rock 4		
Rock 5		
Fish Fossil		
Dinosaur Skull		
Trilobite		
Small Human Skull		

Hint: For the last four items on the list, neither C-14 or U-238 will work well. Select "Custom", and pick a half-life that gives you something other than 0.0% on the probe.

Analysis questions

1. Why can't we use Carbon-14 to date the rocks?

   _____

2. Why couldn't the fish fossil or dinosaur skull be dated with either C14 or U238?

   _____

   _____

3. Could Carbon-14 be used to date a hammer suspected of being used in 3400BC? _____
4. Why/Why not? _____

   _____

5. Starting with 100 Carbon-14 atoms, how many would you expect to have after one half-life? _____
   After three half-lives? _____
6. Make a small sketch of what a decay curve may look like for an unknown element→
7. You happen upon an antiques store and the clerk claims that he has a belt that was once worn by Alexander the Great, around 350 BC. You radiocarbon date it and find the percent of carbon to be 75% remaining. Could the belt be genuine? How did you arrive at your answer?

   _____

   _____

   _____