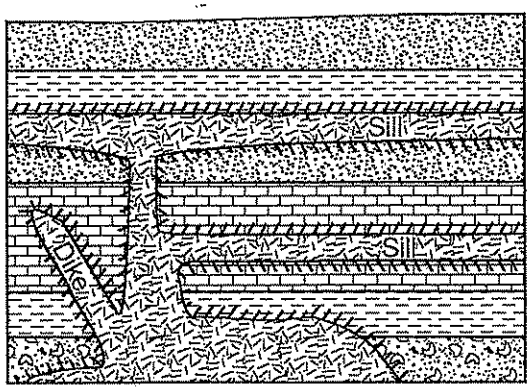
NAME _____

22 Geologic Profiles



Planet Earth probably formed about 4.6 billion years ago. Geologists locate, observe, and interpret the clues recorded in Earth's rocks. A primary role of geologists is to take the evidence from rocks and reconstruct a sequence of geologic events. There are several fundamental principles that guide geologists in interpreting Earth's history. Stratigraphy is the study of the history of the Earth's crust, particularly its stratified rocks. Stratigraphy is concerned with determining age relationships of rocks as well as their distribution in space and time. Rocks may be studied in an outcrop but commonly are studied from drilled cores. Most of the Earth's surface is covered with sedimentary rocks that record much of geologic history; this is what makes stratigraphy important.

Sediments, such as those at the bottom of an ocean or lake, are usually deposited in layers. When layers are tilted, it is assumed that the layers were deposited level, and that the area tilted after it turned into sedimentary rock. The rocks used in sequence stratigraphy are bounded by, or surrounded by, surfaces of erosion called inconformities.

"Four Laws of Stratigraphy"

Law of Cross Cutting Relationships: A rock is always older than the process that affects it; rock strata are older than the faults that cut through them.

Law of Original Horizontally: Sedimentary rocks are almost always deposited in horizontal layers.

Law of Superposition of Strata: Oldest rocks layers can be found at the bottom of an undisturbed bed.

Law of Uniformitarianism: The processes that are currently shaping the Earth have been the same processes since the formation of the Earth; "the present is the key to the past".

Objective:

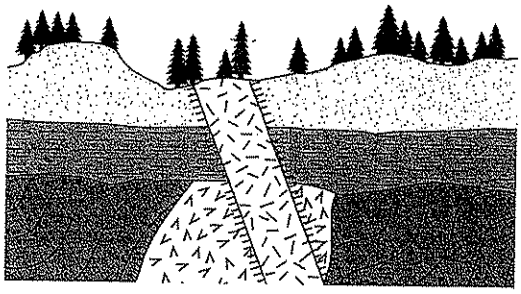
The objective of this lab is to determine what events might have led to stratigraphic layers.

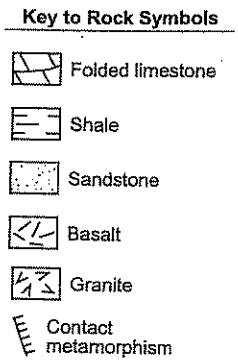
Materials:

Use the Geologic History Of New York State Chart in the NYS Earth Science Reference Tables.

Procedure: Using the following pictures, determine the order of the geologic events. Start with the first event, usually deposition, and list the events as they occur. Defend your findings.

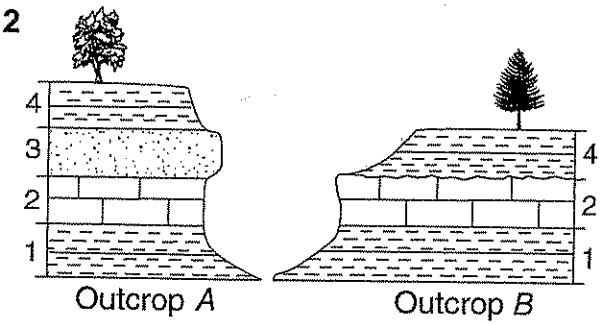
Profile 1





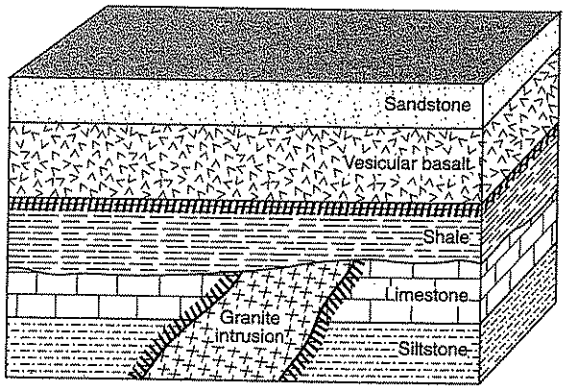
_____(youngest)
_____
_____
_____
_____
_____
_____(oldest)

Profile 2



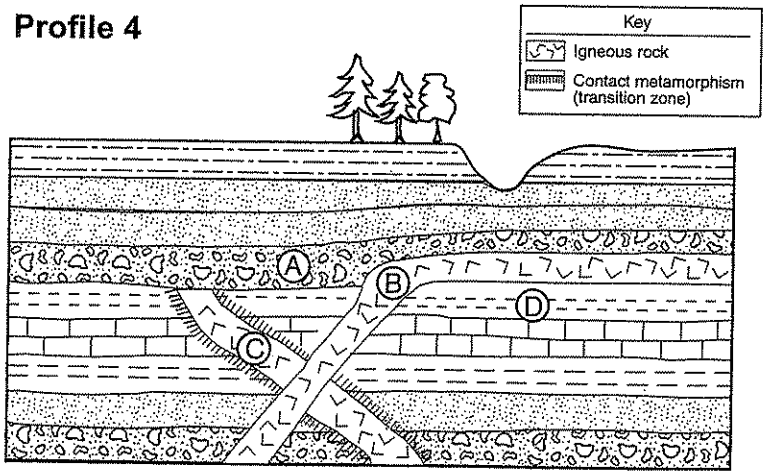
_____(youngest)
_____
_____
_____(oldest)

Profile 3



_____(youngest)
_____
_____
_____
_____
_____
_____(oldest)

Profile 4



_____(youngest)
_____
_____
_____
_____
_____
_____(oldest)

Observations:

1. In undisturbed layers, how do we know which layer was deposited first?

2. How can we tell the difference between an intrusion and an extrusion if there is a layer of sandstone on top?

3. We base these inferences on the Earth processes we see today. Upon what assumption do we state that these processes have not changed?

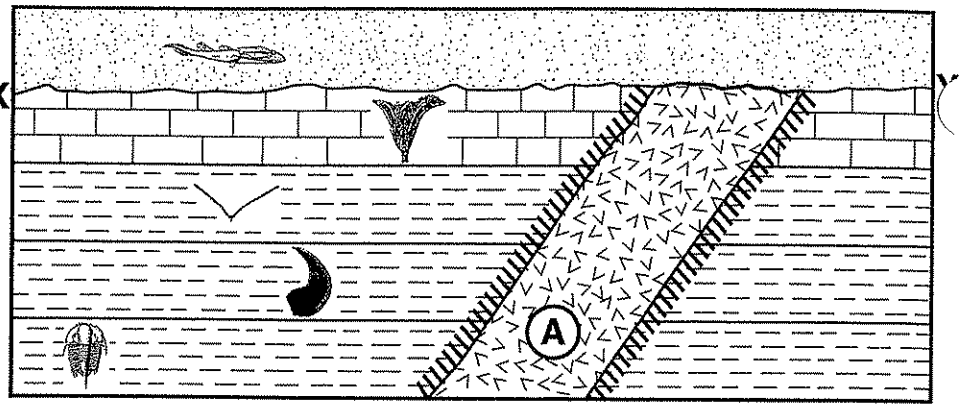
4. Why are sedimentary rocks almost always deposited in flat strata?

5. Why would some parts of layers be missing from the profile?

6. What do you call the missing parts of the rock record?

7. Are these events occurring anywhere in the world today? Explain.

Directions: Answer the following questions based on the diagram and the chart of the Geologic History of New York you will find on pages 210 and 211, in back of the book.



Key
Index Fossils
Bothriolepis
Ctenocrinus
Dicellograptus
Valcouroceras
Elliptocephala

Key
Rock Units
Sedimentary rocks
Igneous rock
Contact metamorphic rock

8. Based on the fossil evidence, determine the geologic period during which the inconformity formed.

9. Each index fossil existed for a relatively short geologic time interval. State one other feature that each fossil must have in order to be considered an index fossil.

10. Based on the rock type, in what type of environment did the organisms exist?