



Fields of Time

Adapted from the *Striding Through the Millennia* Activity, The Big Beast Book, p.13-17.

Grade Level: K-8

Preparation Time: 5 minutes or less

Activity Duration: 30 minutes-1 hour

Concepts Addressed

- Relative time is the order of major events that have occurred during Earth's natural history.
- Absolute geologic time assigns numbers to major events that have occurred during Earth's natural history.
- The Earth's history has spanned a *very* long time.
- Non-avian dinosaurs lived during the Mesozoic Era.
- The Mesozoic Era consists of three time periods--the Triassic came first, then the Jurassic and finally the Cretaceous.
- The Mesozoic Era began around 240 million years ago and ended around 65 million years ago.

Objectives

The student will:

- Literally walk through a model of deep time.
- Identify the relative times of certain events in Earth's history.

Materials Included

- Labeled flags
- Fields of Time Notes (laminated)

Materials Not Included

- Football field or very large open area (playground, or a city block of sidewalk)—make sure there is grass or a soft surface in which to stake the flags

Background

Geologists and paleontologists divide the history of the earth into four eras—the Cenozoic, the Mesozoic, the Paleozoic and the Precambrian. The Precambrian era stretches from when the earth formed, 4.6 billion years ago, to 600 million years ago. The first record of the existence of life on earth comes from fossilized microorganisms found in rocks from about 3.5 billion years

ago. The Paleozoic era (600 to 225 million years ago) marked the first appearance of complex animals and plants. The Mesozoic era (225 to 64 million years ago) is when the non-avian dinosaurs (this terminology is explained in the *Dinosaur* section) flourished. And finally, the Cenozoic era (64 million years ago to present) saw the appearance of animals and plants similar to those you see on Earth today.

Each of these eras is in turn divided into periods, which are divided into epochs, which are divided into ages. All the terms get confusing really fast, but in order to understand when in time non-avian dinosaurs lived, we will need some guide posts. We will focus on nine major events in the history of time in this activity.

Procedure

1. Lead a discussion about the concept of deep time with your students.
2. Gather the class in a location with lots of open space (a field or football field).
3. Choose a starting point at one end of the open area.
4. Have one student place the first flag in the ground.
5. Use the "Time Notes" sheet to explain that this flag represents the present time and that you will be "stepping back in time" through this activity. Along the way, you will see when major events (such as when the non-avian dinosaurs lived). Each step will take you back a million years in time (although we will not focus on absolute times for this activity).
6. Before you start walking back in time, work with your group to determine what size steps you will take. This will help keep your group together as you move back through time.
7. Return to the first flag you placed. Remind everyone that this flag represents the present. You will now take two steps back in time. Take the steps together as a group. At this point, place the second flag and use the "Time Notes" to discuss what it represents.
8. Continue in this manner, using the "Time Notes" to help you, to place at least 7 of the nine flags.
9. The eighth and ninth flags should be located 3,500 and 4,600 steps from the first, respectively. That is more than 2 miles. If this is feasible by walking or driving, it would certainly provide a hard to forget visual for your class about the scope of deep time. If not, you may try to determine a landmark about 2 miles away that you can point out to the class.
10. When you are done with this activity, lead a follow-up discussion about relative time.

Fields of Time Notes

1. First flag represents the present, or beginning of the timeline. From this point on, each step you take will represent a million years in the history of the Earth.
2. Take 2 steps from the first flag. This is about the time that the first humans appeared. From here back to the first flag represents the total amount of time that humans have been on Earth.
3. Take 21 steps from flag 2 and place flag three in the ground. You are now in the middle of the Age of Mammals—this is a time when large and strange looking mammals dominated the landscape. No humans here.
4. Take 42 steps from flag 3 and place flag four in the ground. You are now 65 steps from the beginning of your timeline, or at 65 million years ago. This is the very end of the Cretaceous period and the time when the last of the non-avian dinosaurs became extinct. This is a time for dinosaurs like *T.rex* and *Triceratops*. There were some small mammals living at this time but no large ones like we saw at flag 3. Birds (avian dinosaurs) also coexisted with the non-avian dinosaurs and were able to survive the extinction and persist to the present.
5. Take 75 steps from flag 4 and place flag 5 in the ground. You have just passed through the entire Cretaceous period and are standing in the Jurassic period. We are still in the midst of dinosaurs. The Jurassic was a time when huge dinosaurs such as the long-necked *Apatosaurus* and the meat-eating *Allosaurus* flourished. It was around this time that birds (avian dinosaurs) first evolved from non-avian dinosaurs.
6. Take another 95 steps from flag 5 and place flag 6 in the ground. This brings you to the beginning of the Triassic period—245 steps or about 245 million years ago. Dinosaurs first appeared during the Triassic period, evolving from more primitive reptiles. *Coelophysis* is an example of an early dinosaur, which were typically small and walked on two legs. From here, turn around and look back at flag 3, the end of the Cretaceous period. Together, the Triassic, Jurassic and Cretaceous periods make up the Mesozoic Era. This is the length of time that non-avian dinosaurs existed on Earth. Compare that to the length of time that humans have existed. Which animals would you consider more successful?
7. Get ready to walk! Take another 355 steps from flag 6 and place flag 7 in the ground. You are now at about 600 million years ago—the beginning of the Paleozoic Era when the diversity of life on earth exploded. Up until this time in history, the main life form had been microorganisms, but at this time we start to see all kinds of strange looking animals in the seas.
8. At this point, you may want to stop placing flags. The next major milestone in Earth's history is the first evidence of life—fossils of microorganisms found in rocks dating from about 3.5

billion years ago. To place flag number 8, you would have to take about 2,900 steps from flag 7—a total of 3,500 steps from the beginning of your timeline!

9. To complete your timeline by adding the final flag representing the beginning of Earth history 4.6 billion years ago, you would have to take a total of 4,600 steps from the beginning of the timeline—over two miles. You may not be up for the hike, but it goes to show just how long our Earth's history is.