



Reinforcement

Absolute Ages of Rocks

Directions: Match the terms in Column I with their definitions in Column II. Write the letter of the correct phrase in the blank at the left.

Column I

- _____ 1. absolute dating
- _____ 2. half-life
- _____ 3. radioactive decay
- _____ 4. radiometric dating
- _____ 5. uniformitarianism

Column II

- a. time it takes for half of the atoms in an isotope to decay
- b. breaking down of a neutron into a proton and an electron
- c. principle that Earth processes occurring today are similar to those that occurred in the past
- d. process that uses the properties of atoms in rocks and other objects to determine their ages
- e. calculating the absolute age of a rock by measuring the amounts of parent and daughter materials in a rock and by knowing the half-life of the parent material

Directions: Follow the steps below to demonstrate the radioactive decay of carbon-14. Then answer the questions.

1. Cut a strip of paper 8 cm long. Think of the paper as all of the carbon-14 in an animal when it died.
2. The idea is to show how you find the age of a rock that contains an animal fossil by using the half-lives of isotopes. Cut the strip of paper in half.
3. Discard one half of the paper. This represents the decayed material. Record the cut in Item 6 below with an X.
4. Continue by cutting the second half of the paper in half. Record the cut below with an X.
5. Continue Steps 3 and 4 until the paper is so small you cannot make another cut. Record each cut you make with an X.

6. Number of cuts: _____
7. What is the total number of times you were able (practically) to cut the sample in half?

8. Each cut represents the half-life of carbon-14. What is the total amount of time represented by each cut?

9. Multiply the number of cuts by the half-life of carbon-14. What is the total amount of time represented by the cuts?

10. Could using the half-life of carbon-14 determine when dinosaurs died? Explain.

SECTION
3**Enrichment****Calculating Half-Lives**

Directions: You learned in the chapter about the half lives of carbon-14 and radium. Here is a table of some other isotopes and their half-lives. Use the table to answer the questions that follow.

Isotope	Half-life
Plutonium-238	86 years
Americium-241	433 years
Curium-242	163 days
Berkelium-249	314 days
Californium-249	360 days
Einsteinium-253	20 days
Nobelium-259	1 1/2 hours
Lawrencium-260	180 seconds
Element 103-262	40 seconds

1. If you had a 100-gram sample of plutonium, how much would still remain in 43 years?

2. What happened to the part of the plutonium that is no longer there?

3. If you had a 5-gram sample of Lawrencium, how much would still remain in 30 minutes?

4. If you had a 100-gram sample of Einsteinium, how much would you have left after 40 days?

5. A rock sample contains 7.5 grams of Californium-249 and 52.5 grams of the product into which the Californium has changed. How old is the rock?
