# PRINCIPLES OF GEOLOGY

Inspire Science 8th

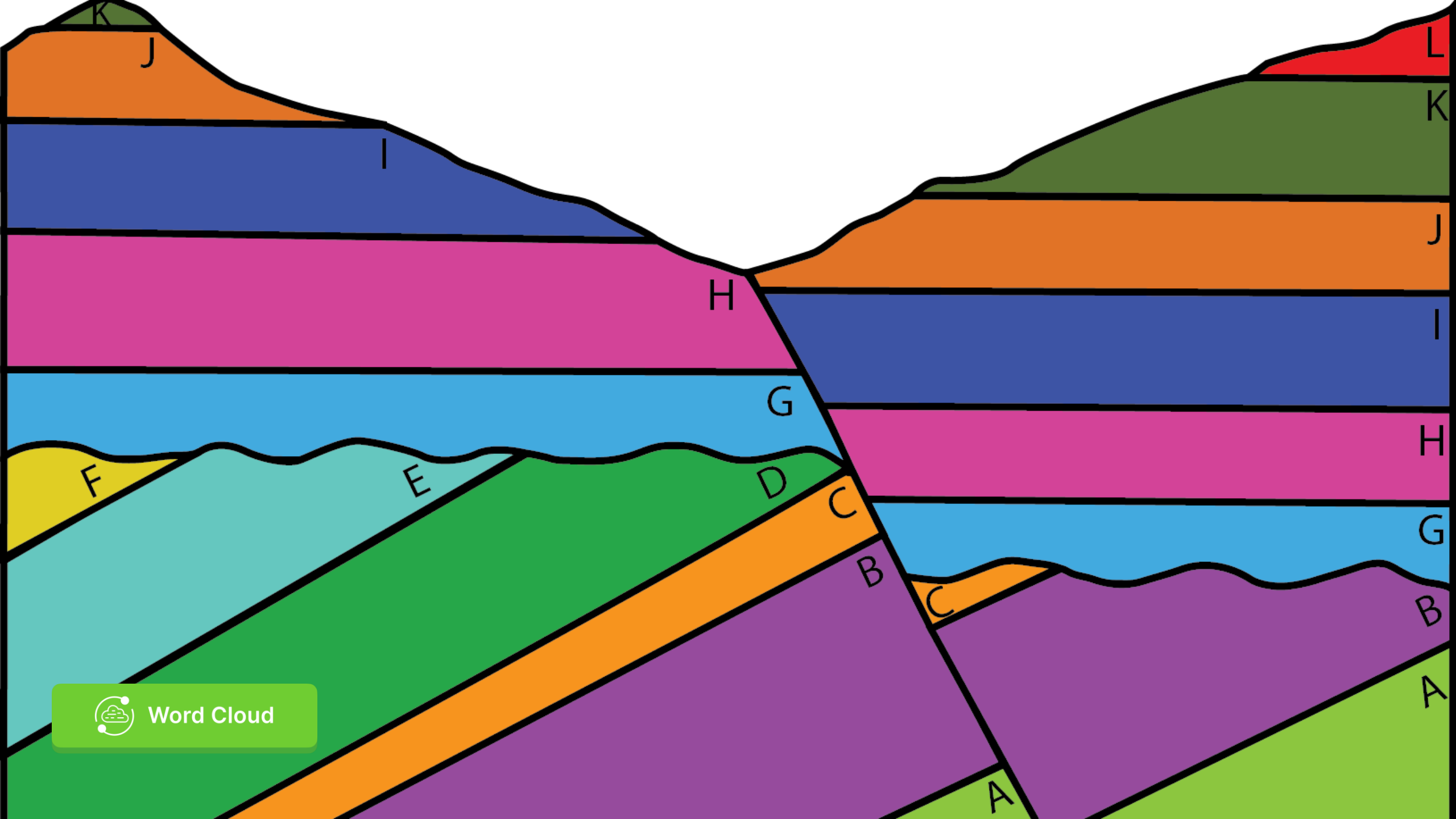
August 25, 2025

# Learning Objectives

- Understand fundamental principles of geological interpretation
- Analyze rock formations and their relative ages
- Explain how geologists determine the sequence of geological events

# Student Goals

- Develop critical thinking skills in geological reasoning
- Interpret geological evidence systematically
- Understand how rock layers tell Earth's historical story



# Principles of Geology

- These are general rules, or laws, that we use to determine how rocks were created and how they changed through time. We also use these laws to determine which rock formations are older or younger.

# 5 PRINCIPLES OF GEOLOGY

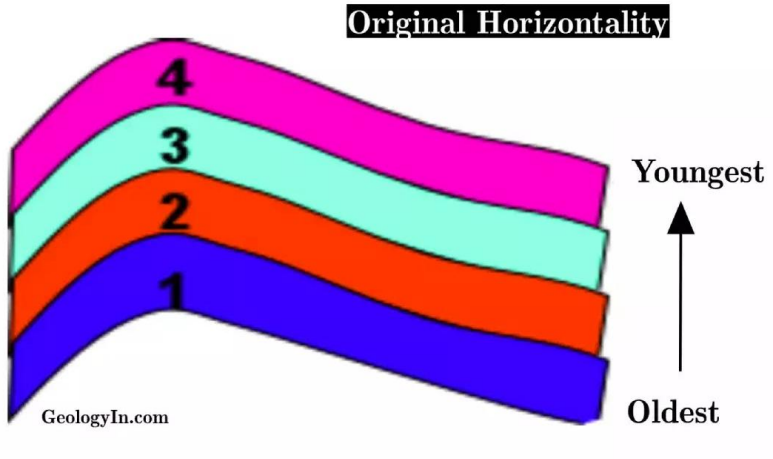
- The Law of Superposition
- The Law of Original Horizontality
- The Law of Lateral Continuity
- Cross-cutting relationships
- The Principle of Faunal Succession

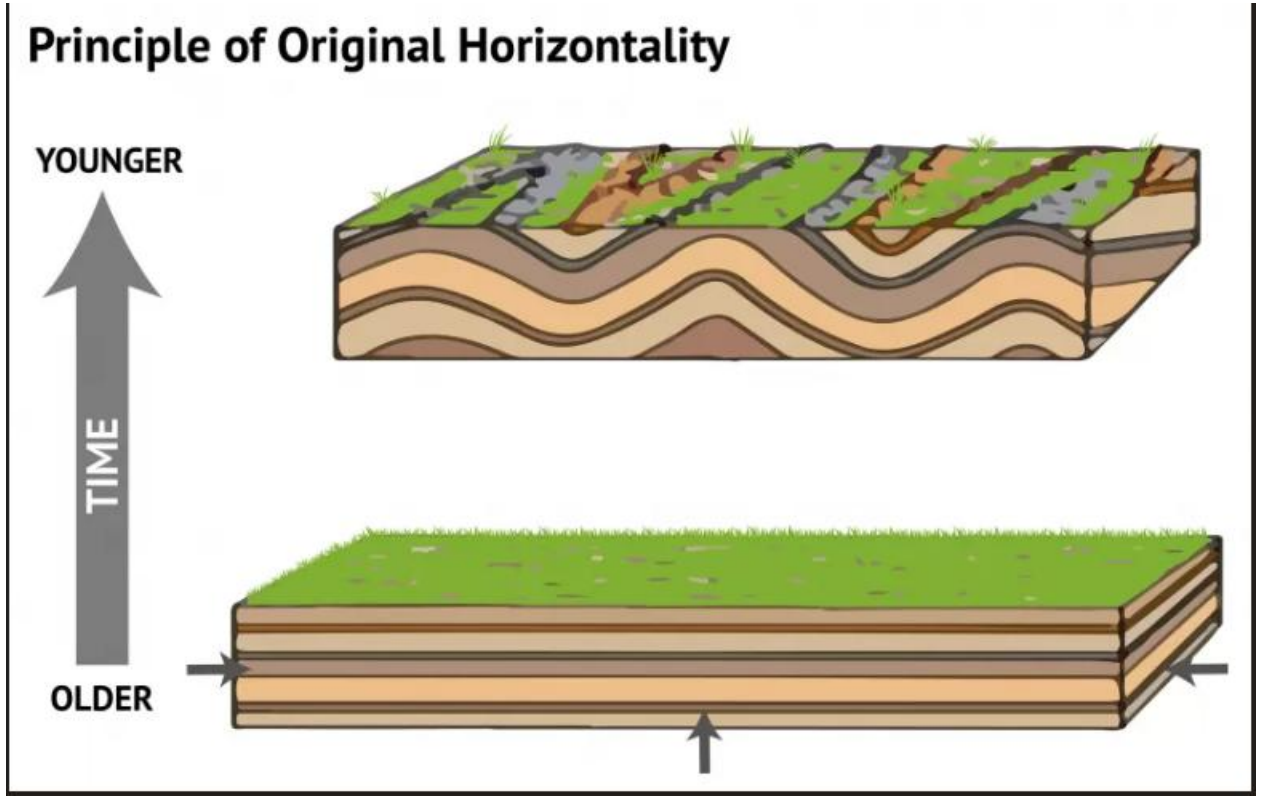
# The Law of Superposition

**The Law of Superposition** states that beds of rock on top are usually younger than those deposited below. This is logical, consider a layered cake or a stack of books, you can't add another layer unless one already exists to begin with. By understanding the Law of Superposition, we can make general statements about the ages of these rock units.

# The Law of Original Horizontality

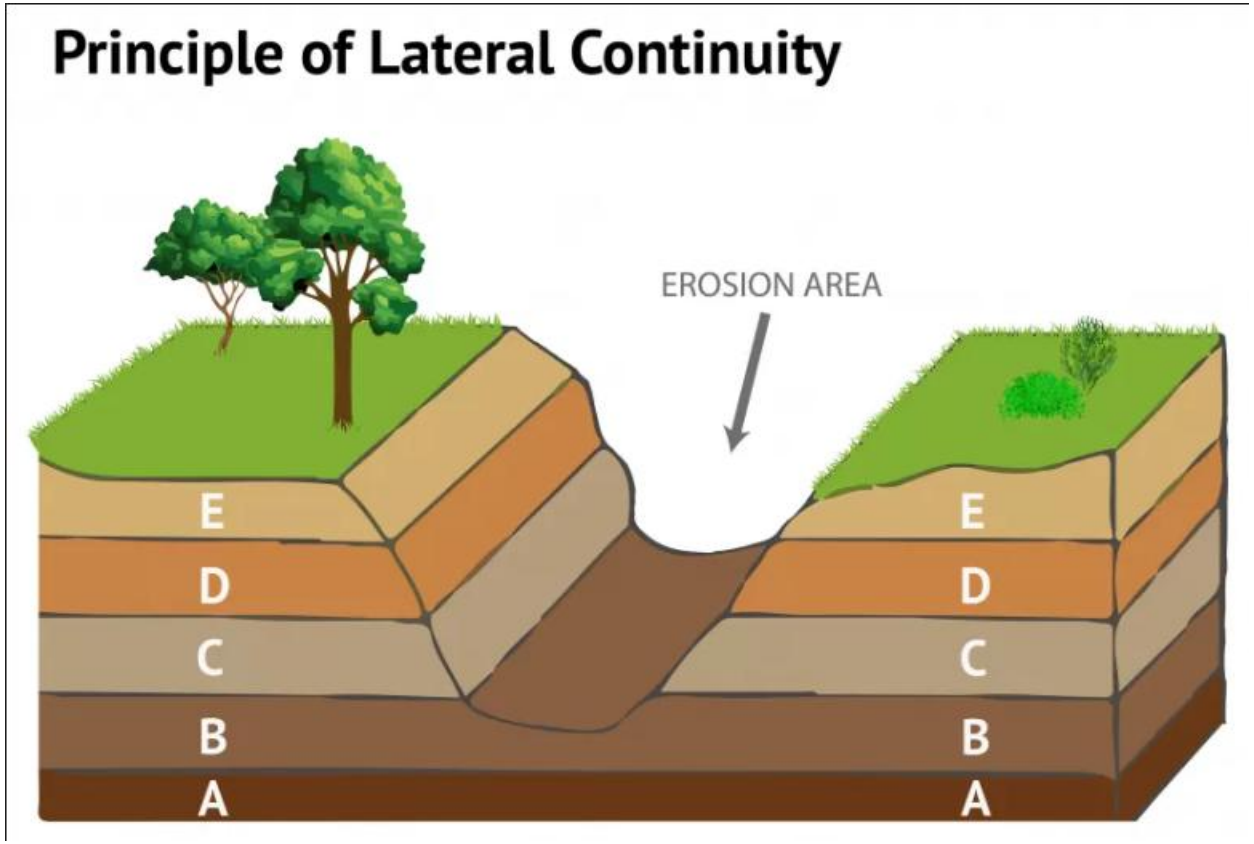
**The Law of Original Horizontality** suggests that all rock layers are originally laid down (deposited) horizontally and can later be deformed. This allows us to infer that something must have happened to the rocks to make them tilted. This includes mountain building events, earthquakes, and faulting. The rock layers on the bottom have been deformed and are now tilted. The rock layers on the top were deposited after the tilting event and are again laid down flat.



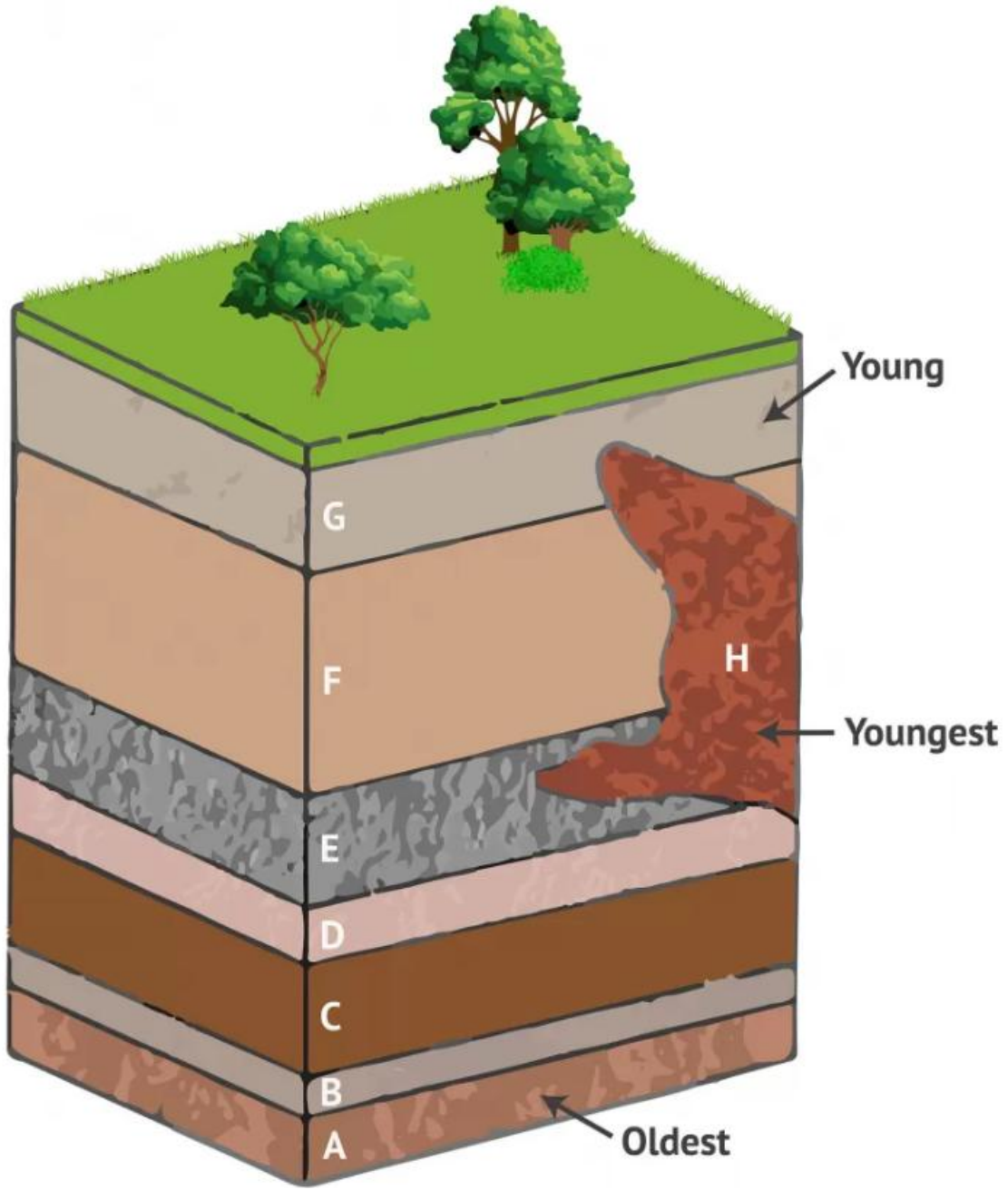
# The Law of Lateral Continuity

**The Law of Lateral Continuity** suggests that all rock layers are laterally continuous and may be broken up or displaced by later events. This can happen when a river or stream erodes a portion of the rock layers. This can also happen when faulting occurs. Faulting causes displacement in rock units. The figure here shows the offset between the layers signified by the black line cutting across the rocks. Trace the colors or letters across to find the layers that match. The rock layers on the top seem to form a valley but we can tell that on one side is the same as the one on the other side. There is missing rock in between and a displacement caused by deformation.



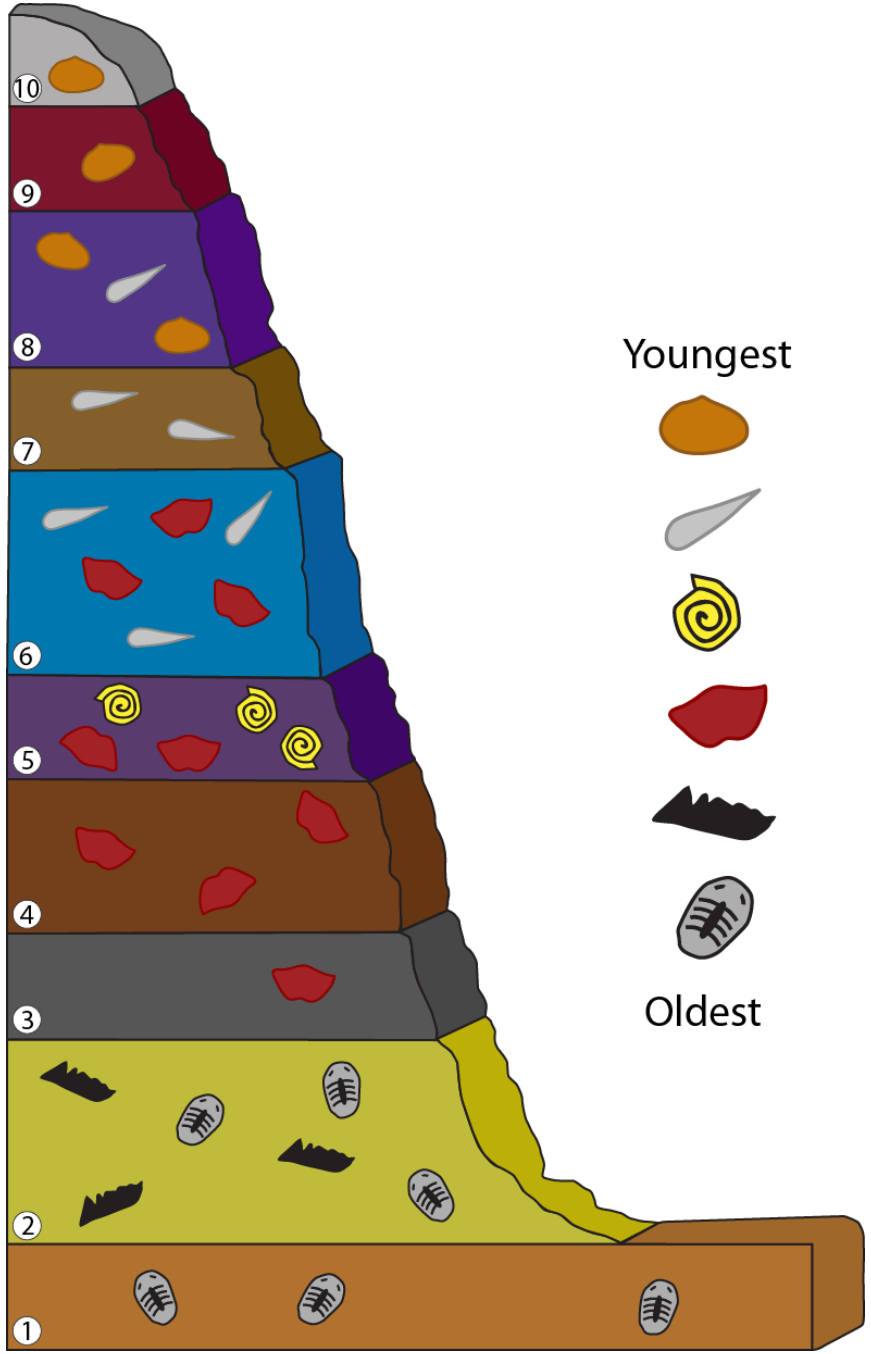
# Cross-cutting relationships

**Cross-cutting relationships** also helps us to understand the timing of events. Younger features cut across older features. We know that these rock layers were involved in the fault movement because they are all offset. We can also determine which beds of rock were tilted and that relationship to the rocks that are not tilted. The rock layers on the bottom have been deformed and are now tilted. The rock layers on the top were deposited after the tilting event and are again laid down flat.



# The Principle of Faunal Succession

**The Principle of Faunal Succession** states that a species appears, exists for a time, and then goes extinct. Time periods are often recognized by the type of fossils you see in them. Each fossil has a ‘first appearance datum’ and a ‘last appearance datum’. This is simply the oldest recorded occurrence of a fossil and then the youngest recorded occurrence of a fossil.

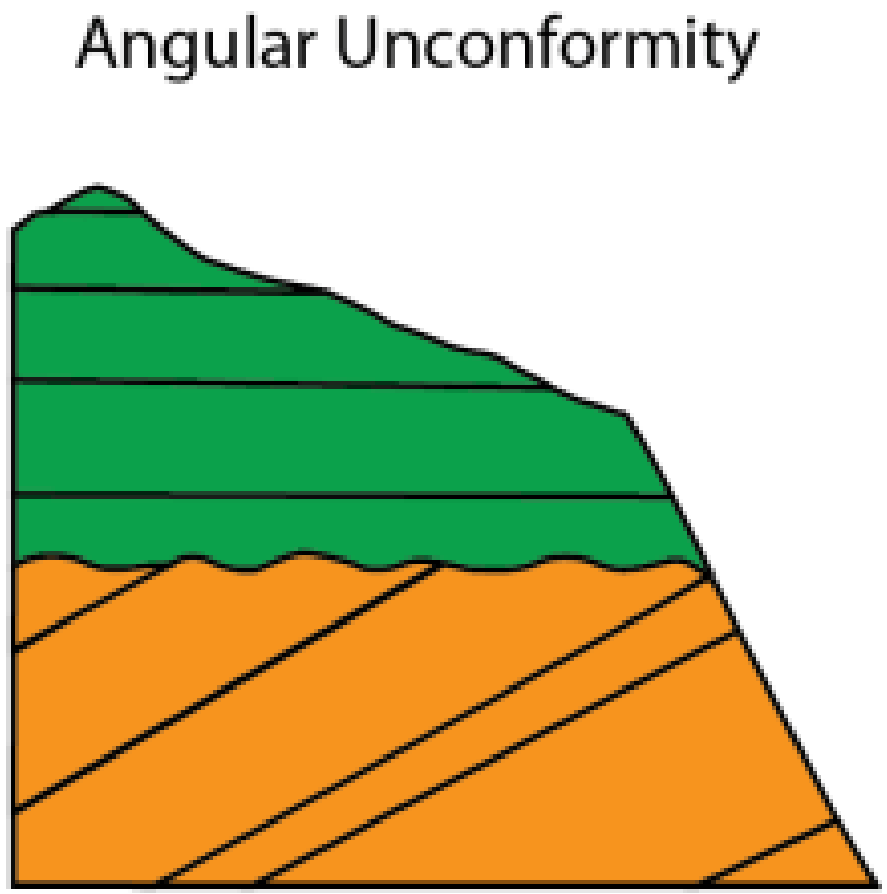


# UNCONFORMITIES

- Angular unconformities
- Disconformities
- Nonconformities

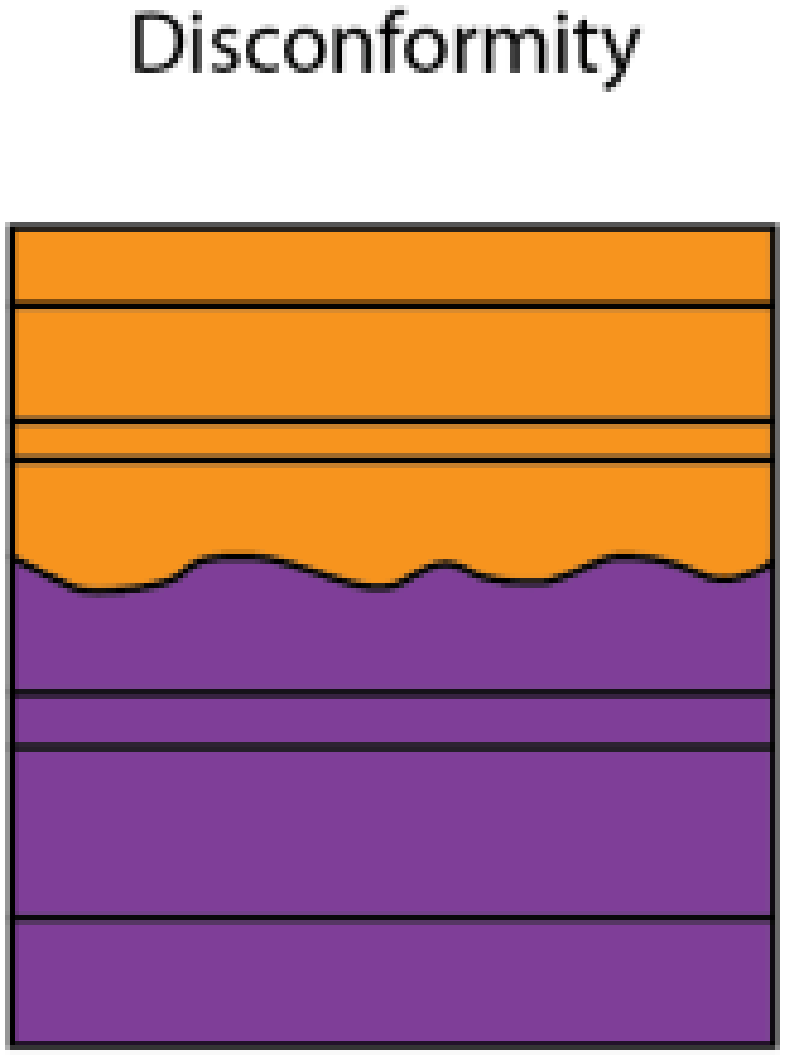
# Angular unconformities

**Angular unconformities** are represented by an older group of rock layers has been tilted, eroded, and another younger set of rock layers were deposited on top of this erosional surface. The tilting process is commonly by a mountain building event, it doesn't necessarily have to be in the mountains but the effects of mountain building processes are long reaching.



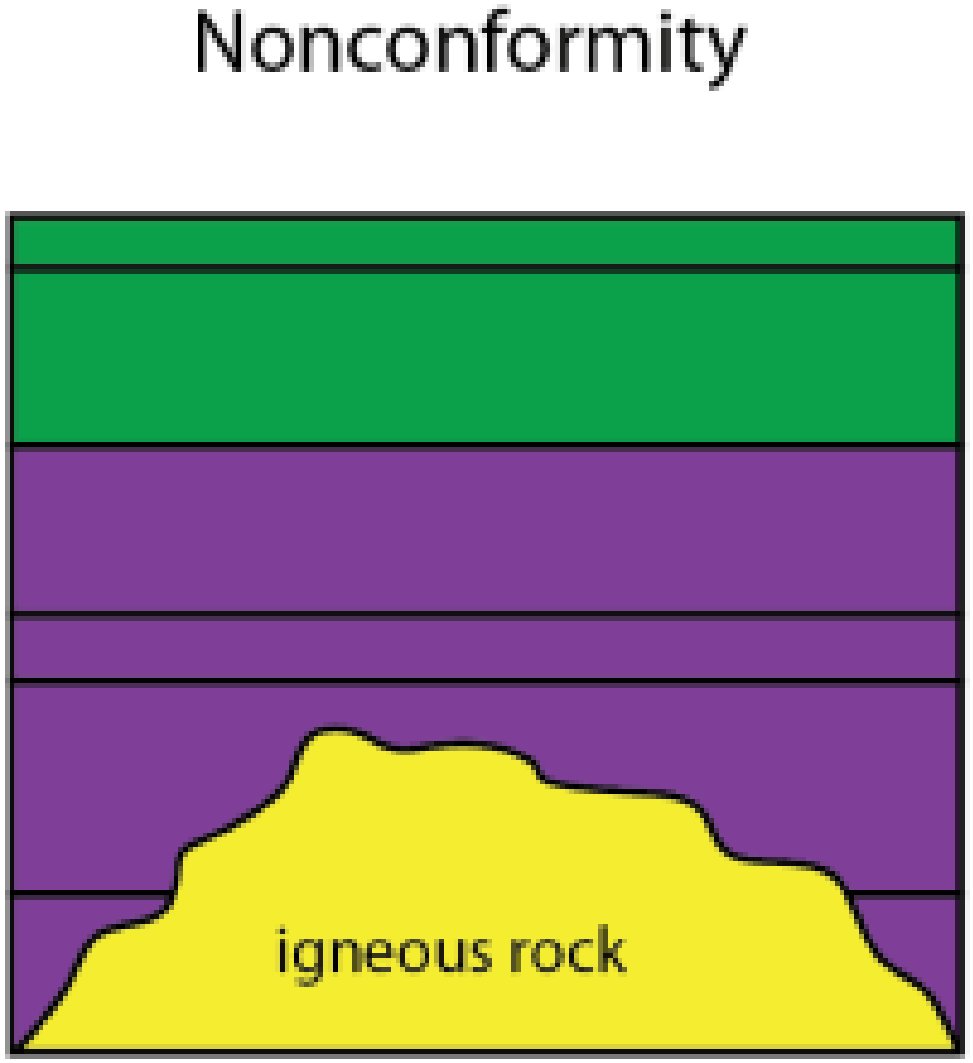
# Disconformities

**Disconformities** are an erosional surface between two sets of rock layers. Unlike with angular unconformities, there is no tilting of the older rock layers. This makes disconformities difficult to recognize because the erosional surface is often very difficult to find.



# Nonconformities

**Nonconformities** are unconformities that separate different rock types. This is commonly the separation between igneous and sedimentary or metamorphic and sedimentary rocks. These types of unconformities usually indicate that a long amount of time has been eroded away before the younger sedimentary rocks were deposited.



According to the Law of Superposition, what determines the relative age of rock layers?

A Chemical composition

B Color of the rocks

C Position of layers

D Fossil content

Multiple Choice

The Law of Original Horizontality suggests that rock layers are initially:

A Vertical

B Curved

C Horizontally deposited

D Randomly arranged

Multiple Choice

# What does a cross-cutting relationship indicate about geological events?

A. Rocks of the same age

B. Younger features cutting across older features

C. Similar rock compositions

D. Identical geological processes

Multiple Choice

The Principle of Faunal Succession is primarily concerned with:

A Rock layer formation

B Fossil distribution over time

C Mountain building

D Erosional processes

Multiple Choice

# Unconformity represents:

A. A continuous rock record

B. A gap in the geological record

C. A perfect rock layer sequence

D. Constant geological conditions

Multiple Choice

Which unconformity type separates different rock types?

A Disconformity

B Angular unconformity

C Nonconformity

D Conformity

Multiple Choice

When geologists find smaller rock pieces within a larger rock, they can conclude:

A. The rocks are the same age

B. The smaller rocks existed before the larger rock

C. The rocks have identical composition

D. The rocks formed simultaneously

Multiple Choice

# What does the "first appearance datum" of a fossil represent?

A. The rock's age

B. The oldest recorded occurrence of a fossil

C. The rock's chemical composition

D. The fossil's size

Multiple Choice

# Lateral Continuity suggests that rock layers:

A. Are always horizontal

B. Can be broken or displaced

C. Never change

D. Are identical worldwide

Multiple Choice

# Mountain building events can cause:

A. Rock layer tilting

B. Fossil creation

C. Chemical erosion

D. Volcanic eruptions

Multiple Choice

# A disconformity is characterized by:

A. Tilted rock layers

B. An erosional surface between layers

C. Igneous rock formations

D. Continuous rock deposition

Multiple Choice

# The Principle of Components implies:

A. All rocks are the same

B. Smaller rock pieces predate larger rocks

C. Rocks never change

D. Rocks form instantly

Multiple Choice

# Faunal Succession helps geologists:

A. Determine rock composition

B. Recognize time periods through fossils

C. Predict future geological events

D. Measure rock density

Multiple Choice

# An angular unconformity typically involves:

A. Horizontal rock layers

B. Tilted and eroded rock layers

C. Identical rock types

D. Continuous deposition

Multiple Choice

# Cross-cutting relationships help determine:

A. Rock composition

B. Timing of geological events

C. Fossil content

D. Rock color

Multiple Choice

# The Law of Lateral Continuity suggests rock layers:

A. Can be displaced by rivers or faulting

B. Are always connected

C. Never change

D. Are identical globally

Multiple Choice

# Nonconformities typically separate:

A. Identical rock layers

B. Continuous rock formations

C. Similar rock types

D. Different rock types

Multiple Choice

# Faunal Succession indicates that species:

A. Never change

B. Form instantly

C. Remain constant

D. Appear, exist, and go extinct

Multiple Choice

# Unconformities can indicate:

A. Constant rock formation

B. Identical geological conditions

C. Continuous geological processes

D. Erosion, deformation, sea-level changes

Multiple Choice

# The Principle of Original Horizontality helps geologists understand:

A. Rock color

B. Rock composition

C. Deformation of rock layers

D. Fossil content

Multiple Choice