

# GEOLOGY 12

## CHAPTER 8 WORKSHEET #2

### RELATIVE TIME AND ABSOLUTE TIME

Name \_\_\_\_\_

Match the descriptions on the right to the persons on the left. Place the letter of the corresponding description in the blank by each name. You may use some descriptions more than once.

- |          |                                    |   |
|----------|------------------------------------|---|
| <u>E</u> | 1. Henri Becquerel                 | A. calculated age of earth from number of generations in the Bible <i>Ussher</i>                                    |
| <u>C</u> | 2. Lord Kelvin (reworked Buffon's) | B. proposed the Law of Faunal Succession <i>Smith</i>   |
| <u>D</u> | 3. Nicholas Steno                  | C. calculated age of earth based on cooling rate of the earth from an initially molten state <i>Buffon + Kelvin</i> |
| <u>C</u> | 4. Georges Buffon                  | D. proposed the principles of Superposition and Original Horizontality <i>Steno</i>                                 |
| <u>G</u> | 5. John Joly                       | E. discovered radioactivity of uranium <i>Becquerel</i>   |
| <u>B</u> | 6. William Smith                   | F. calculated age of earth based on rates of sedimentation <i>Walcott</i>   |
| <u>A</u> | 7. Archbishop Ussher               | G. calculated age of earth based on amount of salt in the oceans <i>Joly</i>  |
| <u>F</u> | 8. C.D. Walcott                    | H. calculated age of earth based on rate of "burning" of the sun - <i>Kant</i>                                      |

9. After two half-lives, how much radioactive parent isotope will be left in a given mineral?  
 A. 133%      B. 50%      C. 25%      D. 33% *100 → 50 → 25*

10. If the ratio of daughter isotope to parent isotope is 7, how many half-lives have passed?  
 A. can't tell from information given      C. one *1:7*  
 B. seven      D. three *8 → 4 → 2 → 1*

11. As each half-life passes, the amount of daughter product will  
 A. decrease by half each time  
 B. increase by doubling each time  
 C. never exceed the amount of parent isotope remaining  
D. increase by the amount of parent isotope which has decayed

12. A mineral being used for radiometric dating contains 600 units of the daughter isotope and 200 units of radioactive parent isotope. How many half-lives have passed?  
*800 → 400 → 200*  
A. two      C. three  
 B. none      D. can't tell from the information given

13. A mineral contains an amount of daughter isotope equal to the amount of radioactive isotope remaining in it. The half-life for the radioactive isotope is 250 million years. How old is the mineral? *1 h.l. passed*  
A. 250 million years      C. 500 million years  
 B. 125 million years      D. just formed; no decay has occurred

14. Rubidium-87 has a half-life of 48.8 billion years. Let's assume that radioactive rubidium would be safe to be around if there was less than 1/64 the original number of radioactive atoms left. How many years would that take?  
 A. about 800,000 years      C. about 3200 million years  
B. a little over 290 billion years      D. cannot be calculated from the information given

$$1 \rightarrow \frac{1}{2} \rightarrow \frac{1}{4} \rightarrow \frac{1}{8} \rightarrow \frac{1}{16} \rightarrow \frac{1}{32} \rightarrow \frac{1}{64}$$

P  
D

$$6 \text{ h.l.} \times 48.8 = 292.8 \text{ b.y.}$$

For fun...

15. Placing rocks or geological events in their proper time order is known as relative dating.
16. In a sequence of sedimentary rock layers, the oldest rock is always on the bottom.
17. Sedimentary rocks, which are now folded or otherwise deformed, initially were deposited as horizontal layers of sediments.
18. A disconformity is a type of unconformity in which sedimentary rock layers are parallel above and below it.
19. An igneous dike or pluton is younger in age than the rocks which it cuts across.
20. The Law of Faunal Succession is useful because it allows geologists to correlate rock layers based on the fossils they contain.
21. In the nineteenth century, the age of the earth was thought to be considerably younger than it is today.
22. Radioactive decay affects the numbers of protons and neutrons in the nucleus of an atom.
23. Each alpha particle consists of two protons and two neutrons.
24. Beta particles may be electrons or positrons.
25. Gamma rays are a form of electromagnetic radiation, similar to X-rays.
26. A mass spectrometer is used to measure the tiny amounts of parent and daughter isotopes in radiometric age dating.
27. Radioactive decay is a statistical phenomenon, "obeying" the laws of probability.
28. Potassium-40 will decay to the daughter isotope Argon-40 (a gas) (1.25 by)
29. Uranium-235 will decay to the daughter isotope Lead-207 (4.5 by)
30. Of the radioactive isotopes used for age dating rocks, Rubidium-87 (48.8 by) has the longest half-life.
31. Carbon-14 (5730 yrs), which has an extremely short half-life by geologic standards, is used primarily for age dating archeological artifacts.
32. If some of the daughter product has escaped from a mineral since the time that radioactive decay started, the derived age of the mineral (or rock) will appear to be too young.
33. The era of the geologic time scale that represents "middle life" is the mesozoic.
34. The shortest and most recent era of the time scale is the cenozoic.
35. Arrange the terms in order by age from oldest to youngest, as they are arranged in the geologic time scale : Paleozoic, Proterozoic, Cenozoic, Mesozoic, Archean

Cenozoic  
Mesozoic  
Paleozoic  
Proterozoic  
Archaen

} Precambrian