**Name(s):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***Geologic Time Scale Activity***

Earth’s history can be divided into geologic time segments called eras, periods, and epochs. These time periods are useful for placing events such as the disappearance of the dinosaurs and the appearance of humans in perspective relative to the history of life on Earth. The time segments are not as equal as they sound, however. In earlier eras, life processes on Earth appear to have been developing quite slowly, whereas later eras saw enormous changes over relatively short segments of geologic time. In this activity, you will compare and contrast various segments of Earth’s history by constructing a geologic time line.

**Materials**

* 1 meter (100cm) of blank paper
* Ruler
* Pencil
* Colored Pencils/Markers/Crayons

**Procedure**

1. You will be taping the paper edge to edge (short edge) to create a banner like structure. On that, you’ll be creating a traditional timeline for geologic time. Don’t tape all of the paper together until you know exactly how much you need.
2. Distance for this activity will represent time. To convert from time to distance, use the following formulas. Note that the billions of years formula is different that millions of years:

***\*For calculating events from millions of years ago:***

*Age of event* ÷  *6 m.y./cm*

1. Calculate the distances in (cm) for each of the major Eras of geologic time in TABLE 1. You’ll be excluding the Precambrian Era just to conserve paper. Record the corresponding distances in the column titled “Distance from Beginning of Time (cm)”.
2. Starting on the left end of your paper, write the word “TODAY”. Use your distance conversions from TABLE 1 to measure out the distances for each major era. **Note: The distances you calculated are all starting from the edge (TODAY end) of the paper.**
3. Make sure you clearly label each Era somewhat big since these are the major time frames.
4. Once you’ve measured the Cenozoic, Mesozoic, and Paleozoic Eras, write “Precambrian” just beyond the Paleozoic Line with an arrow pointing toward Earth’s Formation. Since we are excluding the Precambrian to conserve paper, this will at least account for the Precambrian.
5. Next, you will use TABLE 2 to separate each Era, excluding the Precambrian, into its component periods and epochs. The time frame for each period/epoch is given. You must use the same calculation methods to determine how far in centimeters they should extend. Record your conversions in TABLE 2 under the column “Distance from Previous Period/Epoch (cm)”. ***Note: These measurements will be from the previous period/epoch line, not from the very edge like the Eras were.***
6. Label each period and epoch with the appropriate name leaving space for more information. You can write those names on the top or side of each period/epoch.
7. Once you have your periods/epochs labeled, use the information in the last column of TABLE 2 to mark the significant events in the appropriate area. You may use small illustrations to mark these events.

**TABLE 1**

|  |  |  |
| --- | --- | --- |
| **Major Geologic Era** | **When Time Division Began** | **Distance from “Beginning of Time” (cm)** |
| *Precambrian Era* | *4.6 billion years ago* | *(You’ll be leaving this out)* |
| *Paleozoic Era* | *540 million years ago* |  |
| *Mesozoic Era* | *248 million years ago* |  |
| *Cenozoic Era* | *65 million years ago* |  |

**TABLE 2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Period/Epoch** | **Time Frame (millions of years ago)** | **Length of Period/Epoch (subtract time frame)** | **Distance from Previous Period/Epoch (cm)** | **Significant Event(s)** |
| Cambrian Period | 540-500 |  |  | Earliest primitive fish |
| Ordovician Period | 500-438 |  |  | Primitive plants; North America under shallow sea |
| Silurian Period | 438-408 |  |  | First jawed fish; centipedes, millipedes |
| Devonian Period | 408-360 |  |  | “Age of Fishes” fish and land plants abundant and diverse; first amphibians; sharks, bony fish |
| Carboniferous Period | 360-280 |  |  | First winged insects, first reptiles, cockroaches |
| Permian Period | 280-248 |  |  | “Age of Amphibians” amphibians and reptiles dominant; continents merge into super-continent of Pangaea; 248 mya—largest mass extinction—50% all animals, 95% all marine species, many trees—due to glaciation or volcanism |
| Triassic Period | 248-208 |  |  | First dinosaurs and mammals, true flies first appear; breakup of Pangaea |
| Jurassic Period | 208-146 |  |  | First birds (Archaeopteryx), first flowering plants; dinosaurs dominant |
| Cretaceous Period | 146-65 |  |  | Feathered dinosaurs, earliest known butterflies, snakes; high volcanic activity  65 mya—large extinction—dinosaurs, 50% marine invertebrates—due to asteroid impact or volcanism |
| Paleocene Epoch | 65-54 |  |  | First hooved mammals |
| Eocene Epoch | 54-38 |  |  | First whales, rodents appear |
| Oligocene Epoch | 38-24 |  |  | Early formation of European Alps |
| Miocene Epoch | 24-5 |  |  | First dogs and bears |
| Pliocene Epoch | 5-1.8 |  |  | First hominoids (apes) |
| Pleistocene Epoch | 1.8-0.008 |  |  | Modern humans, mammoths, saber-toothed cats;  Mass extinction (10,000 years ago) large animals and birds caused by the end of the last Ice Age |
| Holocene Epoch | 0.008-Present |  |  | Sea levels rise as climate warmed; first civilizations |

**Analysis Questions (this side and the flip-side):**

1. When did the Dinosaurs become extinct? How far (Distance and Time) on the paper is this event from the present day?

2. Which life form appeared first? During which Era and Period?

3. Geologic time is divided by specific periods and epochs based on what events?

4. Find two pieces of evidence that supports the following statement: “most life-forms that existed on the Earth have become extinct”.

5. What is the longest section of the Earth History? (which Era was excluded?)

6. Which segment of Earth History has the least amount of fossil record? Why? *(be careful here!)*

7. Why do you believe scientists use scale models such as this one?

8. Looking back at your Geologic Time Scale, is there anything that you didn’t know before doing this activity or anything that surprises you? If so, what?