



Educator information for Activity 4: When did Megalodon live?

Grade Level: 3-12

LESSON OBJECTIVES

- This lesson allows students to relate uncommonly large concepts of time with a common football field.
- Students will construct their own timeline using a football field. They will place icons/symbols on their football field that correspond to major evolutionary events.
- In the end, students will be able to understand when in geological time Megalodon's closer relatives including early fish and sharks first occurred, when Megalodon occurred, and how these events compare to other major evolutionary events including the first appearance of our human species, *homo sapiens*.

STEM Subjects: earth science, geology, life sciences, mathematics

STEM Concepts & Skills: geological time scale, mathematic conversions and/or proportions, relative timing of major evolutionary events.

- **Football field template**
- **List of major evolutionary events**
- **Symbols/icons**

Vocabulary:

avian dinosaurs – “bird-like” dinosaurs; living and fossil birds are considered to be avian dinosaurs.

Cenozoic – a geological era that represents the time period from 65 million years ago to the present.

evolution – change over time; in biology, it refers to the change of traits or frequency of traits in organisms over time.

extinction – the termination of the existence of a species.

fossilization – the process of turning a formerly living organism into stone, resulting in a fossil

geological – a chronological arrangement of geological events representing major eras of time scale biological and geological activity. It is divided into major eras, periods, and epochs and accounts for 4.6 billion years of time.

Mesozoic – a geological era that represents the time period from 248 to 65 million years ago.

Miocene – a geological epoch that represents the time period from 24.5 to 5 million years ago.

paleontologist – a scientist who studies ancient organisms and their environments.

Paleontology – the scientific study of ancient life "paleo"=ancient life, "ology" = the study of.

Paleozoic – a geological era that represents the time period from 570 to 248 million years ago.

Pliocene – a geological epoch that represents the time period from 5-1.8 million years ago.



LESSON SCRIPT

TEACHER: The earth is very old – about 4.6 billion years old. How do we wrap our brains around this enormous number?

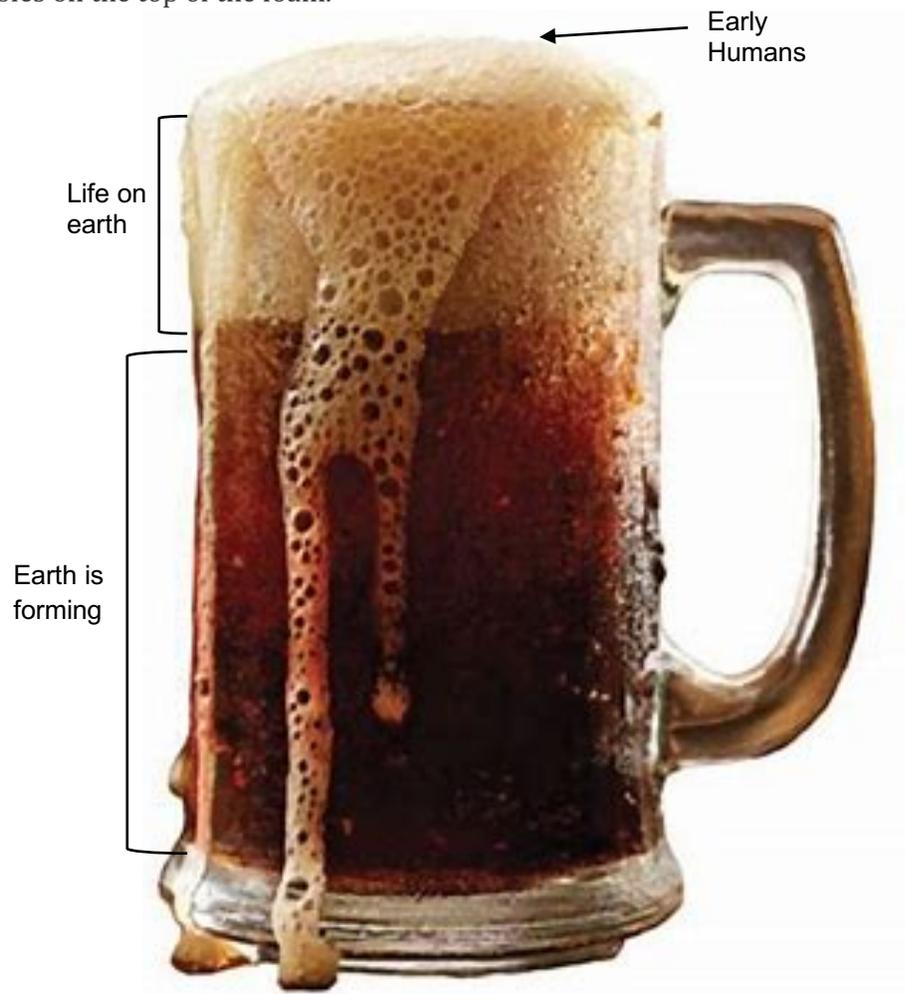
TEACHER: The Geologic time scale represents the best method for placing the planet's historical events in perspective.

TEACHER: To illustrate, we will (pretend to) pour ourselves a big mug of root beer. The mug of root beer represents earth.

TEACHER: If you study the mug of root beer you will notice that most of the glass contains the dark liquid, and there is only a little foam on the top, right?

TEACHER: The dark liquid represents the earliest part of earth's history - the Precambrian time.

TEACHER: The foam on the top represents when life formed on earth. Humans would be the tiny bubbles on the top of the foam.





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TEACHER: Megalodon occupied the world's ancient oceans approximately 17-2 million years ago. Megalodon did not overlap with modern humans whose first occurrence was around 100,000 years ago.

TEACHER: Megalodon's relatives include ancient fish and sharks whose first occurrences are estimated at 510 million years ago and 435 million years ago, respectively. As you can see, Megalodon lived much later than some of its early relatives but is no longer found in today's oceans.

TEACHER: Additionally, Megalodon did not live concurrently with **non-avian dinosaurs** (e.g., Tyrannosaurus Rex).

TEACHER: Although it is fun to imagine a world in which Megalodon, dinosaurs, and humans coexisted, it is not scientifically accurate.

TEACHER: Students, you have two activity sheets. One has a list of "major evolutionary events" and the other is a "football field" timeline.

TEACHER: We are going to say that our football field equals 570 million years (the Paleozoic through to the Recent), then 1 yard = 5.7 million years

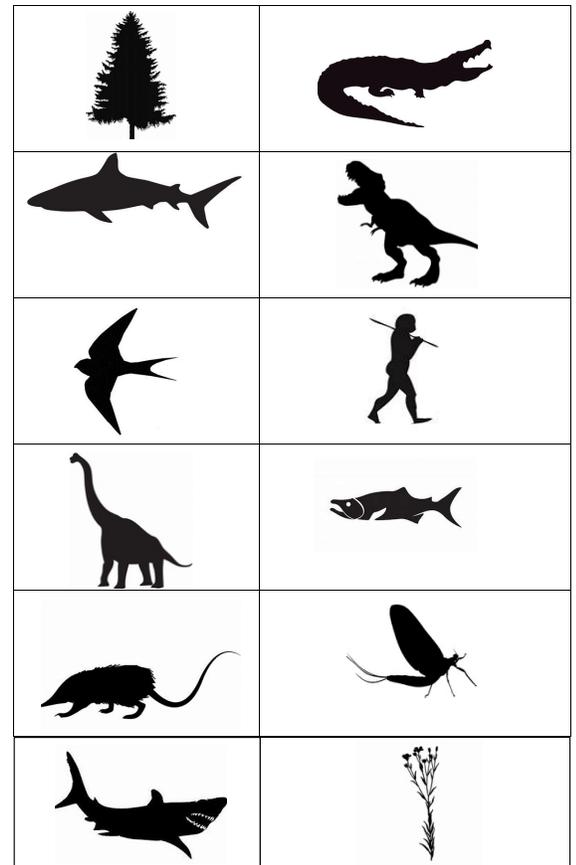
TEACHER: Using the pictures (on Activity Sheet 1) locate each one on the football field timeline (Activity Sheet 2).



Activity Sheet 1

- The age of the earth (4.6 billion years old)
- First plants - algae (3.6 billion years ago)
- First multi-cellular organisms (1.5 billion years ago)
- **First fish (510 million years ago)**
- **First sharks (435 million years ago)**
- **First land plants (430 million years ago)**
- **First insects (385 million years ago)**
- **First reptiles (330 million years ago)**
- **First mammals (240 million years ago)**
- **First non-avian dinosaurs (225 million years ago)**
- **First birds (220 million years ago)**
- **First flowering plants (115 million years ago)**
- **Extinction of non-avian dinosaurs (65 million years ago)**
- **The first evidence of Megalodon (17 million years ago)**
- The extinction of Megalodon (2 million years ago)
- **First modern humans - *Homo sapiens* (100,000 years ago)**

- > Cut out each picture and place it on the timeline. ✂
- > Next, write the event and the date next to the picture on the timeline. (an example is on page 5).





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TEACHER: Here is an example of what your football field will look like. (Placement is approximate to help the children visualize the timeline).



First modern humans 100,000 years ago

57 million years ago	 Extinction of non-avian dinosaurs 65 million  Megalodon 17 million years
114 million years ago	 First flowering plants 115 million years ago
171 million years ago	
228 million years ago	 First non-avian dinosaurs 225 million years  First birds 220 million years
285 million years ago	 First mammals 240 million years ago
342 million years ago	 First reptiles 330 million years ago
399 million years ago	 First insects 385 million years ago
456 million years ago	 First sharks 435 million years ago  First land plants 430million
513 million years ago	 First fish 510 million years ago
570 million years ago	

Football Field Timeline