

Climate Change

REVIEW

Geological Time Scale (GTS)

- ▶ The Cambrian Explosion happened during the Cambrian period in the Paleozoic era. The Cambrian Explosion was the “sudden” appearance of complex life.
- ▶ The Cambrian Explosion is such an important event that the entire 4 billion years of Earth history that happened before it are grouped into the Precambrian supereon. This is the only supereon.
- ▶ The Permian–Triassic extinction (AKA: “The Great Dying”) marked the end of the Paleozoic era, between the Permian and Triassic periods. 95% of all life on Earth perished.
- ▶ Dinosaurs ruled during the Mesozoic era.
- ▶ The Hadean eon was the longest eon, accounting for billions of years. This was when the Earth was a ball of molten rock. It was called Hadean after the Greek “Hades” – the underworld. Our knowledge of this eon is limited.
- ▶ There are only two subperiods: Mississippian and Pennsylvanian.
- ▶ The GTS includes supereons, eons, eras, periods, subperiods, epochs, and ages.
- ▶ The eons are: Hadean, Archean, Proterozoic, and Phanerozoic.

GTS questions

- ▶ What is the Cambrian? (Era or Explosion?)
- ▶ What types of things survived the Great Dying?
 - ▶ Therapsids (mammal-like reptiles) and the more reptilian Archosaur.
- ▶ How long is a time scale? (What scale?)
- ▶ “I don’t know anything, so tell me everything.”

History of Earth

- ▶ When the Earth was formed, it was over 1,093 degrees Celsius. It was a ball of molten rock. This was the Hadean eon.
- ▶ When the Earth formed, it spun so fast that a day was 6 hours.
- ▶ Snowball Earth hypothesis proposes that Earth surface's became entirely or nearly entirely frozen. It ended near the end of the Proterozoic eon when volcanos erupted, releasing carbon dioxide. Hydrogen dioxide (a type of oxygen) was created through the sun's rays reacting to water molecules in the ice, which was released into the air as the ice melted.
- ▶ The Cambrian Explosion took place after Snowball Earth.
- ▶ Water crystals were brought to Earth by meteors.

History of Earth (CON'T)

- ▶ Meteors bombarded early Earth for 20 million years.
- ▶ Cretaceous–Paleogene extinction event, which killed off the dinosaurs, along with three-quarters of the plant and animal species on Earth happened between the Cretaceous and Paleogene periods, 66 million years ago. This marked the end of the Mesozoic era and the beginning of the Cenozoic era, when mammals took over.
- ▶ Pikaia may have been the first animal with a spine.
- ▶ The first animal to walk on land was the tiktaalik rosea.
- ▶ According to the giant-impact hypothesis, the hypothesized ancient planet, Theia, collided with early Earth. The debris from this impact created the moon and may be why the Earth's core is so hot.

History of Earth questions

- ▶ What happened to the Earth to cause the Permian–Triassic extinction (AKA: “The Great Dying”)?

Fossils

- ▶ Animals and plants can be fossilized.
- ▶ They take millions of years to form.
- ▶ They are not bone; they are rocks.
- ▶ Fossils are extremely rare as most remains rot or are eaten, and the conditions to make a fossil are complicated. Fossils are less likely in places like jungles where a massive amount of animals live, so most remains will be devoured.
- ▶ Some organic material such as feathers, skin, fur can be found fossilized, but it is very rare.
- ▶ Fossils can only form where an imprint can be made.
- ▶ Paleontologists dig up and study fossils.

Fossils (CON'T)

- ▶ Fossils must survive millions of years of pressure, uplift, and erosion if they are to come back to the surface.
- ▶ Some types of fossils: unaltered preservation, permineralization/petrification, replacement.
- ▶ Carbonization/coalification fossils can be used as fuel, but is killing our planet.
- ▶ Types of fossil fuels: crude oil, coal, natural gas, and peat.
- ▶ Index fossils are fossils that are found in the rock layers of only one geologic age and is used to establish the age of the rock layers. They are found in rock layers around the world (ex: trilobites).

Fossil questions

- ▶ What could fossils be used for?
- ▶ How are fossils formed?
- ▶ What kinds of plants were fossils?
- ▶ Where's the proof? Show it. (Proof of what?)
- ▶ Can you tell us more about fossils?

Fossil Fuels

- ▶ Fossil fuels include oil and natural gas.
- ▶ The Alberta oil sands are bigger than Britain. On average it produces 3 times more greenhouse pollution than producing conventional oil.
- ▶ Fossil fuels are used in cars as gas and have been for over a century.
- ▶ Fossil fuels are formed over millions of years by intense pressure and heat.
- ▶ Fossil fuels are burned to make energy.
- ▶ Buried combustible geologic deposits of organic materials, formed from decayed plants and animals that have been converted to crude oil, coal, natural gas.
- ▶ Plastic is made from oil.
- ▶ They are the leading cause of Climate Change.

Fossil Fuel questions

- ▶ What does it do? (Elaborate.)
- ▶ What kind of climate change? (Explain.)
- ▶ Could you explain more of this? (What do you want to know?)

Climate Change (evidence/cause)

- ▶ The current global temperature has already risen 0.8 degrees Celsius (global warming).
- ▶ Ice sheets and glaciers are melting.
- ▶ Hotter summers (in some climates). Snow in February (Southern BC).
- ▶ Records for how hot it gets.
- ▶ Sea levels are rising. They will rise 1-4 feet by 2100.
- ▶ Decreased snow cover.
- ▶ Arctic is likely to become ice free in the summer.
- ▶ Hurricanes bigger and stronger.
- ▶ Changes in precipitation.
- ▶ Oceans are warming.

Climate Change (evidence/cause)

CON'T

- ▶ The sun can cause climate change, but it will take 100,000 years for our orbit to change.
- ▶ Greenhouse gases released into the air by humans cause Climate Change. Gases: water vapor, carbon dioxide, methane
- ▶ We have enough fossil fuels in reserves to raise the temperature by 6 degrees if we burn it.
- ▶ The buildup of greenhouse gases is causing Climate Change, which is melting the poles, which raises sea levels.
- ▶ We are at the start of a cooling period (naturally); the Earth should not be warming as it currently is.

Climate Change (evidence/cause) questions

- ▶ How does the sun cause climate change?
- ▶ Can you tell us more about Climate Change? (What do you want to know?)

Climate Change (impact/solutions)

- ▶ There are more droughts and heat waves.
- ▶ If we do not stop Climate Change from going over 1.5 degrees, the Earth will be unrecognizable by 2040.
- ▶ It is destroying homes.
- ▶ Switch to renewable energy.
- ▶ Stop burning fossil fuels.
- ▶ Eat less meat and other animal products. Even switching to white meat will help (bird vs cow/pig).
- ▶ Live in smaller houses.
- ▶ Car pool/public transit.

Climate Change (impact/solutions) questions

- ▶ What can we do to stop it?
- ▶ Why must we stop mining oil? What will happen if we don't stop?
- ▶ When do we have to start making an impact for the world to change? (Explain.)
- ▶ Should we start changing now?
- ▶ What happens if it is a bigger family (re: smaller homes)?
- ▶ How can we stop so fast?