

Lesson/Unit Title Lesson _____ Unit Plan _____	Unit: Diversity of Life Lesson: Geologic Time Scale Submitted By: Jennifer Reis
Grade Level	7 th grade
Content Area(s)	Life science, earth science, geology, social studies
Time Allotment	Two weeks
Academic Standards	PA State Standards <ul style="list-style-type: none"> • Science & Technology <ul style="list-style-type: none"> ○ 3.1.7.B.C.D.E, 3.2.7.A.B, 3.3.7.D, 3.5.7.A, 3.7.7.B.C, 3.8.7.A.C • Environment & Ecology <ul style="list-style-type: none"> ○ 4.3.7.A.B.C, 4.6.7.A.B.C, 4.7.7.A.B.C, 4.8.7.A.C, 4.9.7.A
Abstract	Evolution is a confusing concept for students to understand and especially controversial for teachers to teach due to religious beliefs, but should not be completely cut out from science. In trying to deal with this controversy, this lesson will follow the geologic time scale. Students previous knowledge will be tested by giving a pre-test. Students will then work through a sequencing of events throughout their life to show how a timeline works. A geologic time scale will be shown, but only after questions have been answered by the students on the Earth's history and how long ago those events occurred by placing several items on the board. The students will then work through a geologic time scale website that guides them through the different time periods. Students will then be given a post test and a specific age within an era to describe life forms and what occurred to eventually create a class geologic timeline to be hung from the ceiling.
Goal	What is a geologic time scale? What research have scientists completed that helped create the geologic time scale? Why is the geologic time scale important to us?
Performance Indicators	Students will learn: <ul style="list-style-type: none"> • place events in sequence assign relative times to each event • relative and numerical time • methods used by scientists to develop the geologic time scale • how long a billion years is • that the Earth has a very long history • about some of the events that have taken place during Earth's history • how to read a timeline • how scientists use the Law of Superposition to determine the relative age of rocks and fossils • how scientists use radiometric dating to determine the absolute age of rocks and fossils • that the Geologic Time Scale is a vertical timeline representing the history of the Earth • how the Geologic Time Scale is arranged into periods of time based on major changes in biodiversity
Background Information	Read timelines; know how to create timelines Know how to navigate through a website and get onto the internet
Materials	Toilet paper, pen/pencil, paper, geologic time scale overhead, computer with

internet capabilities, focus questions, pre and post test, sequencing time handouts, how big is a billion handouts, printouts with information regarding the different time periods

Technology Online access

Instructional Procedure

Introduction: (Day 1)

- Students take the pre test. (Found on website)
- Students sequence events within their life.

Events in Your Life
Place these events in order from 1 (earliest) to 8 (latest)
_____ when you started 2 nd grade
_____ when you were born
_____ when you started kindergarten
_____ when you learned to ride a bike
_____ when you learned to walk
_____ when you learned to read
_____ when you lost your first tooth
_____ today's date

- Students create personal timeline like scientists did within the geologic time scale including numerical and sequential time.
- Use above events to place into time interval space on chart with most recent event first.
- In the middle of the chart (numerical time) record today's date as zero. Then think of the number of years ago each event happened. Write these numbers in the column in front of each event. If you can't remember exactly, try to guess and round off to the nearest whole year. These numbers are the numerical ages of the event and make up a numerical time line.
- Sequential time can be used to identify relationships between when different things occurred. For instance, I started kindergarten before I learned to ride a bike, but after I learned to walk.

Time Interval	Numerical Time	Sequential Time

Activities: (Day 2) Work through several activities dealing with the number one billion.

- Who wants to be a billionaire? Try saving \$1,000,000,000. If you do this by saving \$100/day, how long will it take?
 - $\$1,000,000,000 / \100 (savings per day) = 10,000,000 days
 - $10,000,000 / 365$ (days in a year) = 27,397.26 years
- Counting – How long will it take to count to 1 billion
 - You get 3 seconds per number = 3 billion seconds
 - $3,000,000,000$ seconds / 60 (seconds in 1 minute) = 50,000,000

minutes

- $50,000,000 \text{ minutes} / 60 \text{ (minutes in 1 hour)} = 833,333.333 \text{ hours}$
- $833,333.333 \text{ hours} / 24 \text{ (hours in 1 day)} = 34,722.22 \text{ days}$
- $34,722.22 \text{ days} / 365 \text{ (days in 1 years)} = 95.1 \text{ years}$
- A Billion Step Hike – How many times would that take you around the equator?
 - 1 step spans a 2ft length
 - 2 feet per step = 2 billion total feet traveled
 - 1 mile = 5,280 feet
 - $2 \text{ billion (feet traveled)} / 5280 \text{ (feet per mile)} = 378,787.8787 \text{ total miles}$
 - The equator's circumference = 24,792.5 miles
 - $378,787.8787 \text{ (total miles)} / 24,792.5 \text{ (miles around the equator)} = 15.278 \text{ times around the equator}$
- Ask your students what they know about the age of the Earth and how that age is determined.
- Draw a timeline on the board and have students enter when they believe different events occurred.

(Day 3 & 4 – may need only 1 day?)

- Students will see an overhead of the geologic time scale.
- Students will work in groups to view the geologic time scale module on the internet, and answer focus questions throughout viewing.

(Day 5)

- Teacher will make a timeline using toilet paper. (1"= 5 million years)

4 bya	120"
3 bya	320"
2 bya	520"
1 bya	720"
590 mya	802"
240 mya	872"
65 mya	907"
Recent	920"

- On the toilet paper, the teacher will identify the 4 main eons. (Pre-cambrian, Paleozoic, Mesozoic and Cenozoic)
- In groups of 2, students will be given an event card.
 - Events include: bacteria, green algae, jellyfish, trilobites, first vertebrates, sharks, spiders, ferns, earthworms, greatest extinctions, Pangea forms, first mammal, Archaeopteryx, first flowering plants, ants, Triceratops, camel, grass, Lucy
- As a class, students will work together to arrange the events into chronological order from earliest to latest. (Errors will occur, but will be used to learn)

Bacteria	3 bya
Green algae	1 bya
Jellyfish	600 mya
Trilobites	550 mya
First vertebrates	480 mya
Sharks	400 mya
Spiders	400 mya
Ferns	350 mya
Earthworms	300 mya
Greatest extinctions	250 mya
Pangea forms	240 mya
First mammal	210 mya
Archaeopteryx	140 mya
First flowering plants	120 mya
Ants	100 mya
Triceratops	65 mya
Camel	35 mya
Grass	20 mya
Lucy	4 mya
End of Timeline	

- This information will be used to make a ceiling “mobile” to be hung throughout the classroom.

(Day 6-8)

- In groups of two, students will be provided with a specific age within an era, along with information regarding that time period.
- Students will then provide a quick presentation and poster on their specific age.

(Day 9)

- Students will take the post test.
- Students will write an essay (2 paragraphs) on what they learned throughout the last few days.

Assessment	Sequencing Events handout completed correctly Class participation throughout calculations to 1 billion Class participation throughout timeline on board Focus questions throughout Geologic Time Scale Module online Discussion following Geologic Time Scale Module Class participation throughout toilet paper geologic time scale activity Poster presentation on specific age within specific era Post test results Essay on what was learned
Connection to other Content Areas	Math, history, social studies, earth science, computer
Extensions	Move into unit on diversity of life – 5 Kingdoms
Acknowledgements	Geologic Time www.ucmp.berkeley.edu/education/explorations/tours/geotime/guide/index.html www.ucmp.berkeley.edu/education/explorations/tours/geotime/gtpage10.html

