**Geologic Change**

During the 18th century, when scientific studies of geology really began, there were two conflicting theories on geologic change.

1. **Catastrophism** (root word: catastrophe)

The Earth changes as a result of immense worldwide events such as floods and volcanic eruptions. These large events quickly create valleys and oceans and raise mountains and continents. Plant and animal populations are wiped out by these events and replaced by new populations. Between events (or catastrophes), the world remains more or less unchanged.

1. **Uniformitarianism** (root word: uniform)

The geological processes that we see acting today also acted in the past. By observing today’s processes we can deduce what may have happened in the past. A popular oversimplification of this theory states that “the present is key to the past”. In this theory, although the processes stay the same over time, the speed of these processes may change. This change of speed results in differing rates of geologic changes. Rare catastrophes (e.g. meteorite collisions) do occur, but these events are not the primary cause of change.

*Problem to solve:* Some metal steps leading towards a building have holes in them. Propose two explanations of how these holes may have formed, one explanation using a catastrophist approach and the other a uniformitarian approach. Explain which is the most likely explanation for the wearing away of the metal.

**Rate of Change**

Over time, the theory of catastrophism proved to be weak and uniformitarianism is now the basis of all modern geology.

**Rates of change and Geologic Time** – If we know the rate of geologic change and we know how much change has occurred, we can calculate how much time has passed.

*Example 1*: If the tile of the floor is 3mm thick and it is being worn away at a rate of 0.125 mm per year, how long will it take to wear through the tile?

3 ÷ 0.125 mm per year = 24 years

Equations:

**Amount = Rate x Time**

**Rate = Amount**

**Time**

**Time = Amount**

**Rate**

*Example 2:* During May of 1980, the north slope of Mt.St.Helen’s bulged outwards approximately 25 meters in 16 days. Calculate the rate of expansion of this slope.

Rate = Amount

Time

Rate = 25 meters

16 days

Rate = 1.56 meters/day

*Example 3:* At the mid-Atlantic ridge, the North American plate moves west at a rate of approximately 1.5 centimeters per year. How many years will it take for the plate to move 1 meter?

**Bring a Calculator to class tomorrow!**