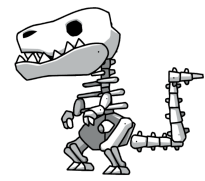


Lesson #5 Geologic Time



Objective: We will improve our scientific literacy to understand how the Earth has changed over geologic time by reading another scientific article. So fun!!!

Do Now: Go to the website and enlarge the Relative Dating image. Record three interesting (not obvious) observations about this image in the space below

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Activity #1: Complete the reading and the questions attached.

Geologic time is the billions of years since the planet Earth began developing. Scientists who study the structure and history of Earth are called **geologists**. They study rocks and **fossils**, or remains of living things that have been preserved in the ground. The rocks and fossils tell the story of Earth from when its crust formed billions of years ago to the present. Geologists have mapped out a time scale that is a “calendar” of Earth’s geologic history.

The scale of geologic time starts 4 billion years ago, when Earth’s crust was formed. Earth itself is slightly older than this, but when it was first formed the planet was in a hot and thick liquid form. As it cooled, the surface of the planet became solid. Geologists have been able to determine that the oldest rocks found so far are about 4 billion years old. They believe that Earth’s crust must also be about the same age.¹

The Geologic Record

The surface of Earth consists of layers of rock formed from pebbles, sand and mud **deposited** by water, wind or glaciers. The oldest layers are lower down and the more recent layers piled up on top. In studying these rocks, geologists found that each separate layer contained different

¹ Why does geologic time start 4 billion years ago, even though the Earth is actually older?

and distinctive² fossils. They also found that the layers were similar all over the world. Geologists then classified and dated each layer of rock and the fossils found in them.

Geologists divide geologic time into a series of eons. Each eon is in turn divided into smaller and smaller units of time. The two oldest eons are part of what is called Precambrian time. The third eon is called the Phanerozoic.

Precambrian Time

Precambrian time covers all of the time from the formation of Earth's crust to the beginning of the Phanerozoic eon, about 542 million years ago. This represents more than 80 percent of all geologic time.

Precambrian time is divided into two eons, the Archaean and the Proterozoic. The Archaean lasted about 1.5 billion years, from about 4 billion years ago to about 2.5 billion years ago. The Proterozoic lasted just under 2 billion years, from about 2.5 billion years ago to about 542 million years ago.³

During the Archaean⁴, the atmosphere was very different from the atmosphere of today. It contained methane, ammonia and other gases that most life on Earth today would not be able to breathe. At the beginning of this period rocks and the continents began to form. The first living organisms — bacteria — appeared.

During the Proterozoic⁵, the continents began to stabilize and build up. The oldest fossils of the geologic record date from this time. Bacteria, fungi, simple plants and the first animals evolved. The atmosphere became enriched with oxygen.

² What does distinctive mean? How are you distinctive?

³ Begin filling out the graphic organizer on the last page of this document for Precambrian Time.

⁴ What would happen if you traveled in a time machine to this eon?

⁵ Why is the Proterozoic so important for humans even though we didn't exist back then?

The Phanerozoic Eon

The Phanerozoic eon stretches from about 542 million years ago to the present. It is divided into three major eras: the Paleozoic, the Mesozoic and the Cenozoic.

The Paleozoic⁶ era lasted about 291 million years, from about 542 million years ago to about 251 million years ago. At the beginning of the Paleozoic the climate was generally mild, and animals and plants lived only in the oceans. By the end of the era about half of all animal groups as well as many plants had evolved.

While plants and animals were developing, the shape of the land was changing as well. The separate continents that existed at the beginning of the Paleozoic era were very different from the continents of today. Most of what is now North America was joined with Greenland in a continent geologists call Laurentia. This continent was situated along the equator.

Toward the end of the Paleozoic era, the great coal deposits of the eastern United States formed. The continents began to move around. By the end of the era, all of the continents had come together to form one giant continent that geologists call Pangaea. As the continents moved and collided⁷, several mountain chains, including the Appalachians and the Urals, were formed during this period as well.

The Mesozoic⁸ era lasted about 185.5 million years, from about 251 million years ago to about 65.5 million years ago. It is sometimes called the Age of Reptiles because reptiles dominated the land. The earliest dinosaurs appeared in the Mesozoic era, but by the end of the era they had disappeared. Many scientists believe that during this era the supercontinent of Pangaea started breaking up into the individual continents that exist today.

⁶ If you wanted to start a Paleozoic Park (like Jurassic Park), would it be more like an aquarium or more like a zoo?

⁷ Do you think the continents moved quickly or slowly? Explain your thinking...

⁸ Why is the Mesozoic era important in modern culture?

The Cenozoic era began about 65.5 million years ago. It continues into the present. If the Mesozoic era was the Age of Reptiles, the Cenozoic era was the Age of Mammals. The early Cenozoic era saw the development and spread of early forms of many animals, including horses, sheep and cattle. Toward the end, the first human ancestors appeared.

ANSWERS TO QUESTIONS #1-8

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	<p style="text-align: center;">Mesozoic</p> <p>Started: Ended: Notes:</p>
	<p style="text-align: center;">Cenozoic</p> <p>Started: Ended: Notes:</p>