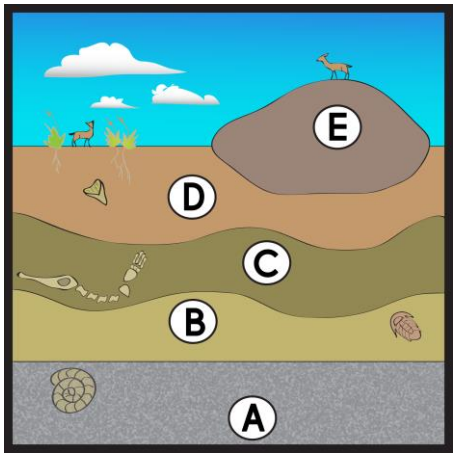
A Trip Through Earth's History

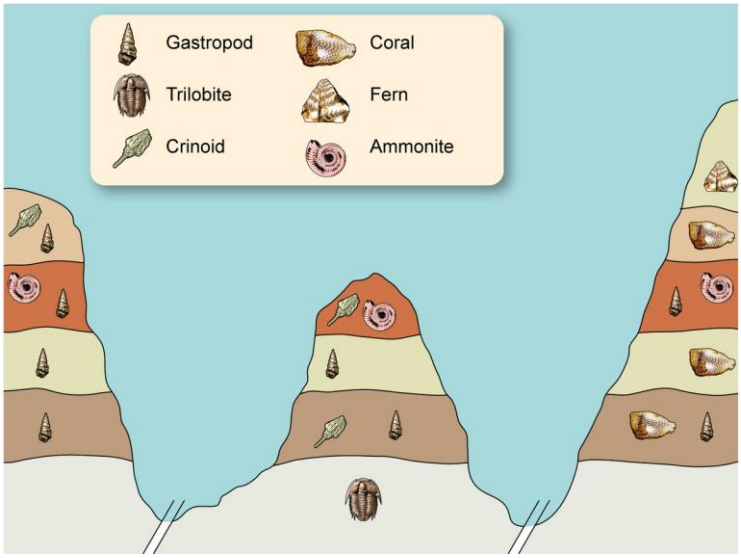
Section 2: Determining Ages of Rocks



One way to determine the age of a fossil is by finding the age of the rock it was found in. The **relative age** of a rock is its age compared with ages of other rocks. The **absolute age** of a rock is the number of years since the rock formed. While it may be impossible to know the absolute age exactly, a geologist can sometimes determine it within a certain number of years. Geologists use the **law of superposition** to determine the relative age of rocks. In horizontal sedimentary rock layers, the oldest layer of rock is at the bottom and each higher layer is younger than the layer below it.

To determine the relative age of rocks, geologists look at other clues besides the position of rock layers. An **extrusion** is lava that hardens on the surface, and it is always younger than the rocks below it. When magma cools and hardens into a mass of igneous rock beneath the surface, it's called an **intrusion**. An intrusion is always younger than the rock layers around or beneath it. A **fault** is a break in the Earth's crust. It is always younger than the rock it cuts through. An **unconformity** is the gap in the geological record where some rock layers have been lost because of erosion.

Certain fossils called **index fossils** represent an organism that existed only briefly and was widely distributed, meaning it lived in many different areas. To date rock layers, geologists use index fossils to match layers, and then they can give the same age to those layers of rocks at other locations.



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Section 2: Determining Ages of Rocks Continued

Most elements are stable, but some exist in forms that are unstable, meaning they break down. An **element** is when all the atoms of a particular type of matter are the same. When an element breaks down, or decays, it releases particles and energy in a process called **radioactive decay**. These unstable elements are said to be radioactive. The rate of decay of each radioactive element is called a half-life, which is the time it takes for half of the radioactive atoms to decay. The decay will continue at a steady rate, slowly changing the original radioactive element into another element, which changes the composition over time. This change causes the amount of the radioactive element to decrease, while the amount of the new element increases. Geologists also use **radioactive dating** to determine the absolute ages of rocks by first determining the amount of radioactive element that exists in a rock.