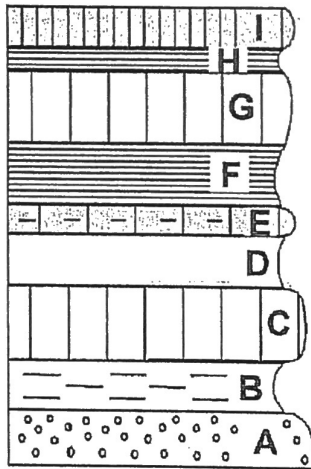


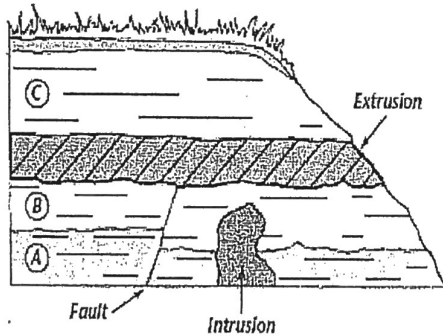
Rock History



The Law of Superposition

The **relative age** of a rock is its age compared with the ages of other rocks. The **absolute age** of a rock is the number of years since the rock formed. The sediment that forms sedimentary rocks is deposited in flat layers. Over years, the sediment hardens and changes into sedimentary rock. These rock layers provide a record of Earth's geologic history. It can be difficult to determine the absolute age of a rock. Geologists use the **law of superposition** to determine the relative ages of sedimentary rock layers. **According to the law of superposition, in horizontal sedimentary rock layers the oldest layer is at the bottom. Each higher layer is younger than the layer below it.**

There are other clues to the relative ages of rocks. To determine relative age, geologists also study **extrusions and intrusions of igneous rock, faults, and gaps in the geologic record**. Igneous rock forms when magma or lava hardens. Lava that hardens on the surface is called an **extrusion**. The rock layers below an extrusion are always older than the extrusion. Beneath the surface, magma may push into bodies of rock. There, the magma cools and hardens into a mass of igneous rock called an **intrusion**. An intrusion is



always younger than the rock layers around and beneath it. More clues come from the study of faults. A **fault** is a break in Earth's crust. A fault is always younger than the rock it cuts through. The surface where new rock layers meet a much older rock surface beneath them is called an **unconformity**. An unconformity is a gap in the geologic record. An unconformity shows where some rock layers have been lost because of erosion.

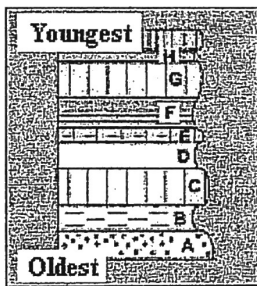
Questions

↑ Use this diagram

1. What is the youngest rock layer? Explain.
2. Is the extrusion older or younger than rock layer B? Explain.
3. Is the fault older or younger than rock layer A? Explain.
4. Is the intrusion older or younger than rock layer B? Explain.

The Fossil Record

Fossils are the traces of ancient life. Most fossils form when organisms that die become buried in sediments. Sediments are particles of soil and rock. Layers of sediments cover the dead organism. Over millions of years, the layers harden to become sedimentary rock. Some remains that become buried in sediments are actually changed to rock. These fossils are called petrified fossils. Sometimes shells or other hard parts buried by sediments are gradually dissolved. A hollow space in sediment in the shape of an organism or part of an organism is called a mold.



Superposition

Scientists use relative dating to determine which of two fossils is older. In a sequence of rock layers, the top layers are usually younger than the lower layers. Therefore, fossils found in top layers are younger than fossils found in bottom layers.

This is called the law of superposition.

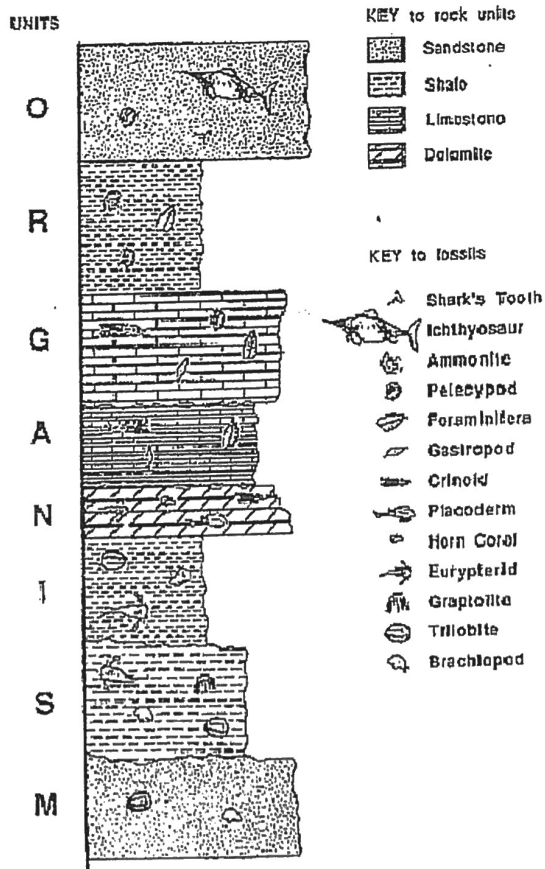
The millions of fossils that scientists have collected are called the fossil record. Despite gaps in the fossil record, it has given scientists a lot of important information about past life on Earth. Index fossils help scientists to determine the age of sedimentary rock layers. An index fossil is organisms that were on Earth for a short time before they went extinct. Almost all of the species preserved as fossils are now extinct. A species is extinct if no members of that species are still alive. Since scientists have determined the age of these fossils their presence tells the age of the rock.

Questions

Section 1 - Fossils

1. Describe the process by which most fossils form.
2. Is the following sentence true or false? Most fossils form when organisms that die become buried in sediments.
3. Fossils are typically found in what type of rock?
4. Which is probably older, a fossil in a sedimentary rock layer at the bottom of a canyon or a fossil in a sedimentary rock layer at the top of a canyon? Explain.

Section 2 - Determining a Fossil's Age



5. In layers of sedimentary rock to the left, which is the oldest?
6. In layers of sedimentary rock to the left, which is the youngest?
7. Select an organism shown that has gone extinct. How does the fossil record show this extinction?
8. Define index fossil

Section 3 - What Fossils Tell Scientists

9. The millions of fossils that scientists have collected are called what?

10. Is the following sentence true or false? The remains of all organisms have become fossils. _____

11. Why is the fossil record incomplete?

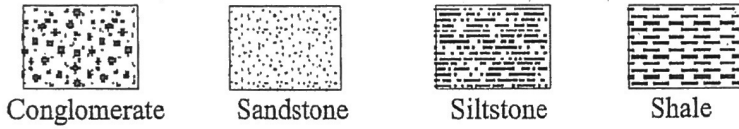
12. How have scientists learned about extinct species?

13. What are mass extinctions and what do we think caused them?

Relative Dating Homework

For the following cross sections, determine the relative age sequence of the rocks. Place the answers in the spaces on the right. Remember, always start by looking for the oldest rock first and working your way from oldest to youngest. Don't forget to consider all intrusions and faults! The diagrams go from simplest to hardest to let you progressively improve your skills.

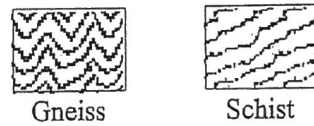
Key to Rock Symbols Sedimentary Rocks




Igneous Rocks



Metamorphic Rocks

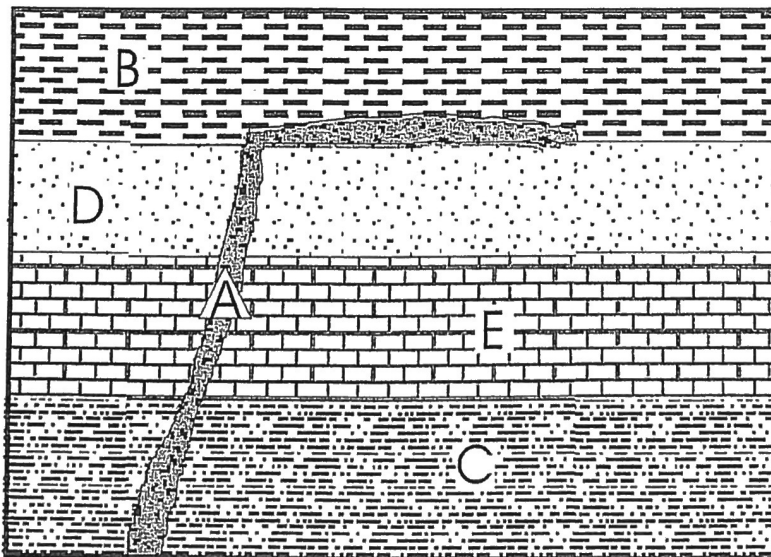


Special Features:

 Contact that is an unconformity (layers on either side of it are of differing ages)

 Fault

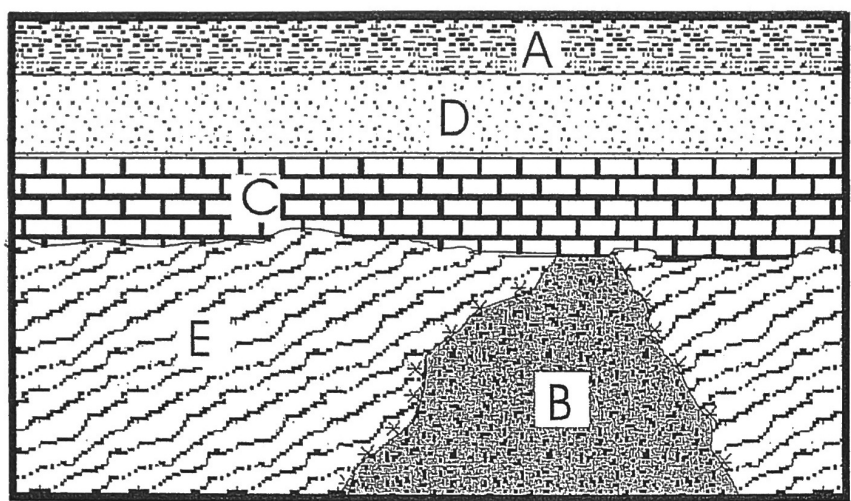
Figure 1:



Youngest _____

 Oldest _____

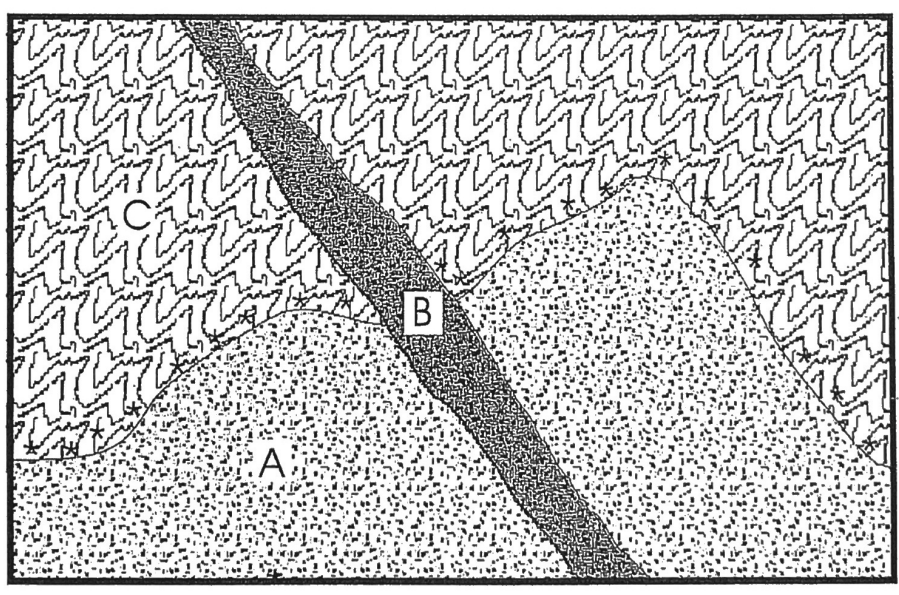
Figure 2:



Youngest _____

Oldest _____

Figure 3:



Youngest _____

Oldest _____

Figure 4: Challenge

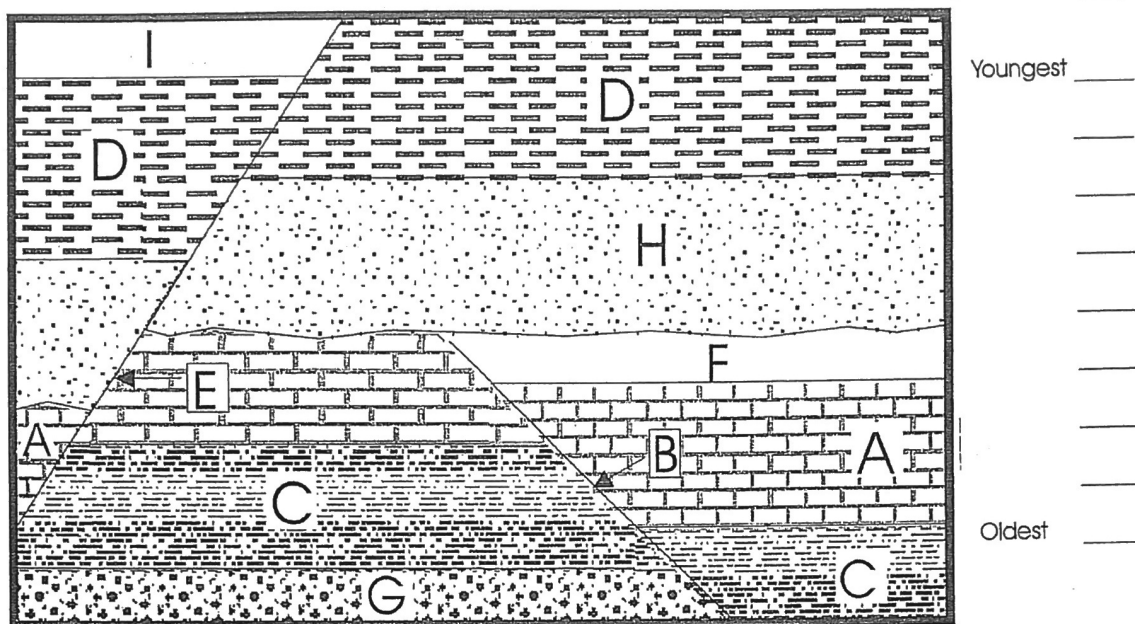


Figure 5: Challenge

