Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_

**Part #2** Dating Fossils vs. Rocks

**PhET Radioactive Dating Simulation**

**Simulation:**

* Open PhET Simulation “Radioactive Dating Game” at <https://phet.colorado.edu/en/simulation/radioactive-dating-game>
* Click on the “Dating Game” tab
* **Complete the information for each object in the table below by doing the following:**
* Place the probe on the object
* Click on and try BOTH C-14 & U-238 to date the object. In the white box at the top of the “Probe Type”, the percent of C-14 or U-238 will appear.
* After determining whether to use (C-14 or U-238, move the graph’s sliding blue line till it is at the % element remaining in the object.
* The box at the top of the blue line will show both the percent and an approximate time (t) or age
* Enter an estimate the age of the object by typing the number of years into the “Estimate Age” box and click “Check Estimate”.
  + **NOTE: For Uranium-238**, you must enter the YEARS into the Estimate Age box with all the needed zeros.
    - If the time (t) at the box at the top of the blue line says MY (Millions of Years), you must multiple the number by 1,000,000 to get years.
    - If the time (t) at the box at the top of the blue line says BY (Billions of Years), you must multiple the number by 1,000,000,000 to get years.
  + If the Estimate is close enough, a green smiley face will appear – enter the age into the “Measured Age” column in the table below.
  + If the Estimate is not ok, a red frowning face will appear. Try again.
  + If you are unable to get a green smiley face saying the estimate is okay, list your estimated age in the table below and put “Unable to Determine” in the Measured Age box – this should only be needed if the percent remaining goes beyond the border of the graph.

|  |  |  |
| --- | --- | --- |
|  | **Which element did you use to date the object?** | |
| **Object** | **Carbon-14** | **Uranium-238** | **% of Original Element Remaining** | **Estimated Age** | **Measured Age** |
| Dead Tree  On surface |  |  |  |  |  |
| Leg Bone in top gray layer |  |  |  |  |  |
| Wooden Cup  Top gray layer |  |  |  |  |  |
| Human Skull top gray layer |  |  |  |  |  |
| Human Skull 2nd layer (blue) |  |  |  |  |  |
| **Object** | **Carbon-14** | **Uranium-238** | **% of Original Element Remaining** | **Estimated Age** | **Measured Age** |
| Animal Skull 3rd layer (pink) |  |  |  |  |  |
| Rock in  3rd layer (pink) |  |  |  |  |  |
| Trilobite fossil 4th green layer |  |  |  |  |  |
| Rock in  4th green layer |  |  |  |  |  |
| Brown Rock  5th gray bottom layer |  |  |  |  |  |

**Analysis & Conclusions:**

1. Did the “Element Used”, C-14 vs. U-238, depend on whether the object was Organic vs. Inorganic? Explain using evidence from your table above.
2. Only once-living things can be dated using C-14.
   1. Were you able to use C-14 for all fossils in the table above? Explain.
   2. Did the age of fossils affect the ability to use C-14 to date the object? Explain. Use evidence from the fossils you tested.
3. Describe the pattern of age based on location of the layer. (How did age of the objects in the top layer, compare to those of a middle layer or the bottom layer?) Use quantitative (numerical) evidence from the table above to support your pattern.
4. What are 2 limits of using Carbon-14 in dating the age of objects? In other words, when would Carbon-14 not be able to be used to date an object?
5. What are 2 limits of using Uranium -238 in dating the age of objects?