

# GEOLOGIC TIME SCALE ANALOGY

## UW-Geology

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**Goal:** To make a properly scaled analogy of geologic time.

**Procedure:** Working with a partner, you will design an analogy of the geologic time scale. To do this, first select a calibrated thing, object, or unit of time for you to base your analogy on (ie. football field). Then place the properly scaled geologic time scale on your analogy. You will have to establish a scale for your chosen object (ie. The 100 yards of football field is equivalent to 4.6 billion years).

**Example:** The method used to determine an analogy value true-to-scale will be similar for all analogies. Units in the analogy model can be in time, distance, volume, mass, etc. depending upon what type of analogy you choose to work with. The general equation used to generate numbers in your analogy which will be true to scale is:

Known age of past event (years before present)	=	UNKNOWN Time scale analogy equivalent
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Known age of the Earth (years before present)		Maximum measurement in analogy

For example, suppose your analogy uses distance on a football field. Remember, any use of time, volume, or mass in your analogy would be just as dandy. 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:

Known first oxygen ( $2.01 \times 10^9$ years)	=	UNKNOWN (first oxygen on football field)
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Known age of the Earth ( $4.6 \times 10^9$ years)		100 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.

Your model must at least include: (see Plummer p.195 for dates)

- The beginning and end of the Precambrian
  - The Paleozoic, Mesozoic, and Cenozoic Eras
  - The oldest known rock (3700 my)
  - A representation of the human life span (80 years)
  - Formation of Mt Rainier (20 my)
  - Beginning of the Industrial Revolution (200 yrs ago)
  - Oldest known human ("Lucy" 4 my)
  - Where you would find Dinosaurs
  - Where you would find mammals
  - Where life first appeared (in earnest) on Earth
  - At least 5 additional items from the following list: (times are in millions of years)
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|----------------------------------|----|
| • Camel                          | 35 |
| • Grass                          | 55 |
| • Cenozoic Era (begins)          | 65 |
| • Tyrannosaurus                  | 65 |
| • Laramide orogeny (Rocky Mtn's) | 66 |

• Ants	100
• First flowering plants	125
• Archaeopteryx	140
• Stegosaurus	160
• First mammal	240
• Pangaea forms	260
• Earthworms	300
• Cockroaches	330
• Ferns	370
• Sharks	400
• Acadian orogeny (Appalachian Mtn's)	410
• Spiders	450
• First vertebrate	515
• Trilobites	520
• Jellyfish	545
• Paleozoic era (begins)	545
• Green algae	1000
• Bacteria	3000
• Precambrian era (begins)	4600

### **Time Scale Analogy Rubric:**

This assignment consists of 2 parts, the physical model and the presentation to the class. I (and Ms. Fawcett) will use the following rubric to score your analogy and presentation. Total possible points are 24 (I will double your score from the rubric).

#### Accuracy:

- 4: Perfect, no mistakes
- 3: Mostly right, very few mistakes
- 2: Mostly incorrect, abundant mistakes
- 1: All wrong.

#### Creativity and Presentation:

- 4: Extremely well crafted, easy to read and understand, items not too cramped, original ideas used for model, presentation clear and equitable between partners.
- 3: Well designed, somewhat harder to read and understand, time divisions somewhat cramped, presentation good, but not as clear and non-equitable between partners.
- 2: Extremely hard to read, little creative effort, minimal time exerted, presentation hard to understand.
- 1: Model not done or partially complete.

#### Appropriate model of Geologic Time?

- 4: Model provides a clear understanding of the enormity of geologic time, scale is easy to understand, an extraordinary "wow" factor when the human life span is scaled on the model.
- 3: Model presents a decent understanding of geologic time, somewhat harder to fully comprehend, "wow" factor decent, but not fantastic.
- 2: Model is difficult to grasp, beginning and end points ambiguous, scale lends to confusion, minimal "wow" factor.
- 1: Model impossible to negotiate, no "wow" factor.