

## Relative Dating: Which Rock Layer Formed First

Name: \_\_\_\_\_

Before the theory of evolution was proposed by Charles Darwin in 1859, geologists had already noticed that fossil assemblages changed from one stratum to the next (i.e. through time). This concept is termed faunal succession. For example, geologists noticed that the abundance of mammal fossils occurred higher stratigraphically (i.e. later in time) than the abundance of reptile fossils. Geologists were able to use the faunal succession of fossil assemblages to correlate distant rock beds to each other. These correlations led to the construction of the geologic time scale, a global record of rocks and their relative ages.

However, before geologists can correlate the ages of rocks from different areas, they must first figure out the ages of rocks at a single location. Within a single locality, geologists are able to determine which rock units are the oldest and which are youngest. This type of analysis is called relative age dating. The principles of relative age relationships are listed below:

1. Principle of superposition: In a sequence of undeformed sedimentary rock layers, the rocks get older from top to bottom (i.e. the bottom layer is the oldest layer and the top layer is the youngest).
2. Principle of original horizontality: When sedimentary rock layers are being deposited, gravity forces them to be deposited as flat, horizontal layers. Once the sediment has solidified and become rock, they can be tilted or folded.
3. Principle of faunal succession: Groups, or assemblages, of plant and animal fossils appear in the geologic record in a specific order. These assemblages can be used to identify certain periods of geologic time.
4. Principle of crosscutting relations: An igneous rock unit or fault that cuts across another rock unit must be younger than the unit it cuts across. In other words, the other rock unit must have already been there for the igneous rock or fault to cut across it.
5. Principle of inclusion: A rock unit that contains inclusions of preexisting rocks must be younger than the rock unit from which the inclusions came.
6. Metamorphic rocks: A metamorphic rock is always older than the non-metamorphosed rocks around it. The metamorphic rock must have formed before the surrounding rocks, otherwise they would be metamorphosed as well.