

# Explore: Modeling the Earth's History

## PROCESS AND PROCEDURES

Evidence shows us that the Earth was formed approximately 4.6 billion years ago, and that life began approximately 3.5 billion years ago. Using this year's calendar to represent a scale model of Earth's history (4.6 billion years worth), you will color in certain periods of time to represent the major eras and write in important events on the appropriate dates. The calendar starts at 12:00 midnight, the morning of January 1<sup>st</sup>. This represents the formation of the Earth 4.6 billion years ago. The calendar ends at 12:00 midnight, the night of December 31<sup>st</sup>. This represents "today".

### How long is a day? An hour? A minute?

What does a day on this geologic time scale calendar represent? 1000 years? 1,000,000 years? More? That's the first step! Calculate what a day represents on your calendar by dividing 4.6 billion years by 365 days. That will give you the years/day on your calendar. Divide that number by 24 to find the years represented by a single hour. Divide that number by 60 to figure out what a minute on your calendar represents. Enter this table in your notebook and fill in the values you've calculated..

Geologic Time Scale	
Calendar Time	Planet Earth Time
1 day	
1 hour	
1 minute	

### A very important date!

Enter the following table of important events in your notebook, and fill in the missing dates. **Remember:** the dates listed are estimated "**years ago**", so the dates you calculate will be **counting backward from December 31<sup>st</sup>**. For "humans appear", put in a time as well as a date in the table. *Example:* The Paleozoic era began 540 million years ago. Divide 540 million by 12,602,739.7 (how many years each day on the calendar represents) to find out how many days back from Dec 31<sup>st</sup> to count. After you fill in the table, enter the abbreviations on the appropriate days on your calendar page.

Event	Abbr.	Estimated years ago	Calendar date
Earliest life	PC	3.5 billion	
Paleozoic era begins	PZ	540 million	
First land plants	LP	430 million	
First seed plants	SP	350 million	
First reptiles	R	300 million	
Mesozoic era begins	MZ	245 million	

Event	Abbr.	Estimated years ago	Calendar date
First dinosaurs	D	225 million	
First flowering plants	FP	190 million	
First birds	B	150 million	
Cenozoic era begins	CZ	66 million	
Primates appear	P	30 million	
Humans appear	H	200,000	

## Colorful Eras

Using colored pencils, lightly color in all the days on your calendar page for each era according to the following chart:

Geologic Era	Color
Precambrian	Red
Paleozoic	Orange
Mesozoic	Green
Cenozoic	Blue

## We're doomed! We're all going to die!

A mass extinction is when a large percentage of the species all become extinct at the same time. There are many theories as to what caused the mass extinctions in the past: climate changes, asteroids colliding with the Earth, tectonic/volcanic upheavals, combinations of these factors, etc. Two notable mass extinctions occurred at the ends of the Paleozoic and Mesozoic eras. The Paleozoic mass extinction is the largest mass extinction found in fossil records with over 90% of marine species and 70% of land species all disappearing at that time. The mass extinction at the end of the Mesozoic is notable because around two-thirds of the species then in existence became extinct. This was especially notable as it signaled the end of the reign of the dinosaurs. Mark a small skull & crossbones on the “last day” of the Paleozoic and Mesozoic eras to note the mass extinctions that occurred at those times.

## ANALYSIS

**Write the following questions in your notebook and answer them using complete sentences.**

1. Which era was the longest era? Which was the shortest?
2. What event(s) marked the ends of the Mesozoic and Paleozoic eras?
3. Dinosaurs ruled the Earth for around 160 million years. What percentage of that time have modern humans been on the Earth?
4. What major development(s) happened in the plant kingdom during the Paleozoic Era?
5. What major development(s) happened in the animal kingdom during the Paleozoic Era?
6. What major development(s) happened in the plant kingdom during the Mesozoic Era?
7. What major development(s) happened in the animal kingdom during the Mesozoic Era?