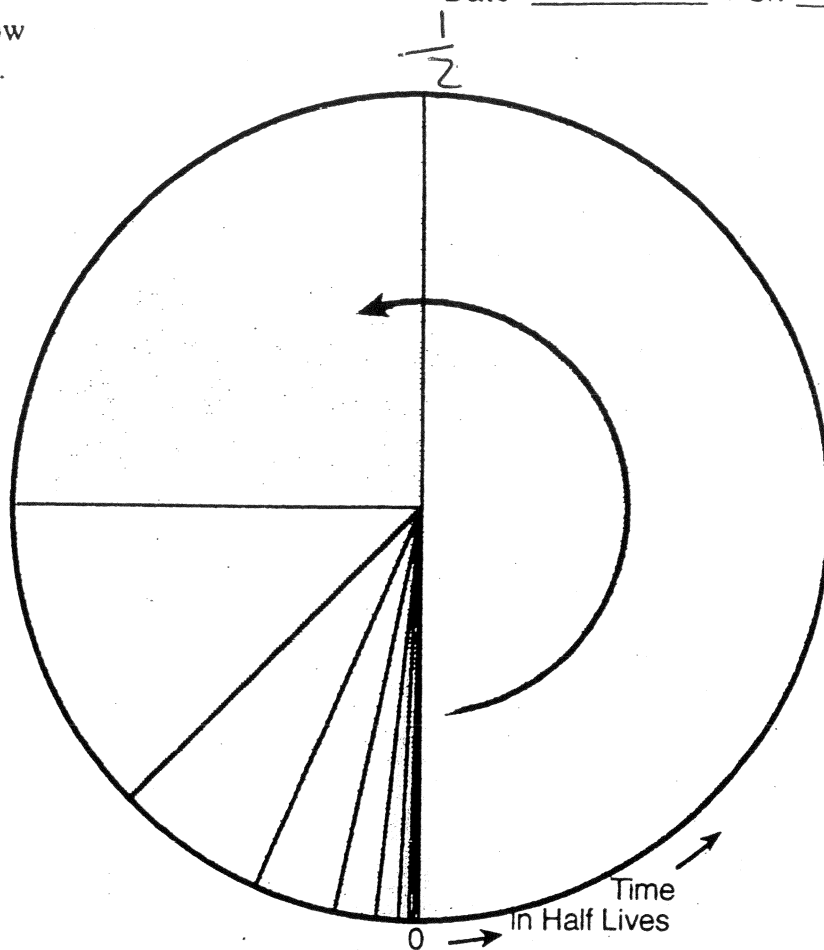


This circle can be used as a model to show radioactive decay of a natural isotope.

Use this diagram, and the information printed below (from the Earth Science Reference Tables) to answer the following questions.

On what page is this information in the Reference Tables? \_\_\_\_\_



**Radioactive Decay Data**

- Carbon 14
- Potassium 40
- Uranium 238
- Rubidium 87

**Disintegration**

**Half Life**

$^{14}C \Rightarrow N^{14}$	$5.7 \times 10^3$ years
$K^{40} \Rightarrow Ar^{40}$ or $Ca^{40}$	$1.3 \times 10^9$ years
$^{87}Rb \Rightarrow Pb^{206}$	$4.5 \times 10^9$ years
$Rb^{87} \Rightarrow Sr^{87}$	$4.9 \times 10^{10}$ years

1. The lines that divide the circle into sections represent the number of half lives that have passed. ("0" represents the initial time at which the sample was a pure radioactive substance.) Along the outside of the circle, label these divisions from 1 (at the top) counterclockwise to 7.
2. In each section of the circle, write in the fraction showing what part of the total circle that particular section represents. Start with  $\frac{1}{2}$  in the big section on the right, and continue to  $\frac{1}{64}$ .
3. After two half lives, what fraction of the radioisotope has changed to its decay product? \_\_\_\_\_
4. After two half lives, what percentage of the radioisotope has changed to its decay product? \_\_\_\_\_ %
5. After two half lives, what portion of the radioisotope remains unchanged? \_\_\_\_\_
6. As time increases, the number of atoms of the radioactive parent material \_\_\_\_\_, while the decay product \_\_\_\_\_.
7. In scientific notation, the half life of Potassium 40 is \_\_\_\_\_ years.
8. The half life of Potassium 40 expressed as a regular number is \_\_\_\_\_ years.
9. Which radioisotope listed above has the briefest half life? \_\_\_\_\_

## HALF LIFE PROBLEMS

Name: \_\_\_\_\_ Period: \_\_\_\_\_

1. Carbon 14, an isotope used to date recent organic remains, would most likely be useful in determining the age of what fossil?
  - A. Beluga whale
  - B. Trilobite
  - C. Coelophysis
  - D. Armored fish
2. The characteristics of the radioisotope uranium 238 that makes it useful for accurately dating the age of a rock is the isotope's \_\_\_\_\_
  - A. resistance to weathering and erosion
  - B. constant half life
  - C. common occurrence in sediments
  - D. organic origin
3. Uranium 238 that crystallized at the same time Earth formed has undergone approximately how many half lives of radioactive decay?
  - A. four half lives
  - B. one half life
  - C. two half lives
  - D. three half lives
4. The absolute age of a rock is the approximate number of years ago that the rock formed. The absolute age of an igneous rock can best be determined by
  - A. comparing the sizes of the crystals found in the upper and lower parts of the rock
  - B. comparing the amounts of decayed and undecayed radioisotopes in the rock
  - C. examining the environment in which the rock is found
  - D. examining the rocks relative position in a rock outcrop
5. A sample of wood that originally contained 100 grams of carbon 14 now only contains 25 grams of carbon 14. Approximately how many years ago was this sample part of a living tree?
  - A. 2850 years
  - B. 11400 years
  - C. 17100 years
  - D. 5700 years
6. A rock contains 5 grams of Uranium 238 and 35 grams of Lead 206. How old is the rock?
7. A rock contains 5 grams of carbon 14 and 75 grams of Nitrogen 14. How old is the rock?