## Lesson Plan: Understanding Geologic Time

**Standards/Benchmarks**

4th Grade- Science Standard 3, A 4.3.1, ST 4.3.1c

4th Math Standards [MA4.MD.1.1](http://www.natronaschools.org/ec/ajax/benchmarks/MA4.MD.1.1) [MA4.MD.1.2](http://www.natronaschools.org/ec/ajax/benchmarks/+MA4.MD.1.2)

7th Grade-Science Standard 1 ET 8.1.9, 8.1.8, ST 8.1.9, R 8.1.8 & .9

**Essential Math Question:** This skill will be assessed by 7th grade PAWS

**Objectives:** Students will create a timeline of the Earth’s 4.5 billion year history by constructing a timeline using butcher paper (or adding tape) and a meter stick. By creating a visual representation, students will comprehend geologic time and when species were introduced to the Earth. In addition, students will illustrate when certain fossil species and humans existed throughout time. Students will label their representation and create a mnemonic of the geological time. For example: Periods: *Cambrian, Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian, Permian* could be: *Come on Spot, Devour My Pepperoni Pizza* ***or*** *Can Olive See Down My Pants Pocket*

**Materials:** butcher paper or adding machine rolls, scissors, meter sticks, markers, research materials

**Prior Learning**- Instruct on:

* Millimeters are on a meter stick and using measurement tools.
* How many million are in a billion?
* Geologic, eras, periods and epochs. (See attached geologic timeline.)

**Procedure:** Using long lengths of paper and meter sticks, students will make a timeline of the earth’s history, 4.5 billion years. Students will mark each meter and answer the question, “if each millimeter mark represents a million years how long will your paper be?” (Answer: 4.5 meters long)

Or start with the oldest rock at 3.3 billion years ago, thus the scale will be one meter = 3 billion years old.

Then students will write in the geologic eras, periods and epochs. Students will research when the corresponding fossils and dinosaurs were present in which period and draw those in the correct location on their timeline. Finally, students will draw humans when they made their first appearance and draw themselves in at the very end. In addition, students will create fun mnemonics to remember geologic time and label their timeline with those.

**Vocabulary:**

* eon = The largest unit of time.
* era = A unit of time shorter than an eon but longer than a period.
* period = A unit of time shorter than an era but longer than epoch.
* epoch = A unit of time shorter than a period but longer than an age.
* Archean = “Ancient” eon from 4,500 Mya – 2,500 Ma.
* Proterozoic = “Early life” eon from 2,500 Ma – 540 Ma.
* Paleozoic = “Ancient life” eon from 540 Mya – 248 Ma.
* Mesozoic = “Middle life” eon from 248 Mya – 65 Ma.
* Cenozoic = “Recent life” eon from 65 Mya to Present.
* Holocene = “All recent” epoch from 10 Ka to Present
* Ma = Mega annum, i.e. million years ago before present.
* Ka = Thousand years ago before present.

**Evaluation**: Check timeline measurements and test on vocabulary terms.

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| ***Phanerozoic EON  (544 mya to present)***  *"The age of visible life"* | ***ERAs*** | ***Periods*** | | ***EPOCH*** |
| [***Cenozoic Era***](http://www.fossilmuseum.net/Paleobiology/Cenozoic_Paleobiology.htm) ***(65 mya to today)*** | [***Quaternary***](http://www.fossilmuseum.net/Paleobiology/Cenozoic_Paleobiology.htm#QuaternaryPeriod) ***(1.8 mya to today)*** | | ***Holocene (11,000 years to today)*** |
| ***Pleistocene (1.8 mya to 11,000 yrs)*** |
| [***Tertiary***](http://www.fossilmuseum.net/Paleobiology/Cenozoic_Paleobiology.htm#TertiaryPeriod) ***(65 to 1.8 mya)*** | | ***Pliocene (5 to 1.8 mya)*** |
| ***Miocene (23 to 5 mya)*** |
| ***Oligocene (38 to 23 mya)*** |
| ***Eocene (54 to 37 mya)*** |
| ***Paleocene (65 to 54 mya)*** |
| [***Mesozoic Era***](http://www.fossilmuseum.net/Paleobiology/Mesozoic_Paleobiology.htm) ***(245 to 65 mya)*** | [***Cretaceous***](http://www.fossilmuseum.net/Paleobiology/Mesozoic_Paleobiology.htm#CretaceousPeriod) ***(146 to 65 mya)*** | | *Divided as:*  *Upper;*  *Middle;*  *Lower* |
| [***Jurassic***](http://www.fossilmuseum.net/Paleobiology/Mesozoic_Paleobiology.htm#JurassicPeriod) ***(208 to 146 mya)*** | |
| [***Triassic***](http://www.fossilmuseum.net/Paleobiology/Mesozoic_Paleobiology.htm#TriassicPeriod) ***(245 to 208 mya)*** | |
| [***Paleozoic Era***](http://www.fossilmuseum.net/Paleobiology/Paleozoic_paleobiology.htm)  ***(544 to 245 mya)*** | [***Permian***](http://www.fossilmuseum.net/Paleobiology/Paleozoic_paleobiology.htm#PermianPeriod) ***(286 to 245 mya)*** | |
| [***Carboniferous***](http://www.fossilmuseum.net/Paleobiology/Paleozoic_paleobiology.htm#carboniferous) ***(360 to 286 mya)*** | ***Pennsylvanian (325 to 286 mya)*** |
| ***Mississippian (360 to 325 mya)*** |
| [***Devonian***](http://www.fossilmuseum.net/Paleobiology/Paleozoic_paleobiology.htm#Devonian) ***(410 to 360 mya)*** | |
| [***Silurian***](http://www.fossilmuseum.net/Paleobiology/Paleozoic_paleobiology.htm#Silurian) ***(440 to 410 mya)*** | |
| [***Ordovician***](http://www.fossilmuseum.net/Paleobiology/Paleozoic_paleobiology.htm#Ordovician) ***(500 to 440 mya)*** | |
| [***Cambrian***](http://www.fossilmuseum.net/Paleobiology/Paleozoic_paleobiology.htm#Cambrian) ***(544 to 500 mya)*** | ***Tommotian (530 to 527 mya)*** |
| [***Precambrian Time***](http://www.fossilmuseum.net/Paleobiology/Preambrian_Paleobiology.htm) *(4,500 to 544 mya)*  *"deep time on earth"* | [***Proterozoic Era***](http://www.fossilmuseum.net/Paleobiology/Preambrian_Paleobiology.htm)  ***(2500 to 544 mya)*** | ***Vendian (650 to 544 mya) or Ediacaran*** | | *No Epochs* |
| ***Neoproterozoic (900 to 544 mya) - Late*** | | |
| ***Mesoproterozoic (1600 to 900 mya) - Middle*** | | |
| ***Paleoproterozoic (2500 to 1600 mya) - Early*** | | |
| [***Archaean***](http://www.fossilmuseum.net/Paleobiology/Preambrian_Paleobiology.htm)  ***(3800 to 2500 mya)*** | | | |
| [***Hadean***](http://www.fossilmuseum.net/Paleobiology/Preambrian_Paleobiology.htm)  ***(4500 to 3800 mya)*** | | | |
| ***Dawn of Time (13,700 mya)*** | [***The Big Bang***](http://www.fossilmuseum.net/paleo/paleoposts/bigbang/bigbang.htm) ***(13,700 mya)*** | | | |