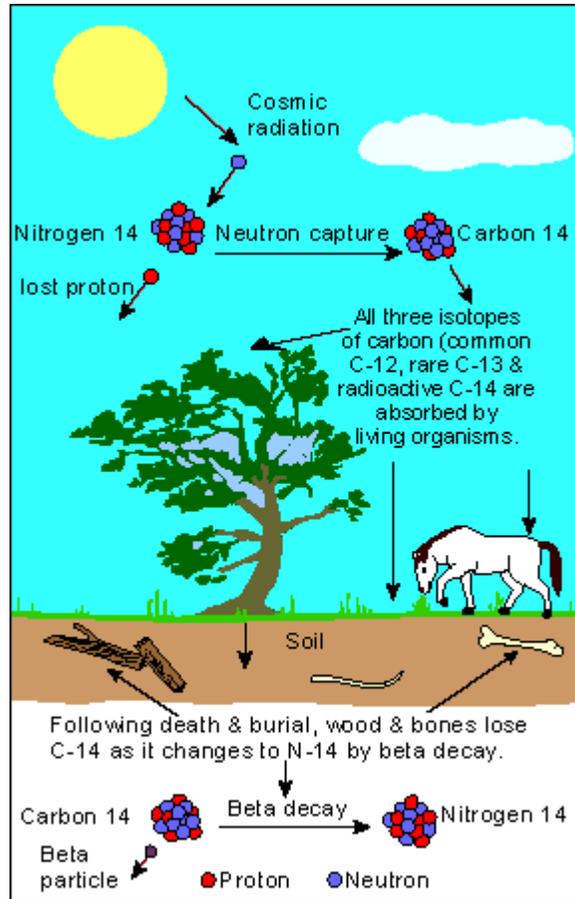Worksheet - Carbon dating

Study the picture and answer these questions

1 The atomic mass number (the sum of protons and neutrons in the nucleus of
. an atom) for N-14 and C-14 is the same. How many protons does N-14 have
   and how many does C-14 have?

   A. 14 of each
   B. 7 & 7
   C. 6 & 8
   D. 7 & 6
   E. 8 & 6

2 C-14 forms from the interaction of Cosmic rays with N-14 by____ and C-14
. reverts back to N-14 by____

   A. beta decay and neutron capture
   B. electron loss and electron capture
   C. neutron capture and beta decay
   D. proton capture both ways
   E. no way to know

3. Of the three isotopes of carbon, which is most abundant and which is radioactive?

A. C-12 and C-13
B. C-13 and C-14
C. C-14 and C-12
D. C-12 and C-14
E. No way to know

4. Generated in the upper atmosphere, C-14 makes up only 0.00000000010% of all carbon atoms. This is the same as 1 atom of C-14 per every____ atoms of Carbon.

A. 1 thousand
B. 1 million
C. 1 billion
D. 1000 billion or 1 trillion
E. no way to know

5. Because of interaction and exchange with atmosphere and oceans, all living tissue maintains a fixed proportion of C-14. After death, the amount of C-14 begins to decrease.

True
False

6. A C-14 date estimates the time since the death of once-living things, up to about 50,000 years. Which of the following materials CANNOT be dated by this method?

A. bones
B. wood
C. soil
D. pottery with imbedded charcoal
E. volcanic ash from Pompei

Parent Atoms
Daughter Atoms
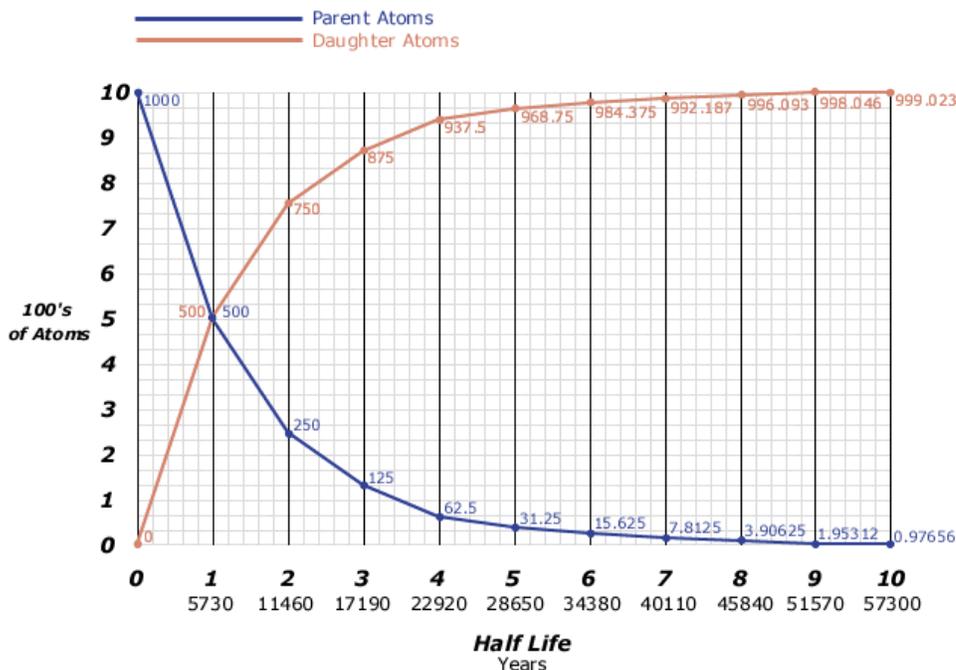
Eric B.

Radiometric dating graph showing the decline in the number of atoms of radioactive parent isotope (dark blue line) and the increase in the number of atoms of stable daughter isotope (red line). Numbers on the vertical axis refer to numbers of atoms. Numbers on the horizontal axis refer to numbers of half lives. (Years are given for the decay of carbon-14 over a period of 10 half lives). The numbers on the graph in red and blue refer to the number of atoms present at each half-life.

The proportion of parent to daughter tells us the number of half-lives, which we can use to find the age in years.
For example, if there are equal amounts of parent and daughter (such as 500 atoms of both carbon-14 and nitrogen-14 in the graph above), then one half-life has passed.
If there is three times as much daughter as parent (such as 750 atoms of nitrogen-14 and 250 atoms of carbon-14 in the graph above), then two half-lives have passed.

What % of C-14 remains in a carbon-bearing material after 3 half-lives of time have gone by?
A. 50%   B. 25%   C. 12.5%   D. 6.25%   E. .39%

2. How many half-lives of time have passed when only a little more than 3% of a sample original C-14 still remains?
A. 1   B. 3   C. 5   D. 7   E. unknown

3. How much daughter N-14 can be found in a burried ancient tree stump that is 4 half-lives old?
A. 6.25%   B. 93.75% C. 4%   C. 96%   E. very little since N-14 is a gas and escapes from the material.

4. What fraction of original C-14 can be found in a sample after 10 HL?
A. over 1/10   B. between 1/10 and 1/1000
C. between 1/100 and 1/1000   D. less than 1/1000   E. none