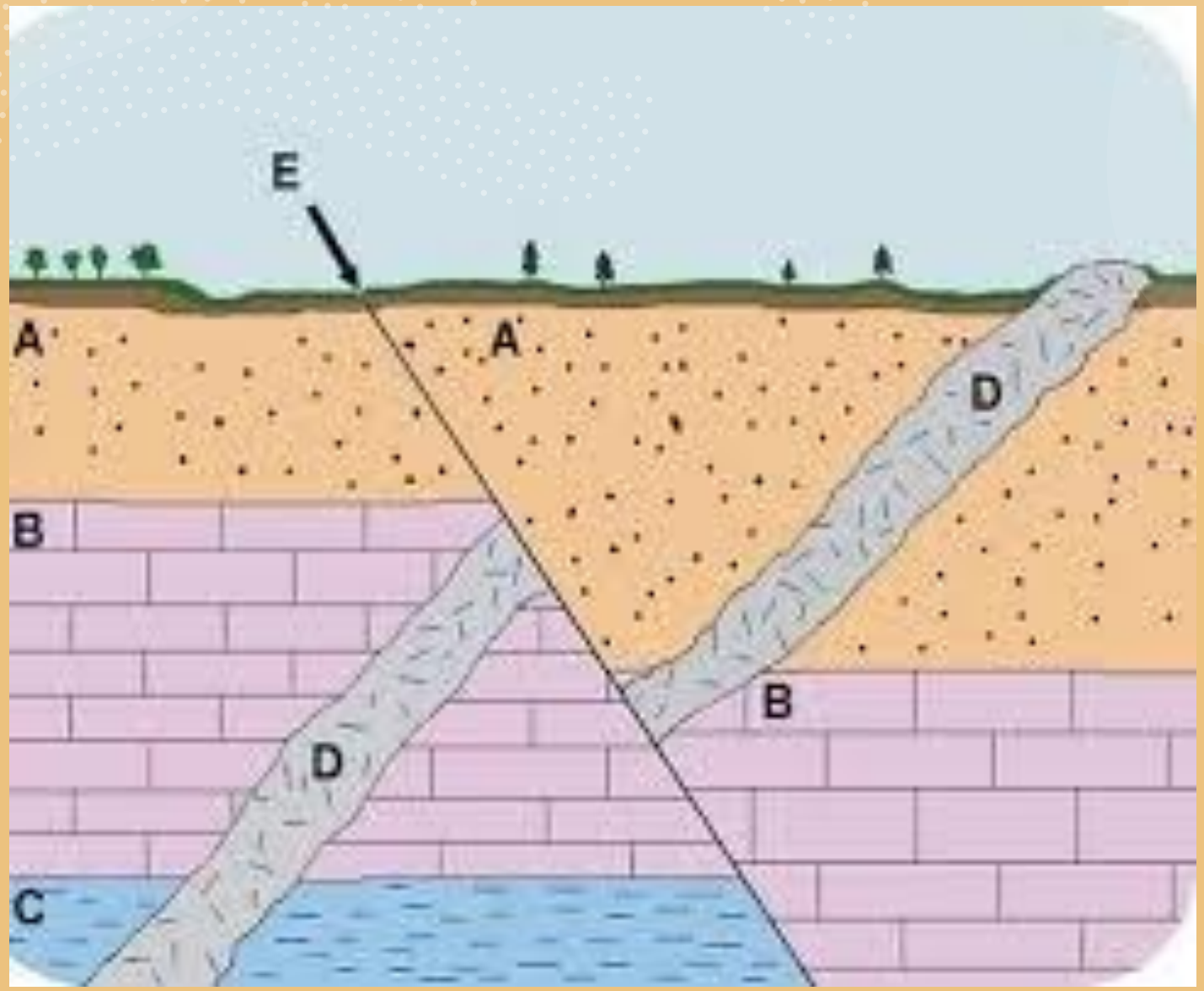
Relative and Absolute Age Dating



Absolute vs. Relative Age

Absolute age = The Rock's actual age in number of years.

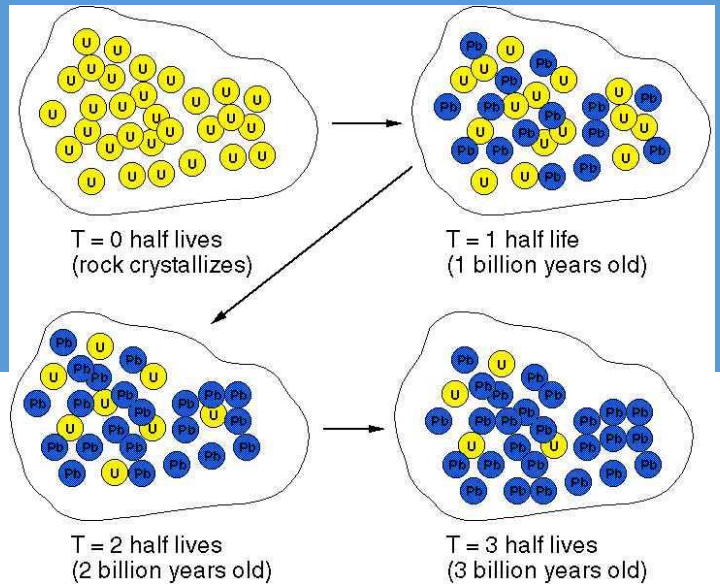
Relative age = Estimate of the rock's age by comparing to rocks of a known age.

Absolute vs. Relative Age

Absolute age = You are 13 years old

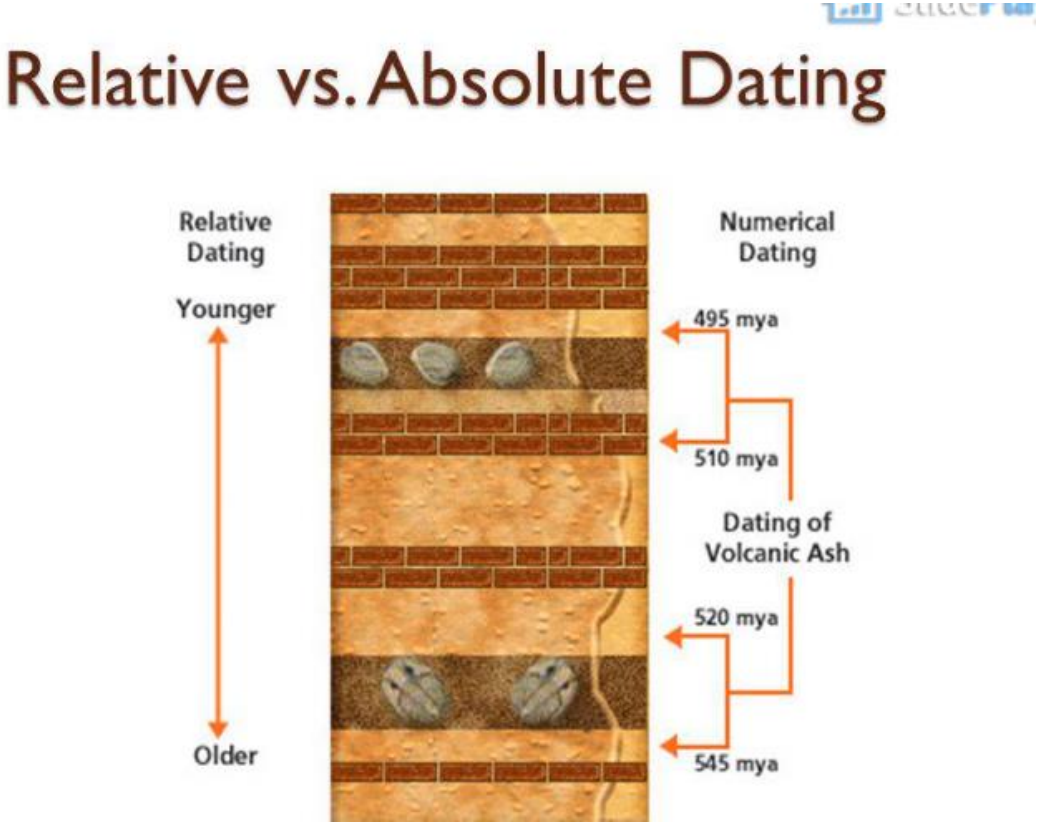
Relative age = You are older than your sister, but younger than your brother.

Absolute Age of Rocks



- Based on **Radioactive Isotopes**
- As minerals crystallize in **igneous and metamorphic rocks**, they trap certain isotopes in their crystal structure
- The isotopes begin to **decay radioactively** as soon as the mineral forms.
- The rate at which the isotopes decay is our “geologic clock.”
- Measuring the amount of the original element still in the rock tells how old the rock is.

Relative Age of Rocks



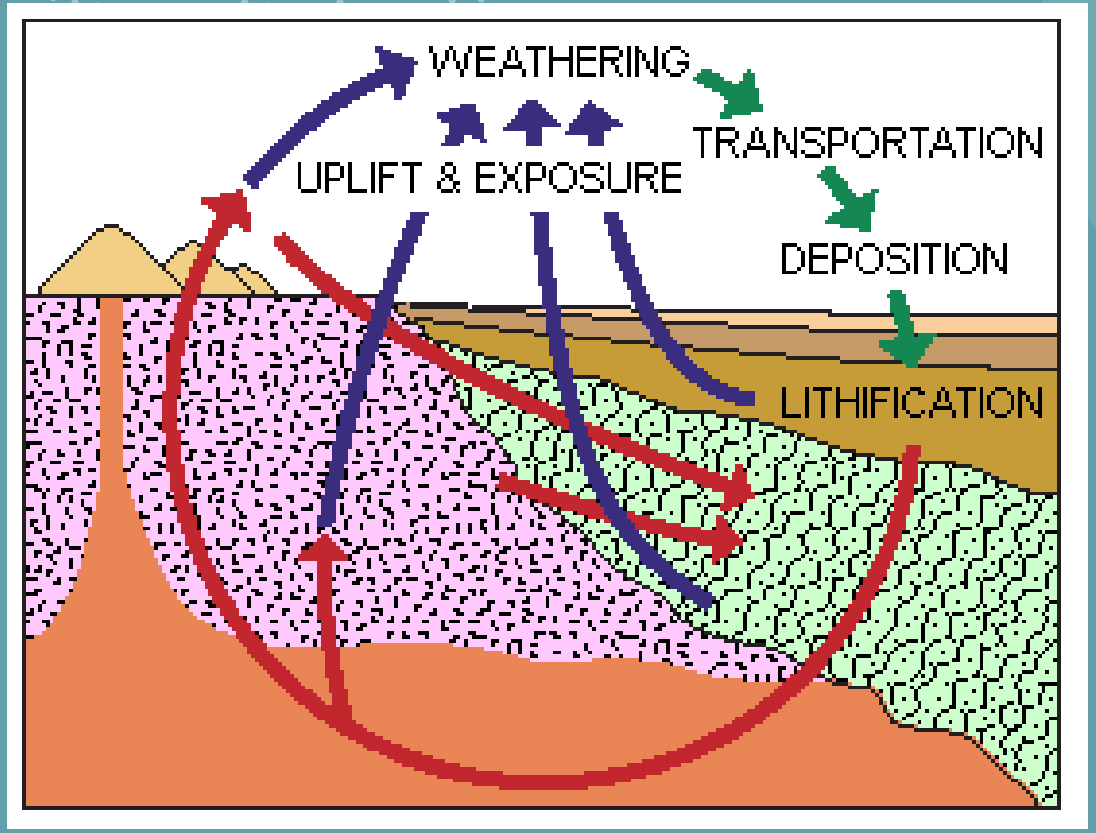
- Determined from the rock record
  - Provide evidence of geological events and past life forms
- Establishes the sequence of events without exact dates
  - A occurred before B
- A comparison not an exact age

Information from Sedimentary Rocks

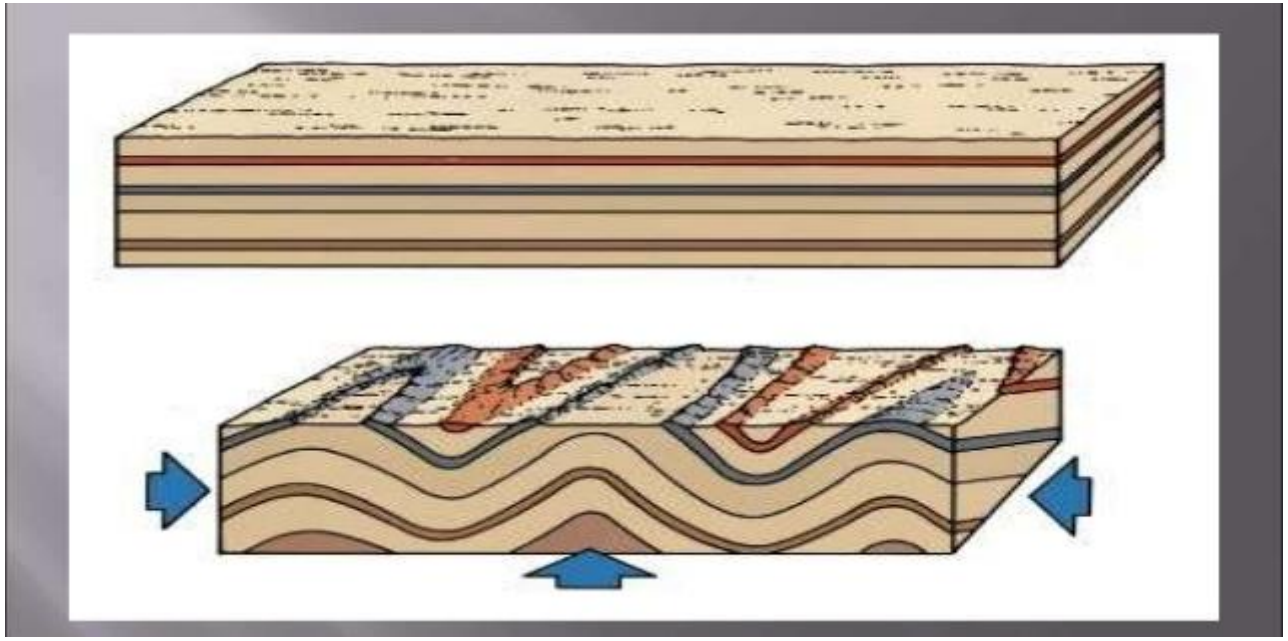
- **Uniformitarianism**
  - Processes that form rocks and landforms today are the same as in the past.
- **Sediments**
  - Represent older rocks that were weathered, eroded and deposited.
- **Principle of Original Horizontality**
  - Layered rocks were deposited flat and horizontal.
- **Principle of Superposition**
  - Rocks in lower layers are older than rocks above them.
- **Rocks can tell us about past environments.**

Uniformitarianism

- “The present is the key to the past.”
- Processes that form rocks and landforms today are the same as in the past.

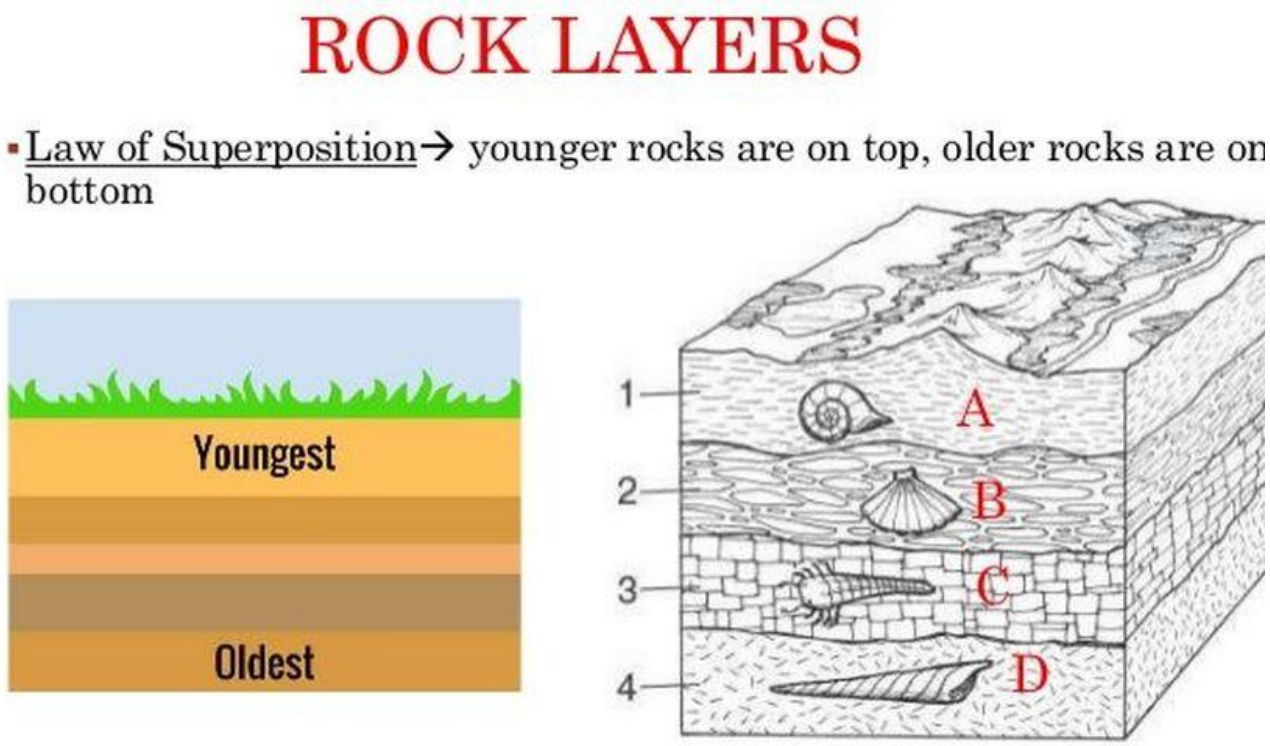


Principle of Original Horizontality



- Layered rocks were deposited flat and horizontal.
- If they are at an angle and/or folded, then something has happened to them since they were deposited.
  - Mountain building
  - Earthquakes
  - Folding

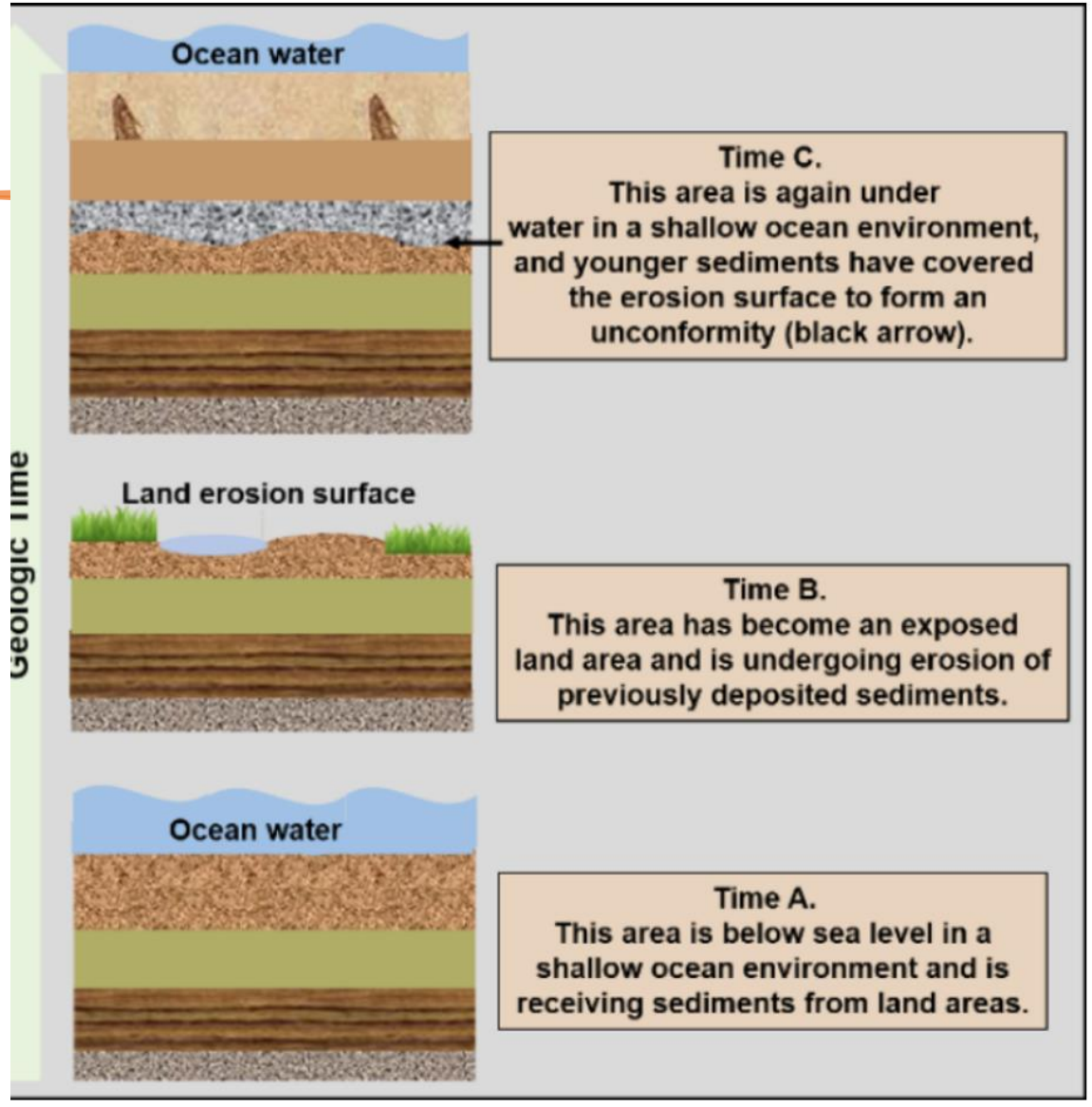
Principle of Superposition



- The first layer deposited is the one on the bottom and is the oldest layer.
- The layers are younger as you go up the sequence.

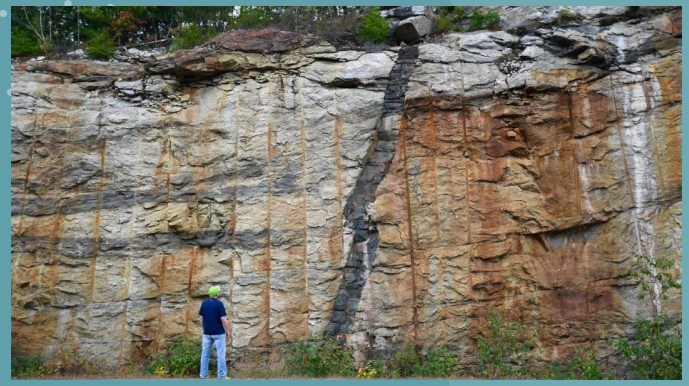
Unconformity

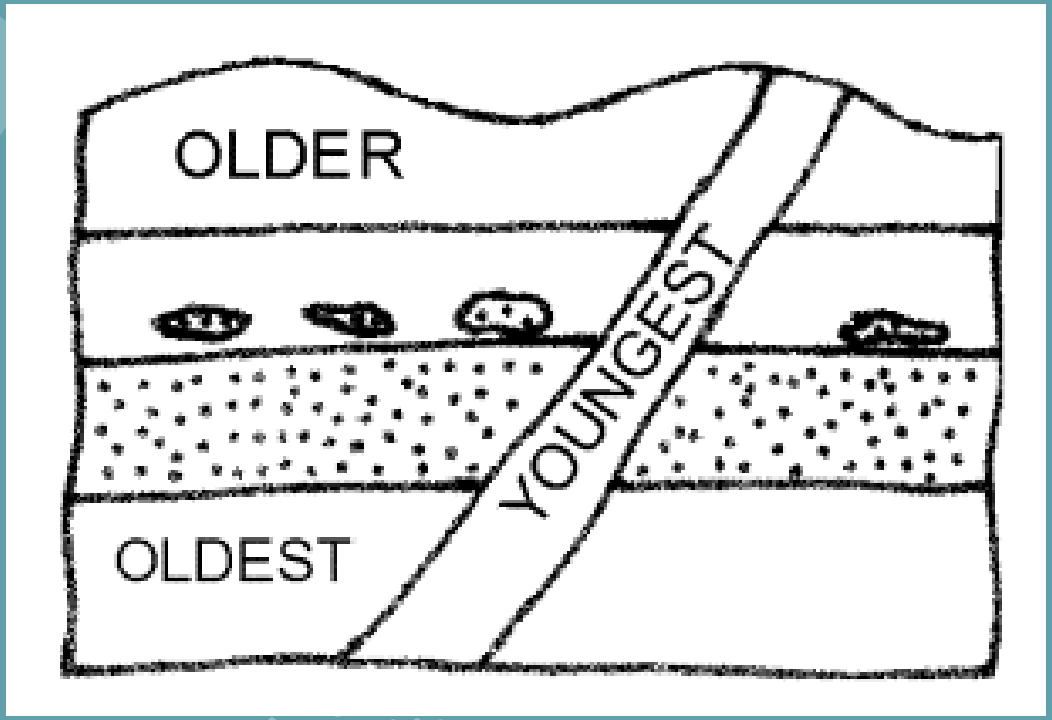
- A boundary between rocks layers with a **gap in age**
  - represents a period of **erosion or a pause in deposition**.
    - Deposition occurred, stopped and/or eroded, started again
  - Deposition was **not continuous**



Angular Unconformity

The Principle of Cross-cutting Relationships

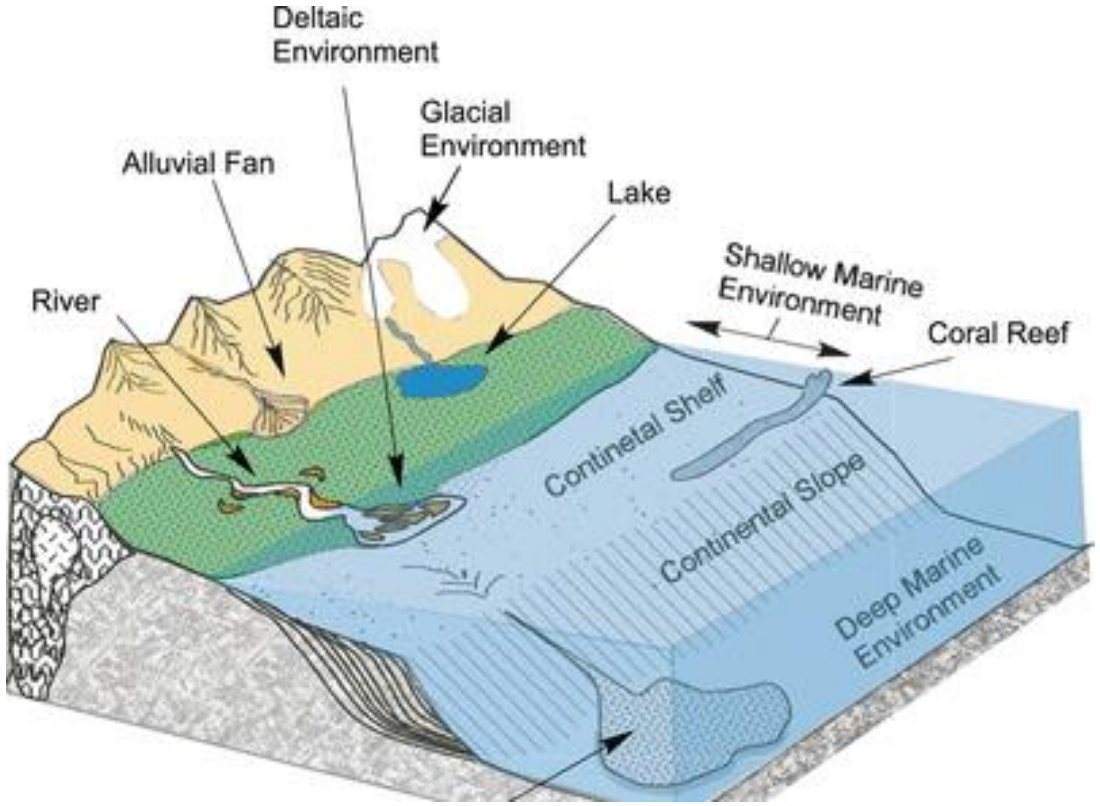




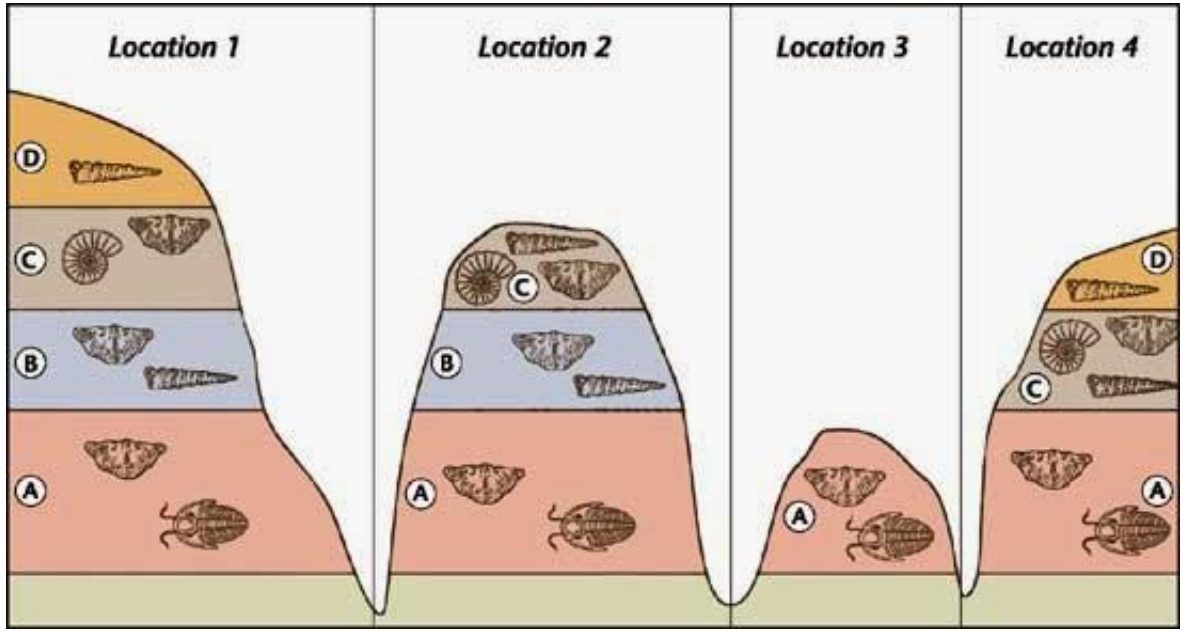
- a **fault** or **intrusion** is younger than the rocks that it cuts through.

Environment of Deposition

- **Limestone** - forms in water
- **Sandstone** - forms from sediments deposited in sandy areas
  - beaches, deserts, and dunes
- **Shale** - forms from sediments deposited in calm, muddy waters
  - Swamps
- **Fossils** add information



Index Fossils



- **Fossils**
  - preserve the remains or traces of living things
  - Form when they die
- **Index fossils**
  - **Widely distributed**
  - Represent a type of organism that existed **briefly**
    - Narrow time frame to better represent a specific age

Oldest to Youngest

- Oldest Basement Rock (tan)
- First layer (green)
- Second layer (orange)
- Third oldest layer (purple)
- Youngest igneous rock (red)