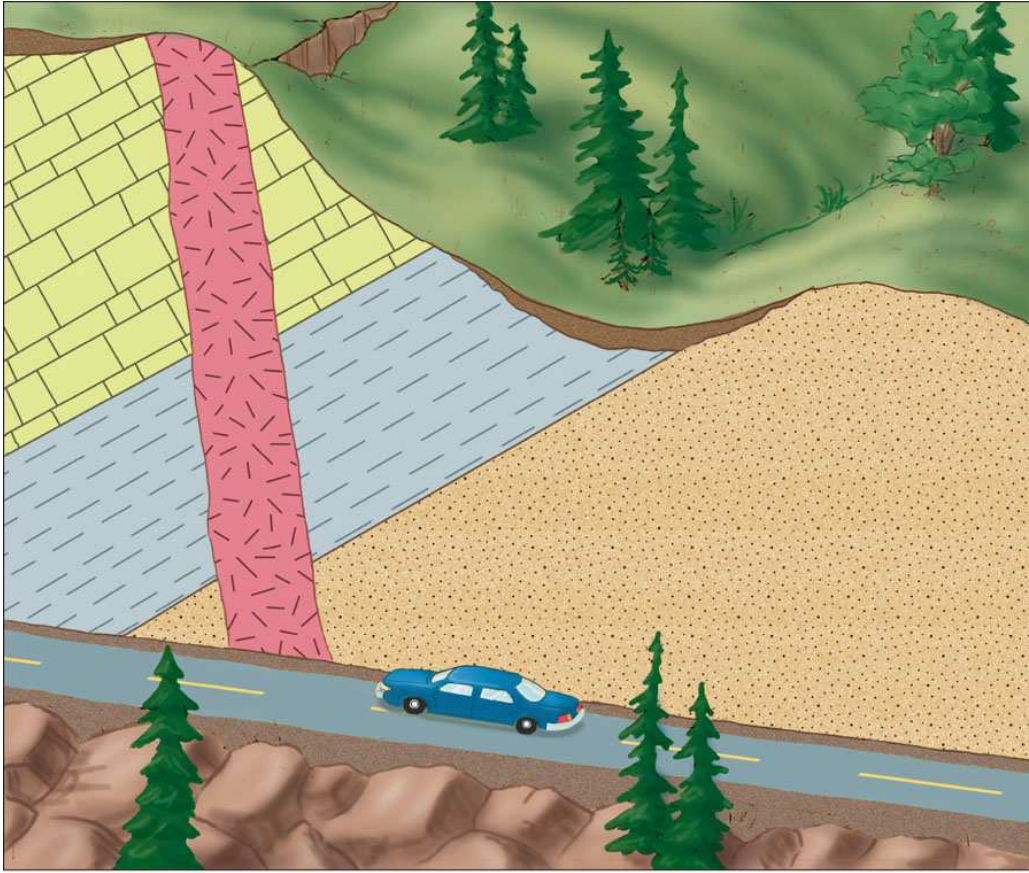


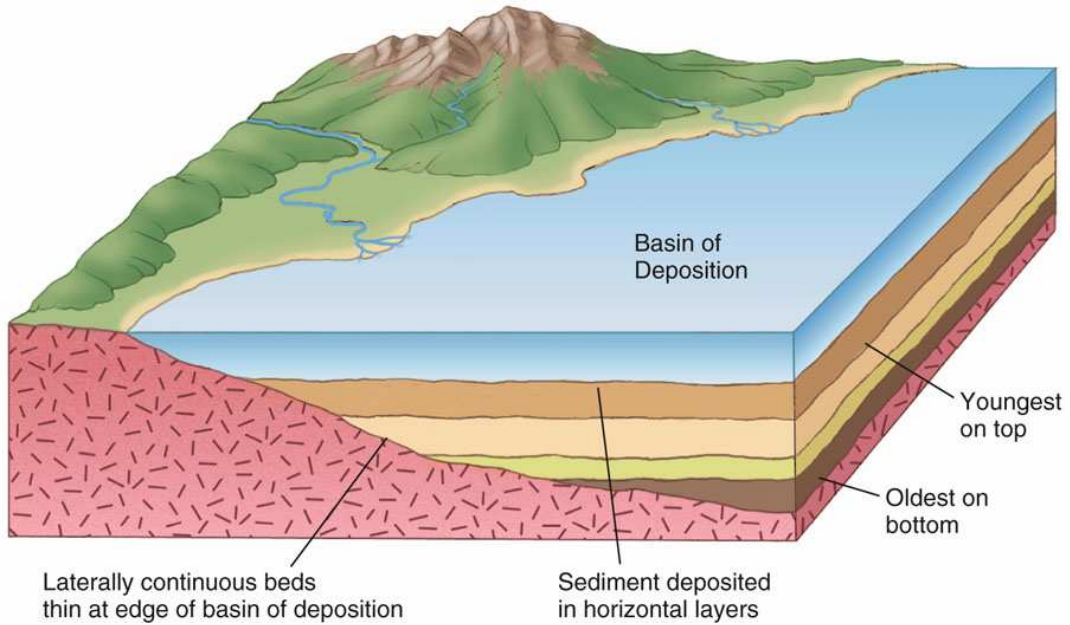
## Geologic Age



**So, when looking at an outcrop, how do we know what layer is deposited first?**

**There are three main laws regarding how rock units are laid out:**

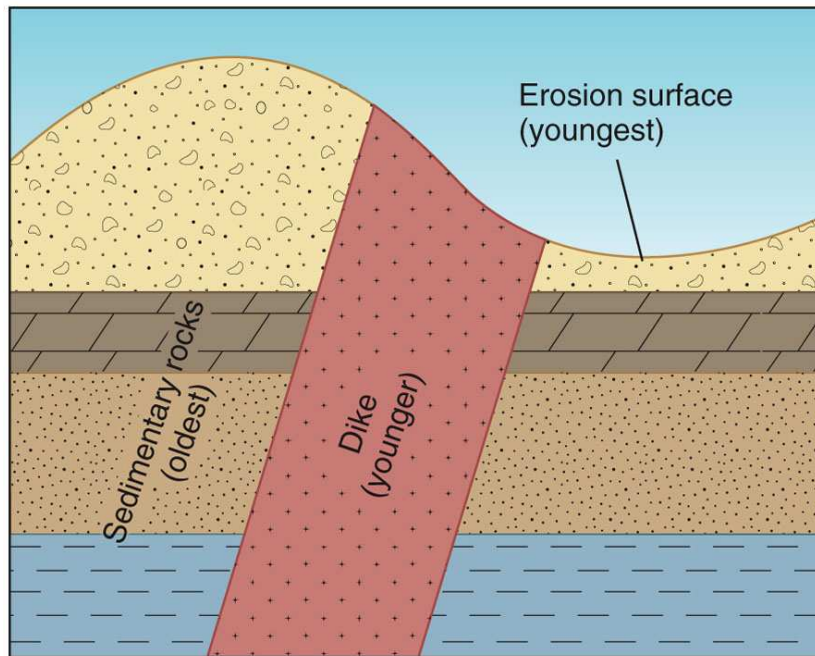
- 1. Law of Original Horizontality** - The proposition of Steno, that all sedimentary bedding is horizontal at the time of deposition.
- 2. Law of Superposition** - The principle stated by Steno that, except in extremely deformed strata, a bed that overlies another bed is always the younger.
- 3. Law of Original Continuity** – Sediments are deposited in layers that continue laterally until they thin out or reach the end of a basin



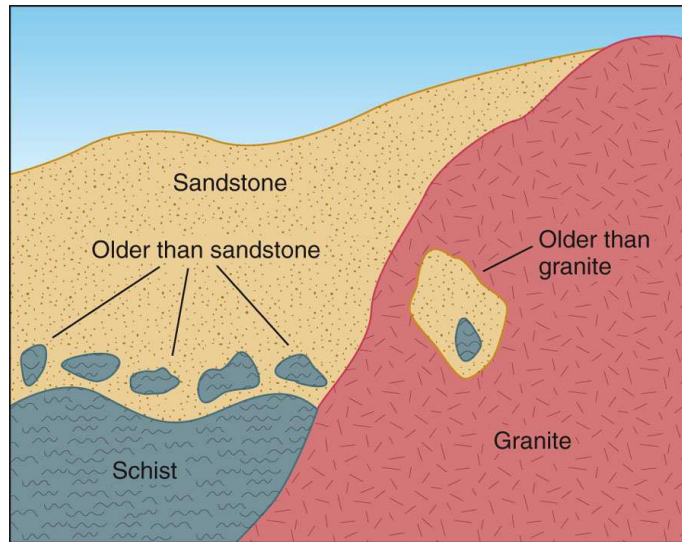
**How are these laws reflected in the above diagram?**

**A couple of basic rules:**

**Anything that cuts through a layer is younger than that layer:**



**If there are inclusions in a layer from another rock unit, that unit is younger:**



**What else can affect the relative geologic age of a layer?**

**Unconformities:**

**4 types: Angular unconformity, Erosional disconformity, Nonerosional disconformity, Nonconformity**

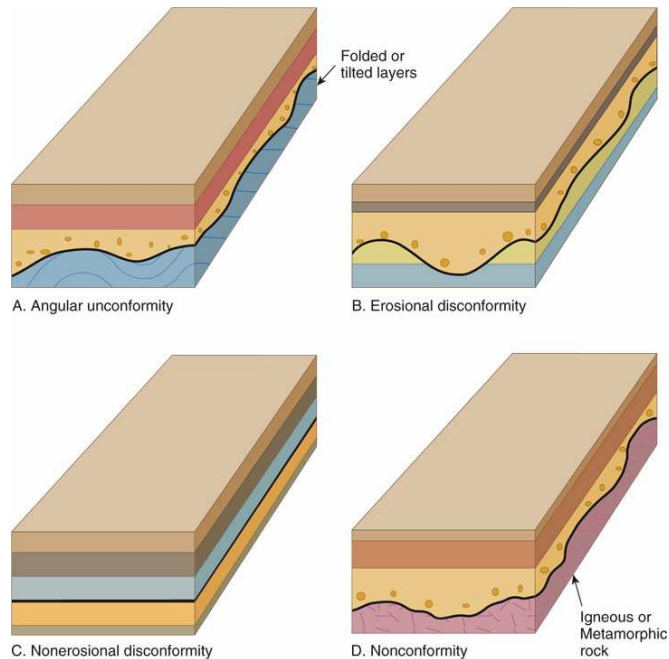
**Note: Erosion occurs both at the surface and may be reflected in the geologic record as well**

**Faulting:**

**Faults are always younger than the beds it penetrates**

**Tilting or folding:**

**Folding and tilting of layers occurs after the layers that are affected are laid down**



## **Radioactive Age:**

**A more precise way to measure geologic age is by using radioactive isotopes that decay at a constant interval.**

**Half Life: Time it takes for half the number of radioactive atoms in a sample to decay**

**Parent atoms: the radioactive isotope**

**Daughter atoms: the more stable isotope that the parent decays to**

**Decay constant ( $\lambda$ ): defined as  $\ln(2)$ /half life**

$$t = (N_D/N_P)/\lambda$$

**t = time in years**

**$N_D$  = number of daughter atoms**

**$N_P$  = number of parent atoms**

**$\lambda$  = decay constant**

**A quick example of relative age:**

**Back to the first figure, what is the order these units were deposited?**