Video Notes: How Was the Earth Formed 2020 → [LINK](https://live.myvrspot.com/iframe?v=fMzRlYTBkNGYxM2U2MmIwYWZmOWUxYjQ4ZmJmY2ZhNDM) to video

How Earth Formed (0:00-11:15)

* Tough to find evidence as almost all was destroyed by erosion, volcanic activity and shifting of oceans.
* After examining a meteorite that hit in northern AZ, scientists discovered that the oldest rocks are from space.
* Scientists hypothesize that the sun was surrounded by dust and gas that condensed to form minerals. The minerals stuck to each other to form granules of rock. The small rocks collided to form larger rocks, etc. More mass means more gravity which means the body will grow faster. Evidence came in 2003 when salt in a bag at zero gravity stuck to each other because of static electric charge. More
* How did Earth become layered? Earth melted. There was no dry land, no oceans - there was only molten lava. The heat came from radioactive decay, collisions of meteorites, and gravitational contraction (see textbook for more details on this). Denser elements moved to what would become the core. Lighter elements moved to the outer part of Earth becoming the crust (see differentiation in textbook).

Age of Earth (11:15-21:40)

* In 1897, Rutherford used radioactive dating to date rocks in the BILLIONS of years.
* In 1953, Patterson dated meteorite samples to be 4.5 billion years old. Most precise dating of Earth at that time: 4.567 billion years old.
* In 1974, Hartman studied the origin of the moon. Hypothesized that another planet (Thea – not named in video). The composition of moon rocks is more similar to that of the crust and upper mantle of Earth, which led him to believe it was not a head on collision. (see textbook for more details on the age of the Earth – age of rocks on Earth, moon rocks, mineral zircon, meteorites).

Formation of Continents and Oceans (21:40-29:00)

* Scientists found amphibolites (old rocks) in Canada dated to be 4.28 by old. This is 200 my after the formation of Earth. Scientists know this type of rock is formed under heat and pressure from other rocks, which means it had to be formed deep underground. This led scientists to believe that Earth had crust about 200 my after it formed.
* Scientists found banded iron formations that contained magnetite, which is usually an indicator of the presence of water. Thus, oceans were present at this time.

Origin of Water (29:00-32:20)

* In 1998, a meteorite containing table salt hit Earth. Upon further study, there were drops of liquid water found in the salt pieces. The water is believed to be at least 4.5 by old (at least as old as the salt it was found in). Thus, water existed when the Earth formed (see textbook for more details)

Life on Earth (32:20-37:00)

* Allende, Mexico – meteorite fragmented in the atmosphere and then hit Earth. The fragments contained amino acids, chemical building blocks for life. Building blocks of life originated in space!

Earth’s Atmosphere (37:00-end)

* 3.5 by ago, there was no free oxygen (O2) on Earth. Oxygen was only found in other compounds (ex: CO2). Because of volcanism, the atmosphere contained sulfur, methane, carbon dioxide, and sulfuric acid (see textbook for more details).
* Scientists discovered stromatolites that were about 3 by old. Stromatolites are layered mounds that were originally formed by the growth billions of cyanobacteria, a single-celled photosynthesizing microbe. They produced free oxygen, which changed life on Earth and created the atmosphere we have today (see textbook for more details).