

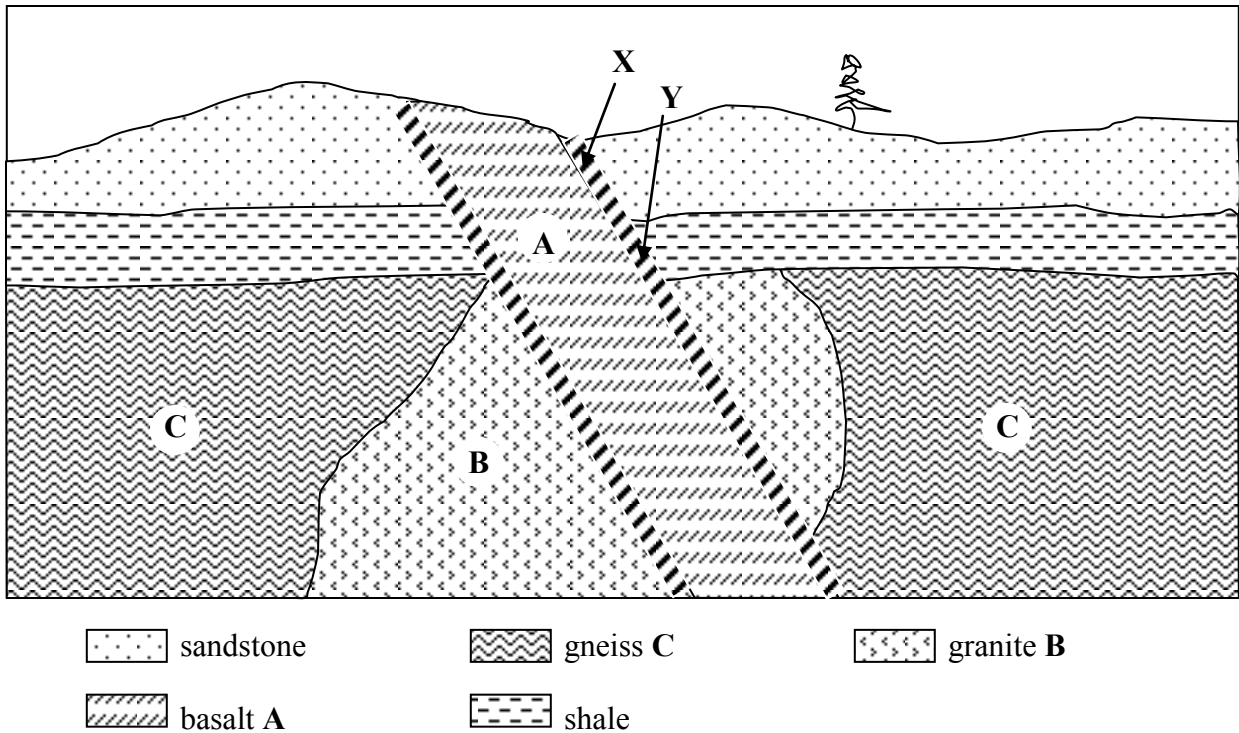
**GEOLOGY 12**  
**DATING EXERCISE**

NAME:

You have already learned the principles of relative and absolute dating. In this exercise you will apply those methods to determine the radiometric age of some of the rock formations below, then use those ages to approximate the ages of the other layers shown.

**Procedures:**

1. Examine the cross-section diagram below, showing five distinct formations, with a legend for rock types under the diagram.

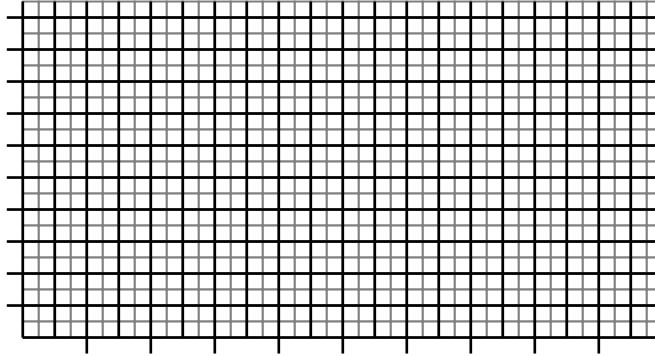


In particular, formations **A**, **B** and **C** were radiometrically dated using the potassium-argon method, where the parent isotope, potassium-40, has a half-life of **1.3 billion years**. The results of this analysis are listed in the table below.

Rock Unit	Number of Parent Atoms Left	Number of Daughter Atoms Created	Ratio of Daughter-to-Parent	Percent (%) of Parent Atom Remaining
<b>A</b>	2517	839		
<b>B</b>	3827	11480		
<b>C</b>	1071	7497		

Complete the table by filling in the last two columns of the chart. You will need a calculator to do this.

2. In the space below, sketch a proper decay graph for potassium-40, using a  $\frac{1}{2}$ -life of 1.3 billion years to complete the horizontal axis. If you are unsure how to do this, refer to your notes or Figure 6.10, p 111 of the text.



3. On your graph, clearly mark off the percent of parent isotope remaining for each rock type **A**, **B** and **C** from the table.

**Questions:**

1.
  - a) From your graph, what is the absolute age of rock unit **A**, the basalt?  
\_\_\_\_\_
  - b) What type of igneous feature is this intrusion? \_\_\_\_\_
2.
  - a) From your graph, what is the absolute age of rock unit **B**, the granite?  
\_\_\_\_\_
  - b) Compare the ages of units **A** and **B**. Based on their relative positions in the cross-section diagram, do your answers make sense? Explain.  
\_\_\_\_\_  
\_\_\_\_\_
3.
  - a) From your graph, what is the absolute age of rock unit **C**, the gneiss?  
\_\_\_\_\_
  - b) Considering how gneiss was formed, what does this absolute age represent?  
\_\_\_\_\_  
\_\_\_\_\_
4.
  - a) Explain why no absolute age was determined for either the shale or the sandstone.  
\_\_\_\_\_  
\_\_\_\_\_
  - b) Give a reasonable age limit for these two rock units, and explain how you arrived at this result.  
\_\_\_\_\_  
\_\_\_\_\_
  - c) Contact metamorphism has taken place between the basalt and the sedimentary layers. Name the rock type you would expect to find at location:  

**X:** \_\_\_\_\_                      **Y:** \_\_\_\_\_