

Earth Time Line

Background: Scientists have developed a time scale for earth history called the Geologic Time Scale. This scale outlines the major events in Earth's history. Scientists use the principle of superposition, radiometric dating, and the fossil record to create the scale.

Goal:

Construct an Earth time line that shows major time divisions and major earth events using the following materials:

- Paper tape
- Scissors
- Metric ruler
- Table of Major Earth Events (provided on back)

Use the following scale for your model: 1 millimeter = 1 million years before present. (1mm = 1mybp).

Step 1: Use the above scale for your model and the age of Earth (4,600 mybp) to determine how long your paper tape needs to be. ****This step has already been completed.**

Length of paper tape in millimeters = 4,600 millimeters

Length of paper tape in centimeters = 460 centimeters

**Length of paper tape in meters = 4.6 meters

Step 2: Measure and cut the paper tape. Decide which end of the paper tape is today (0 mybp) and which end is the beginning of Earth (4,600 mybp). Write beginning of the Earth on one end of the tape and today on the opposite end of the tape. ****The paper cutting has already been completed.**

Step 3: Use the information in the table below to show the four major time eras on your time line. Always measure from the "today" end of the tape. Color and label each era.

Era	Time Range in mybp	Color
Cenozoic	0-66	yellow
Mesozoic	66-251	green
Paleozoic	251-542	blue
Precambrian	542-4,600	red

Step 4: Add the following key events information given on the Geologic Time Scale to your time line in the correct location. You may need to write very small and/or use arrows to label some key events.

- Hadean Eon
- Archean Eon
- Proterozoic Eon
- Phanerozoic Eon
- Tertiary Period
- Quaternary Period
- Add key events from the table of major events (provided on the back)

Step 5: Label the following key events from the timeline provided in your packet.

- humans first appeared
- flowering plants appear
- birds appear
- Late Triassic mass extinction (dinosaurs die off)
- Dinosaurs appear
- Bony fish appear
- First single celled bacteria
- Formation of the Moon
- Formation of the Earth

Eon	Era	Period	Epoch	Key events	
Phanerozoic	Cenozoic	Quaternary 2.6 my	Holocene	<ul style="list-style-type: none"> - <i>Homo sapiens</i> appears ~200,000 yrs - First species of <i>Homo</i> appear ~2.5 mybp - Beginning of Ice Ages ~2.6 mybp - First species of hominids appear ~6 mybp 	
			Pleistocene		
		Neogene 23 my	Pliocene		
			Miocene		
		Paleogene 65.5 million	Oligocene		
			Eocene		
	Paleocene				
	Mesozoic	Cretaceous 145.5 my		<ul style="list-style-type: none"> - <i>Late Cretaceous Mass Extinction</i> - Chicxulub crater forms ~65.5 mybp 	
				<ul style="list-style-type: none"> - Flowering plants appear ~142 mybp - Birds appear ~150 mybp 	
		Jurassic 200 my		<ul style="list-style-type: none"> - <i>Late Triassic Mass Extinction</i> - Mammals appear ~210 mybp - Dinosaurs appear ~225 mybp 	
		Triassic 251 million		<ul style="list-style-type: none"> - <i>Late Permian Mass Extinction</i> 	
		Permian 299 my			
		Pennsylvanian 318 my		<ul style="list-style-type: none"> - Reptiles appear ~305 mybp 	
		Paleozoic	Mississippian 359 my		
			Devonian 416 my		<ul style="list-style-type: none"> - <i>Late Devonian Mass Extinction</i> - Amphibians appear ~365 mybp
			Silurian 444 my		<ul style="list-style-type: none"> - Land plants appear ~425 mybp - <i>Late Ordovician Mass Extinction</i> - Insects appear ~450 mybp
	Ordovician 488 my			<ul style="list-style-type: none"> - Bony fish appear ~485 mybp 	
	Proterozoic	"Precambrian"	Cambrian 542 million	<ul style="list-style-type: none"> - Beginning of Cambrian explosion ~530 mybp - First Multicellular Organisms ~630 mybp 	
Archean	"Precambrian"	2.5 billion	<ul style="list-style-type: none"> - Oxygen begins to accumulate in atmosphere ~2,000 mybp 		
		4.6 billion	<ul style="list-style-type: none"> - First one-celled organisms ~3,500 mybp - Earliest evidence of oceans ~3,800 mybp - Oldest known rocks ~4,000 mybp - Moon forms ~4,500 mybp - Formation of Earth ~4,600 mybp 		

Highlights of the history of the Earth. Time is not drawn to scale.

Earth Time Line Analysis

Refer to the Earth Time Line you constructed to answer the following questions.

1. Arrange the four eras in order from longest to shortest duration: Cenozoic, Mesozoic, Precambrian, and Paleozoic.
2. During which era did the first life forms exist and what were they like?
3. How many millions of years went by after Earth formed before the first life forms appeared?
4. Were mammals and dinosaurs ever on Earth at the same time? If so, when?
5. What is a "mass extinction"?
6. How many mass extinctions have there been and what caused them?
7. What relationship do you see between mass extinction and the start of the Mesozoic and Cenozoic eras?
8. Did the mass extinction 66 mybp kill off **all** of the bacteria, fish, amphibians, birds, mammals, and flowering plants? How do you know?
9. The Pleistocene Ice Age ended about 10,000 years ago. Are humans able to survive an ice age? How do you know?
10. How long have humans been on Earth relative to all of Earth time?