

Geological Time Scale Analogy

Introduction:

Unraveling time and the Earth's biologic history are arguably geology's most important contributions to humanity. Yet it is very difficult for humans to appreciate time beyond that of one or two generations, much less hundreds, thousands, millions and billions of years. Perhaps we can only hope to catch glimpses of our rich geologic heritage, particularly when most of our learning is done in a classroom and not in a field setting. This exercise begins to make time more "three dimensional" and most importantly, help to better appreciation for geologic time and our Earth's history.

Objective:

To better understand the concept of geologic time, produce a time-scale metaphor to share with the class that is true to scale and reflects some of the important events in the history of the Earth (see list on the following page). You will submit: (1) a diagram of the metaphor you created; and (2) your math calculations. Have fun! Be creative! No metaphor is too silly, as long as your math is correct and your choice has meaning to you. No two students can use the same analogy.

Math:

$$\frac{\text{Known age of past event (years before present)}}{\text{Known age of the Earth (years before present)}} = \frac{\text{UNKNOWN Time scale metaphor equivalent}}{\text{Maximum measurement in metaphor}}$$

For example, suppose your metaphor uses distance. Remember, the use of time, volume, or mass in your metaphor would be just dandy. Since we are using a distance metaphor as an example here, a football field with a length of 100 yards will do just fine. To find at what distance along the football field, for example, the "first oxygen" yard mark would be, you would set up the ratio shown below:

$$\frac{\text{Known first oxygen } (2.01 \times 10^9 \text{ years})}{\text{Known age of the Earth } (4.6 \times 10^9 \text{ years ago})} = \frac{\text{UNKNOWN (first oxygen on football field)}}{100 \text{ yards (Football Field Length)}}$$

So taking the math one step further gives you:

$$(2.01 \times 10^9 \text{ years})(100 \text{ yards}) = (X \text{ yards})(4.6 \times 10^9 \text{ years})$$

Solving the ratio (for X) will tell you that the "first oxygen" location on the football field would be 43.7 yards away from the goal line of your choice! Determining the location of the other important dates in the history of the Earth is up to you.

Requirements:

You must include: The Eras, Periods and 2 recent Epochs.

You may include: Some of the important events listed below.

You will create your diagram on one or multiple sheets of A3 paper.

Some Important Dates in the History of the Earth

Years Ago	Event
4,600,000,000	Origin of the Earth
3,900,000,000	Oldest Dated Crustal Rocks
3,800,000,000	Oldest Evidence for Life
2,000,000,000	First Oxygen Atmosphere/Ozone Layer Forms
900,000,000	Oldest Metazoan Fossils
510,000,000	Oldest Fossil Fish
458,000,000	First Land Plants
375,000,000	That important first step: Amphibians Evolve
245,000,000	Huge Mass Extinction at End of Permian Period / Close of the Paleozoic Era
200,000,000	First Mammals
160,000,000	First Birds
145,000,000	Atlantic Ocean first opens
130,000,000	Angiosperms (Flowering Plants) on the Scene
65,000,000	Adaptive Radiation of Mammals Dinosaurs Go Extinct Close of the Mesozoic Era/ Beginning of the Cenozoic Era
3,400,000	New discoveries of Australopithecus afarensis (Lucy) fossils from Ethiopia
2,000,000	Pleistocene Ice Age begins Light from the Andromeda galaxy seen today left Andromeda
600,000	Age of Homo erectus fossils from Ethiopia
125,000	Oldest rocks in the Bahamas
100,000	Homo sapiens appears in the fossil record
15,000	Last ice sheet retreats from northern United States
7,000	Grahams Harbor, San Salvador, Bahamas floods due to rising sea level after ice sheets are reduced to modern day volume
506	Columbus lands in New World
?	You were born