

## Matching Rock Layers

Lab # \_\_\_\_\_

### **Introduction:**

Geologists can determine the relative ages of the rock layers in a rock formation. But how do they determine whether the rocks or geologic events occurring at one location are of the same age as those at another location? The process of showing that rocks or geologic events occurring at different locations are of the same age is called **correlation**.

Geologists have developed a system for correlating rocks by looking for similarities in composition and rock layer sequences at different locations. Certain fossils, called **index fossils**, existed for a very short time and were distributed over a large geographic area. They aid the geologist in correlating sedimentary rock layers.

**Objective:** You will be able to construct a geologic history of a region by observing rock layers in different localities.

### **WARM-UP:**

What is the difference between relative age and absolute age: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

What is an index fossil: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

What is an Unconformity:

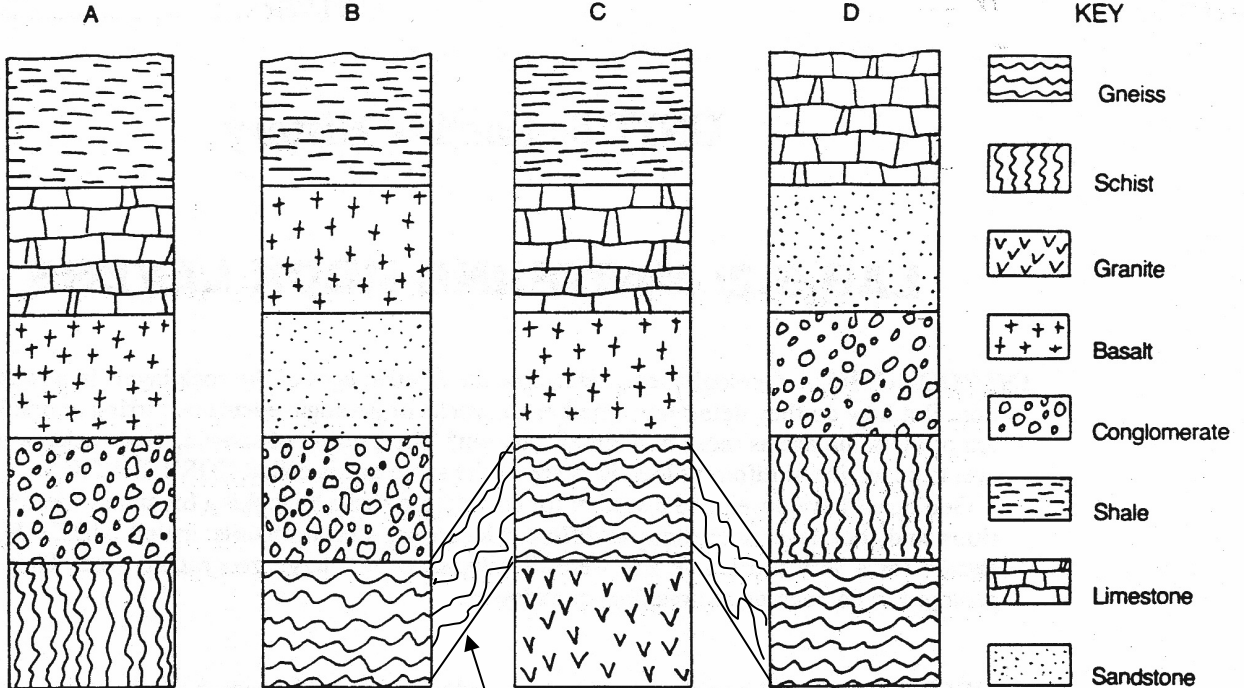
\_\_\_\_\_  
\_\_\_\_\_

**PROCEDURE A:**

The first set of four diagrams represents four outcrops at different locations.

1. Reconstruct the complete sequence of events. Assume that the oldest rocks are on the bottom and the youngest are on top.
2. The best way to do this is by connecting matching layers on the diagram below.....one of the oldest layers have been correlated for you.
3. Draw in the layers on the appropriate column on the **Report Sheet**.

A: OUTCROPS FROM FOUR LOCATIONS



These rock units – MATCH!

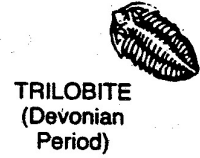
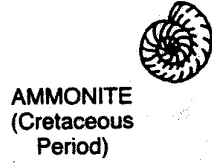
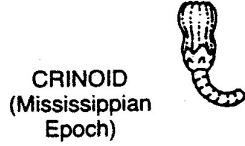
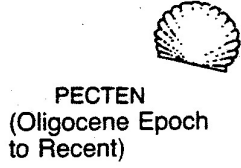
**PROCEDURE B:**

The second set of diagrams identifies four types of index fossils and shows four columns of fossil bearing rock strata. Assume overturning has not occurred.

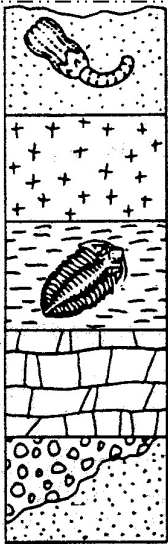
1. Cut out the "Index of Different Geologic Periods" and paste them in the box below!
2. Cut out the four Columns on the dashed lines! Reconstruct the complete sequence of events by moving them around next to each other so that layers and fossils match across units glue them on the bottom of this page!
3. Then draw the layers (with the fossils if present) on the appropriate column on your **Report Sheet**.
4. By referring to your *Earth Science Reference Tables*, identify any layer for which you have enough evidence to determine its age.
5. On the **Report Sheet**, label its age and period/epoch. The abbreviation "*mybp*" means millions of years before present. It may be expressed as a range of several million years.



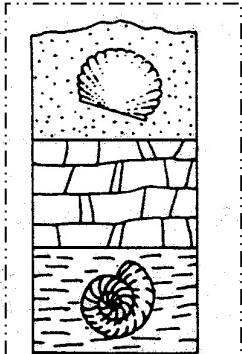
INDEX OF DIFFERENT GEOLOGIC PERIODS



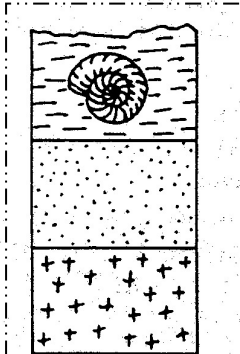
B: ROCK STRATA CONTAINING INDEX FOSSILS



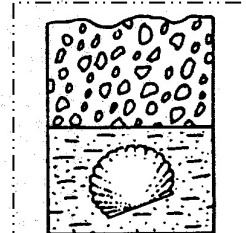
A



B



C

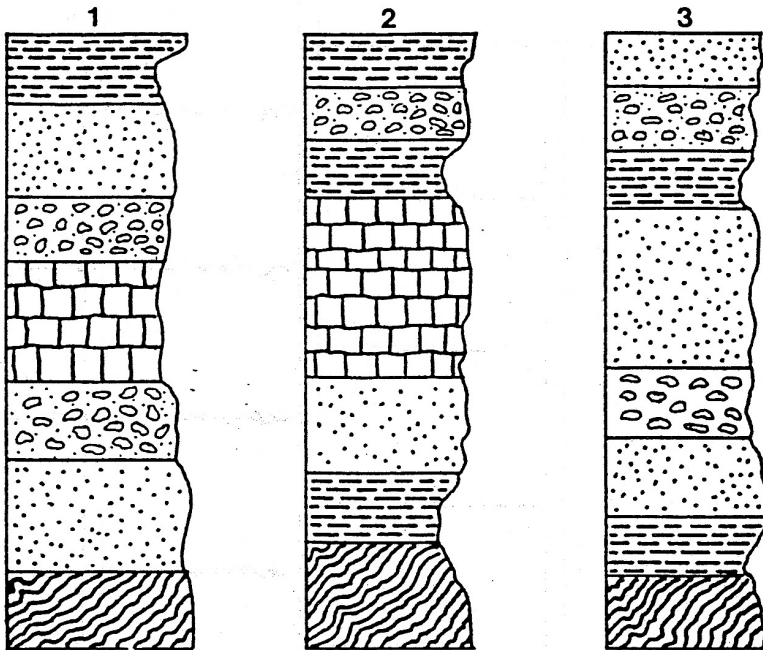


D

**PROCEDURE C:**

The third set of diagrams represent three different outcrops. Using the rock type of the strata correlate the columns.

1. Draw lines representing equivalent boundaries between rock layers from one column to the next.
2. Reconstruct the complete column in the blank column. Assume that the oldest rocks are on the bottom and the youngest are on the top.
3. Draw in thick lines on each column identifying locations of unconformities.



**RECONSTRUCTED COLUMN**

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# REPORT SHEET

**PROCEDURE A**

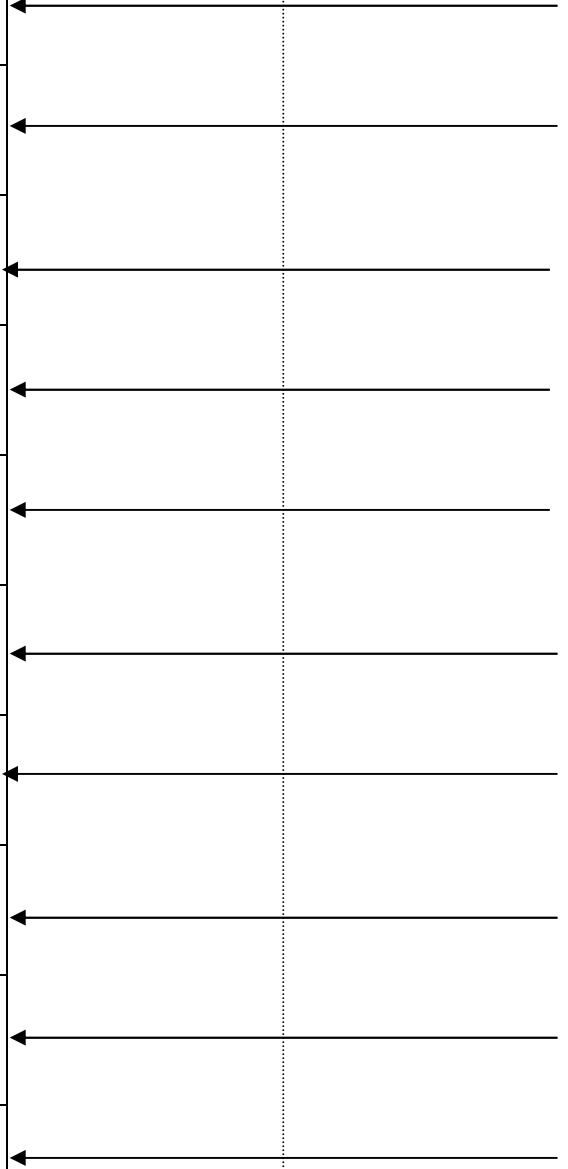
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**PROCEDURE B**

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**DATE(mybp)**

**GEOLOGIC PERIOD/EPOCH**



### **Analysis and Conclusion Questions:**

1. Explain why some rock layers can be missing from the sequence in some outcrops?
2. What does a field geologist look for in rock outcrops to help identify the different rock layers?
3. What is the approximate age (in years) of the rock stratum at the very bottom of the fossil bearing sequence (Procedure B)?
4. In Procedure B, how many years are represented between the top and bottom fossil bearing layers?
5. According to the appearance of the right side of each column in Procedure C, which rock type appears to be the least resistant to weathering and erosion?
6. Why is it necessary to observe the rock layers of several different localities in order to obtain a complete sequence of events?

**Multiple Choice Questions:** Choose the best answer for each of the following.

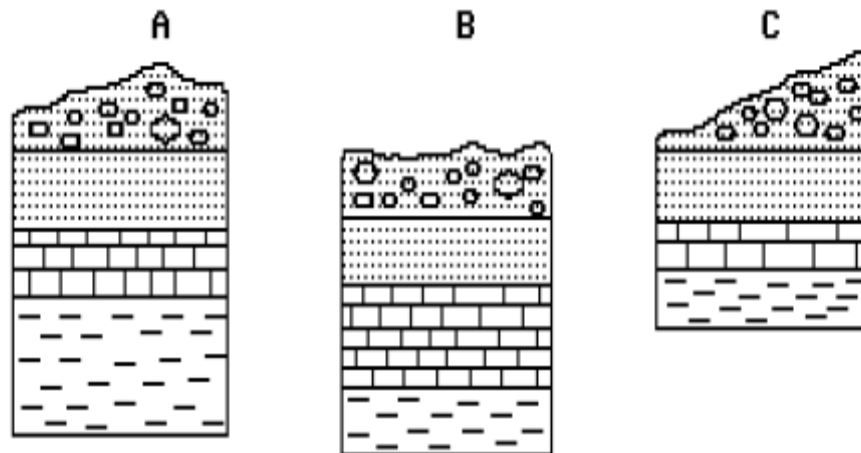
1. Why are ancient volcanic ash deposits important to geologists?
  - A) They form resistant rock layers containing fossils.
  - B) They are easily dated using carbon-14.
  - C) They serve as good geological time makers.
  - D) They indicate major areas where earthquakes occurred.
  
2. Living corals are found in warm shallow seas. Coral fossils have been found in the sedimentary rocks of Alaska. These findings suggest that
  - A) ocean currents carried the coral to Alaska
  - B) coral usually develops in cold climates
  - C) Alaska's cold climate fossilized the coral
  - D) Alaska once had a tropical marine environment
  
3. Unless a series of sedimentary rock layers has been overturned, the bottom rock layer usually
  - A) is the oldest
  - B) contains the greatest variety of minerals
  - C) contains fossils
  - D) has the finest texture
  
4. What characteristics of fossils are most useful in correlating sedimentary rock layers?
  - A) limited geographic distribution and limited to a particular rock formation
  - B) wide geographic distribution but limited to a particular rock formation
  - C) wide geographic distribution and found in many rock formations
  - D) limited geographic distribution but found in many rock formations



5. Which two forms of life existed together on the Earth during the same time period?

- A) dinosaurs and mastodons
- B) trilobites and birds
- C) flowering plants and trilobites
- D) mastodons and flowering plants

6. The diagram below represents cross sections of three rock outcrops approximately 100 kilometers apart. What would be the best method of correlating the rock layers of each outcrop?



- A) comparing rock types
- B) comparing index fossils
- C) comparing thickness of rock layers
- D) comparing mineral composition

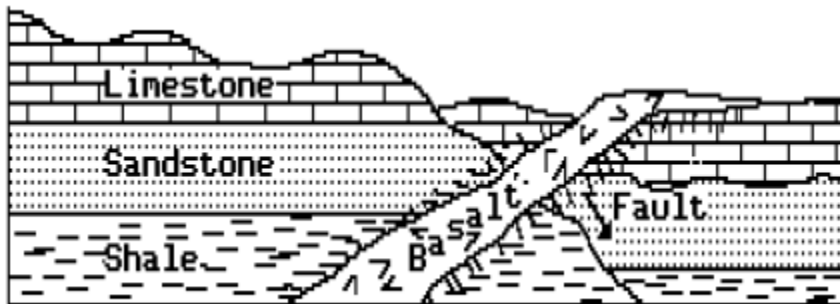
7. Geologists have subdivided geologic time into units based on

- A) rock type
- B) erosion rates
- C) fossil evidence
- D) landscape development

8. According to the Earth Science Reference Tables, which rock is most likely the oldest?

- A) conglomerate containing the tusk of a mastodon
- B) sandstone containing fossils of flowering plants
- C) shale containing trilobite fossils
- D) siltstone containing dinosaur footprints

9. The diagram below represents a cross section of the Earth's crust showing rock units and a fault. The rock layers are not overturned.



Which rock unit is the youngest?

- A) shale
- B) sandstone
- C) limestone
- D) basalt

10. Trilobite fossils from different time periods show small changes in appearance. These observations suggest that the changes may be the result of

- A) a variety of geological processes
- B) the gradual disintegration of radioactive substances
- C) evolutionary development
- D) periods of destruction of the geological record