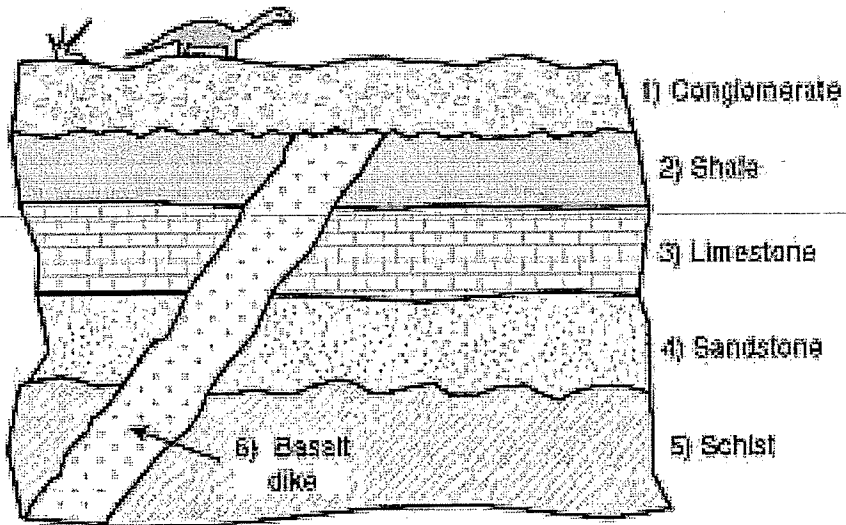
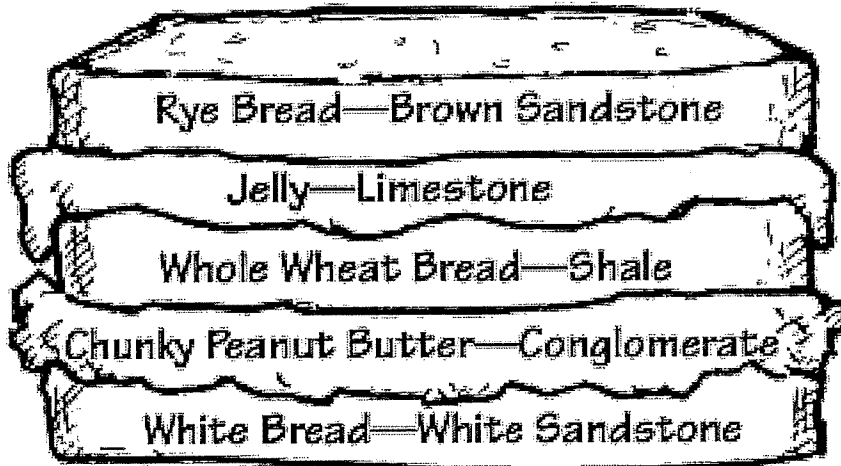


<p><b>The Principle of Original Horizontality:</b> sedimentary rocks are deposited relatively horizontally because they settle out of fluid in a gravitational field</p>	<p><b>The Principle of Superposition:</b> younger sedimentary rocks overlie older rocks because a layer of sediment cannot "stick" unless there is already a layer on which it can collect</p>	<p><b>The Principle of Original Continuity:</b> sedimentary rock layers form in continuous sheets so a layer exposed on one side of a canyon likely spanned the canyon at one time</p>	<p><b>The Principle of Cross-Cutting Relationships:</b> a feature like a fault line or igneous rock intrusion that cuts across a horizontal layer is younger than the layer that it cuts through</p>	<p><b>The Principle of Inclusions:</b> igneous and sedimentary rocks that contain pieces (inclusions) of other rocks must be younger than the rocks they include</p>
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My Peanut Butter and Jelly Sandwich:

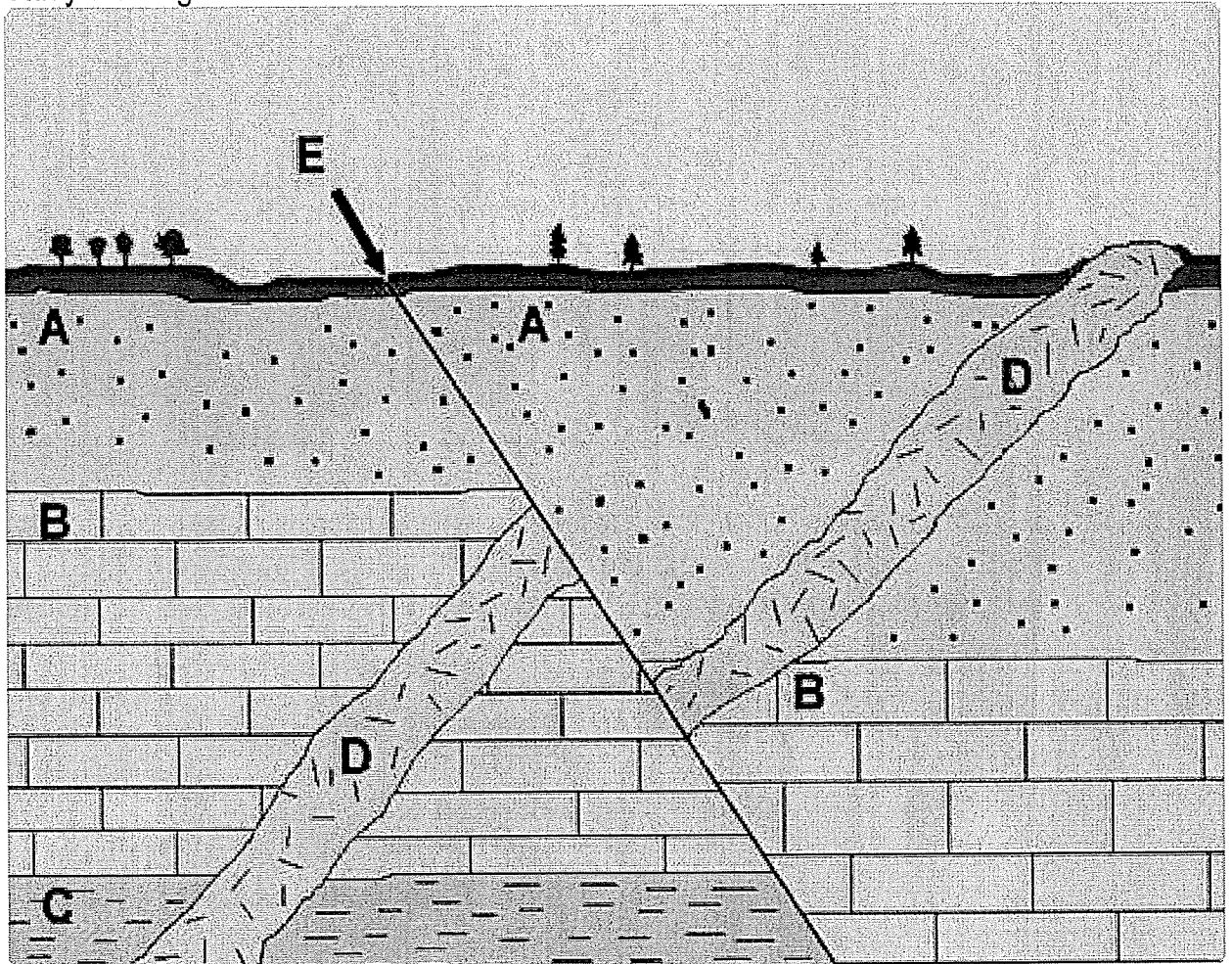
Rock Layers:



- A.** The layers of my sandwich have formed horizontal layers. The layers of sedimentary rock have formed horizontal layers following The Principle of \_\_\_\_\_.
- B.** I spread jelly on top of the whole wheat bread. The limestone layer deposited on top of the sandstone layer following The Principle of \_\_\_\_\_.
- C.** I spread the peanut butter continuously across the entire surface of the white bread. The shale formed a continuous layer across the landscape following The Principle of \_\_\_\_\_.
- D.** I cut my peanut butter and jelly sandwich after I laid the rye bread on top. The basalt dike cut through only the rock layers that were existing at the time following The Principle of \_\_\_\_\_.
- E.** There is jelly in my peanut butter layer after I cut my sandwich in half. There are pieces of limestone in the basalt dike because the limestone was there first following The Principle of \_\_\_\_\_.
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## Part 2: What Is Older?

I. Study the diagram below.

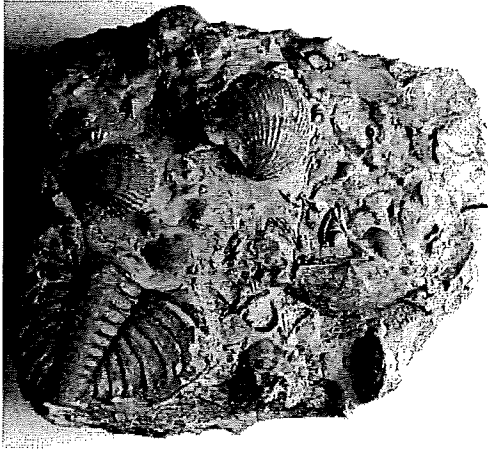


Here is a description of the events that created this cross-section. **Complete the missing letters:**

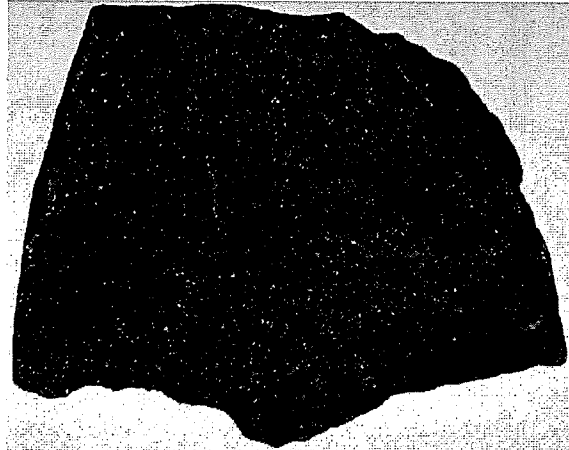
1. Layer C formed.
2. Layer B formed.
3. Layer \_\_\_\_\_ formed.
4. After layers A-B-C were present, a basalt intrusion \_\_\_\_\_ cut across all three.
5. Fault line \_\_\_\_\_ formed, shifting rocks A through C and intrusion D.
6. Weathering and erosion created a layer of soil on top of layer \_\_\_\_\_.
7. \_\_\_\_\_ is the oldest feature and \_\_\_\_\_ is the youngest feature.

2. Remember our fossiliferous limestone and basalt rock samples from Lesson 2? You were asked to make a prediction about which one was older. Which rock did you think was older?

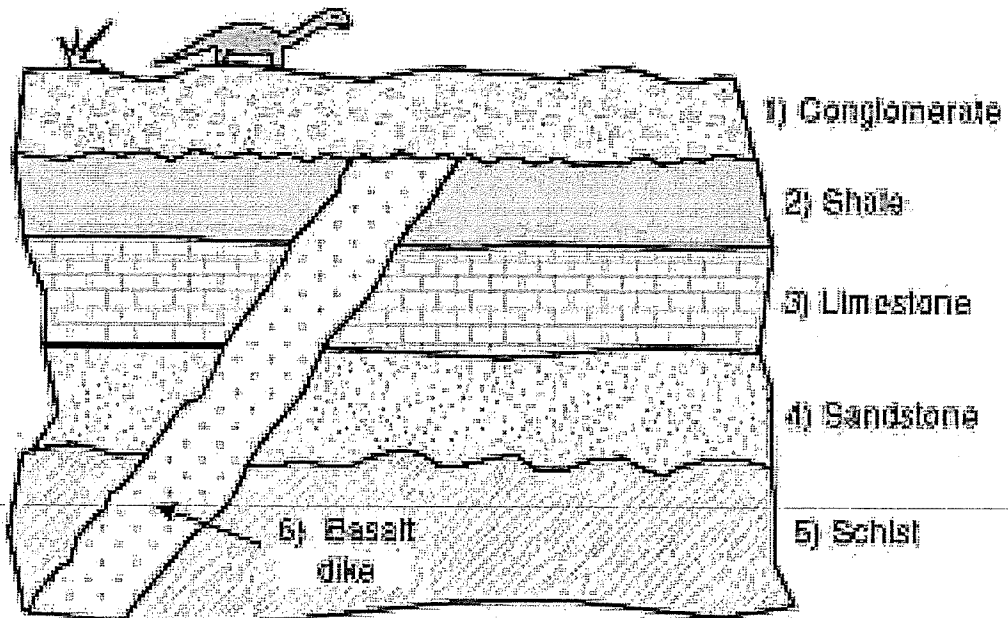
Limestone



Basalt



Study the diagram below. Imagine that these rock samples came from this location. Write an argument (in complete sentences!) using at least two of the Stratigraphic Principles from Part 1 above for why the basalt must be younger than the limestone:



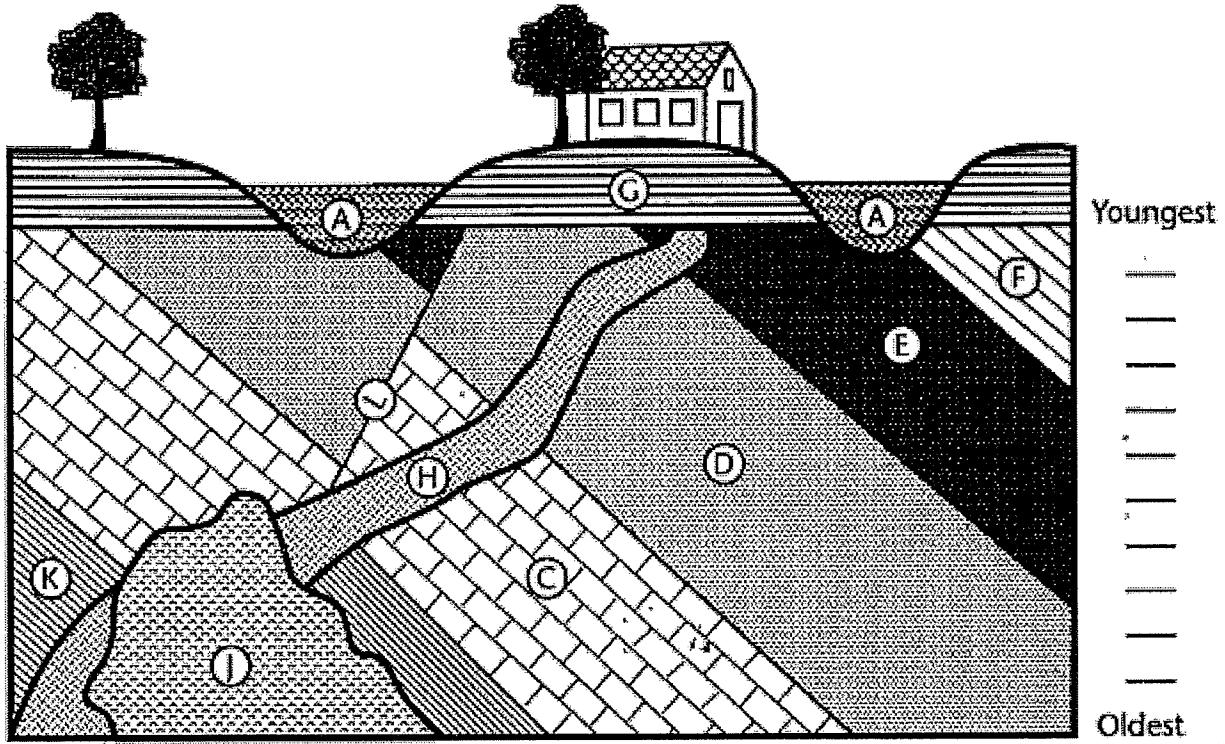
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**CHALLENGE:** Use the Stratigraphic Principles to order the features in sequential time.



## Part 4: Uncovering Layers of the Grand Canyon

- I. Watch Making North America: Uncovering Layers of the Grand Canyon.
  - A. What processes are responsible for exposing the rock layers of the Grand Canyon?
  - B. What does the presence of a limestone layer tell us about the Grand Canyon?
  - C. What evidence supports claims that the American Southwest was once a shallow sea and a huge stretch of sand?
  - D. How does this evidence change your understanding of the Grand Canyon's past?

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- E. Why is the Grand Canyon such a good place to study geology?