

Earth Science

UNDERSTANDING THE VASTNESS OF GEOLOGIC TIME

Earth is old! Our planet began more than 4,560,000,000 years ago. That's 4,560 million years ago (mya), or 4.56 billion years ago (bya). You've learned that Earth, the other planets and their moons, asteroids, comets, and even the Sun formed from a gaseous nebula that pulled together under the force of gravity.

If you could create a time machine and go back to any point in Earth's history, you would observe many differences from the world today. Earth has been changing slowly every day since then, and continues to change, even now. If you could go to the time of the origin of Earth, the surface would be much different—no plants, animals, or even ocean—and the atmosphere would be a poisonous mixture. If you went back 500 million years, there would be no life on continents, only in the ocean.

We have learned what we know about Earth's history through the study of fossils and rocks, combined with radiometric dating methods. We know that much of what happened during the vastness of our planet's existence was never preserved. Many types of organisms lived and died, leaving no trace, and many Earth-shaping events were destroyed by later events.

But even so, we can make a model of the "Geologic Time Scale" that helps you put important parts of Earth's history into an orderly sequence. Just as we divide a calendar into months, weeks, and days, we divide Earth's history into **eons**, **eras**, **periods**, and **epochs**. Many of the names will sound unfamiliar, but they come from roots that are Greek, Latin, or other languages that had significance to the people who named them. (Just as did names like May and October, Thursday and Saturday.)

One kind of model uses paper tape. (This is similar to what we did with the model solar system.) As a group, collect a 6-m piece of tape and a meter stick.

- 1) Use a scale of 1 m = 1,000 million years. (This would mean, e.g., 248 my = 24.8 cm.)
- 2) Indent 5 cm and draw a line to represent "Today."
- 3) Mark off and label lines to represent 1,000 mya, 2,000 mya, 3,000 mya, 4,000 mya, and 5,000 mya.
- 4) Then mark off and label the events listed below and on the other side of this paper. Events are grouped by type of event, so sometimes you may have to go back-and-forth.

Eons:

4,560 mya:	Hadean
3,800 mya:	Archean
2,500 mya:	Proterozoic
540 mya:	Phanerozoic

Eras:

540 mya:	Paleozoic
248 mya:	Mesozoic
65 mya:	Cenozoic

Periods:

540 mya:	Cambrian
490 mya:	Ordovician
443 mya:	Silurian
417 mya:	Devonian
354 mya:	Mississippian (Early Carboniferous)
323 mya:	Pennsylvanian (Late Carboniferous)
<u>290 mya:</u>	<u>Permian</u>
248 mya:	Triassic
206 mya:	Jurassic
<u>144 mya:</u>	<u>Cretaceous</u>
65 mya:	Tertiary (this name is now replaced by Paleogene-Neogene)
1.8mya:	Quaternary

Epochs (used mainly for the Cenozoic):

65.0 mya:	Paleocene
54.8 mya:	Eocene
33.7 mya:	Oligocene
23.8 mya:	Miocene
5.3 mya:	Pliocene
1.8 mya:	Pleistocene
0.01 mya:	Holocene ("Totally Recent," last 10,000 years)

5) Now, place these important events of Earth's history where they belong:

4,200 mya:	oldest known rocks
3,800 mya:	oldest known one-celled organisms (bacteria)
2,000 mya:	first multicellular organisms
540 mya:	first organisms with hard shells
490 mya:	trilobites dominant
450 mya:	first (?) fishes
425 mya:	first (?) land plants
400 mya:	fishes dominant
360 mya:	first (?) insects
325 mya:	amphibian abundant/large coal swamps
300 mya:	first (?) reptiles
<u>248 mya:</u>	<u>EXTINCTION of trilobites and many other marine organisms</u>
225 mya:	dinosaurs dominant/first (?) mammals
150 mya:	first (?) birds (descendants of a type of dinosaur)
140 mya:	first (?) flowering plants
65 mya:	EXTINCTION of dinosaurs, ammonites, and many other organisms <u>(probably due to asteroid collision with Earth)</u>
50 mya:	"Age of Mammals" begins
1.8 mya:	ICE AGE begins
1.0 mya:	Humans develop
0.01 mya:	Last Ice Age ends

If you find other events you want to include, you may do so.