



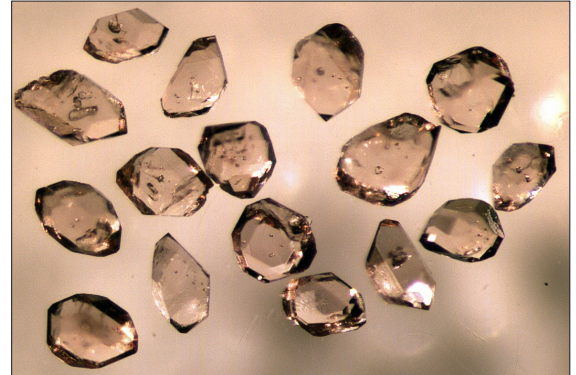
# Radioactive Dice Radiometric Dating

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

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

## Uranium-Lead Dating

Zircon is a mineral with the chemical formula  $\text{ZrSiO}_4$ . As it grows in cooling magma, it allows  $^{238}\text{U}$  into its crystal structure, but it will not allow any  $^{206}\text{Pb}$  in, so a newly formed zircon crystal contains no lead. However, the  $^{238}\text{U}$  trapped inside still decays into  $^{206}\text{Pb}$  according to its half-life. When a geologist finds a zircon crystal that contains  $^{206}\text{Pb}$ , they know that all of that lead came from the decay of uranium. By measuring the amounts of lead and uranium in the crystal, they can “work backwards” to figure out how much time has passed since the crystal formed. This technique is called **uranium-lead dating** - a type of radiometric dating.



Zircon crystals selected for uranium-lead dating in Dr. Drew Coleman's Geochemistry Lab at UNC Chapel Hill. The horizontal field of view of this photomicrograph is half a millimeter!

## Let's Do It!

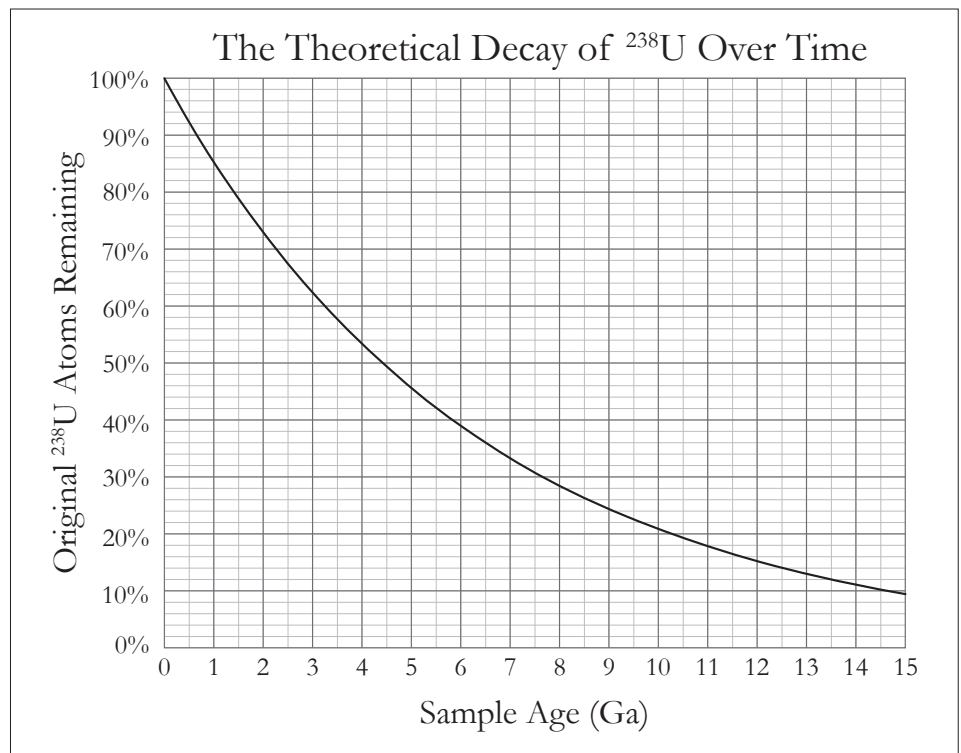
Someone has given you a rock and asked you to figure out how old it is.



You see that the rock contains the mineral **zircon**, so you decide to use **uranium-lead dating**.

You analyze a zircon crystal and discover that it has **6 trillion atoms of  $^{238}\text{U}$**  and **3 trillion atoms of  $^{206}\text{Pb}$**  trapped in its crystal structure.

Using the information on this page, **answer these questions** to figure out the age of the rock:



1. How many  $^{206}\text{Pb}$  atoms were there in the zircon crystal right after it formed?

2. How many  $^{238}\text{U}$  atoms were there in the zircon crystal right after it formed?

3. What percentage of the original  $^{238}\text{U}$  atoms are left?

4. According to the graph above, how long would that decay take? How old is the rock?

Write your answer here and plot the corresponding point on the graph above.