

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

Date: \_\_\_\_\_

LESSON 2 • TIME: 30 min



## Explore Lab: What do these numbers tell you about a rock's age?

**FSAS** SC.7.E.6.3, SC.7.N.1.1

Imagine you are part of a research team studying the Grand Canyon. You have collected some rock samples to identify. When you return to the lab, you plan to use the half-life data of the radiometric isotope Uranium 235 (U-235) to calculate the ages of the rock samples. The results will allow you to identify the source of each rock sample.

1. Complete the table below by converting the number of half-lives elapsed into decimal format.

<b>% of Parent Atoms</b>	<b>% of Daughter Atoms</b>	<b>Half-lives Elapsed (fraction)</b>	<b>Half-lives Elapsed (decimal)</b>
100.0	0.0	0	
95.8	4.2	1/16	
91.7	8.3	1/8	
84.1	15.9	1/4	
70.7	29.3	1/2	
50.0	50.0	1	
35.4	64.6	1 1/2	
25.0	75.0	2	
18.7	81.3	2 1/2	

2. Radiometric dating reveals the amount of parent material left in each sample: Rock A has 18.7 percent material left; rock B has 70.7 percent; rock C has 50.0 percent; and rock D has 35.4 percent. Use Table 1 to determine the number of half-lives that have elapsed for each rock (A, B, C, and D).

3. Calculate the age of rock samples A, B, C, and D. The half-life of U-235 is 700 million ( $700 \times 10^6$ ) years. Multiply the number of half-lives (determined in step 2) by the half-life of U-235. Use the space to set up and complete your calculations.

4. Match the age of rock samples A, B, C, and D to the Grand Canyon rock layers listed in the table below.

**Table 2**

<b>Table 2: Formation-Sample Matching</b>		
<b>Grand Canyon Layer</b>	<b>Age of Rock Layer (million years)</b>	<b>Rock Sample</b>
Temple Butte Limestone	350	
Sixtymile Formation	<740	
Nankoweap Formation	1,050	
Vishnu Schist/Zoroasater Granite	1,700–2,000	

## Analyze and Conclude

1. You collected one more rock sample on your hike, and identified it as Hermit Shale (265 million years old). Radiometric analysis reveals that it contains 95.8 percent parent material. Is your identification correct? Explain and show your calculations.

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2. Why might scientists choose radiometric dating over relative-age dating to date rocks?

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3. How does radiometric dating support the idea that Earth is very old?

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