



Ages of Rock: Geologic Time Scale

Lesson by Lacey Moore

Activity Subject: Geologic time scale, creative expression of science concepts

Grade Level: 6-8 grades

Introduction

In this culminating lesson, students view Ray Troll's music video and artistic representation of the geologic time scale. They then are challenged to create their own artistic representation of the time scale in a medium of their choice, e.g., presentation in Prezi, PowerPoint or Google Slides, music video in iMovie, acted out play, screencast, etc. and then share it with the audience of their choice (parent, younger student, friend, general public). Students share their creations with the whole class in a gallery walk.

Assessments Rubric, Peer/Audience Review

Time 180 minutes (four 45-minute classes)

Group Size Varies; individual, small groups

Materials

- "Ray Troll's Ages of Rock" per each student pair or group of three
- "Ages of Rock" Rubric per student
- "Ages of Rock" Audience Feedback per student
- Various materials and medium for artistic representation of time scale (e.g., computers, tablets, smartphones, chart paper, markers, various props-items representing major earth events and a tape measure or something to represent Earth's and/or a personal time scale)
- "Geologic Time Scale" Worksheet per student (from previous lesson *Classroom Geology*)

NEXT GENERATION SCIENCE STANDARDS

MS-ESS1-4 Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history. *[Clarification Statement: Emphasis is on how analyses of rock formations and the fossils they contain are used to establish relative ages of major events in Earth's history. Examples of Earth's major events could range from being very recent (such as the last Ice Age or the earliest fossils of Homo sapiens) to very old (such as the formation of Earth or the earliest evidence of life). Examples can include the formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms, or significant volcanic eruptions.] [Assessment Boundary: Assessment does not include recalling the names of specific periods or epochs and events within them.]*

LEARNING OBJECTIVES

After this lesson, students will be able to:

- Demonstrate how the geologic time scale is used to organize Earth's history.
- Interpret the geologic timescale for an audience using medium of choice.
- Practice creatively communicating science concepts.



Ages of Rock- Page 2 Procedure - Teacher's Edition

Preparation

1. Review “Ages of Rock” Rubric and “Ages of Rock” Audience Feedback and make a copy for each student. Make a copy of “Ray Troll’s Ages of Rock” for each student pair or small group. Ensure The Ratfish Wranglers--Ages of Rock video (<https://youtu.be/TqKEyHQp9Xc>) and other examples of the geologic time scale are compatible with your technology. (You can google “how to download YouTube videos” if your school may block certain sites.)
2. Consider what materials you and students may need to create the representations and the class time you can devote. (Suggest two 45-minute periods to create, one 45-minute period to share--depending on your students, you may choose to increase or decrease.) You don’t need to be an expert on the mediums the students will use to create their representation. They will likely surprise you with their savviness. You may choose to request volunteers or teacher’s aids on these days to help troubleshoot working in groups and coming up with an idea and process for creation.

Procedure

1. INTRODUCE LESSON OBJECTIVE. (15 MINUTES)

The focus question of this series of lessons is: *How do scientists figure out and sequence major events in Earth’s history?* Students have been introduced to major events in Earth’s history, the geologic time scale and how it has been developed (relative and absolute dating methods). In this lesson, students demonstrate the knowledge and skills gained in previous lessons by creating their own representation of the geologic time scale in various mediums to share with friends or family members. (There is a “Ages of Rock” Audience Feedback form for a friend or family member to fill out after a review.)

Play *The Ratfish Wrangler’s-Ages of Rock* music video for students at <https://www.youtube.com/watch?v=TqKEyHQp9Xc&feature=youtu.be> (4 min 26 sec). Pass out Ray Troll’s Rock of Ages. Have students get into pairs. Ask them to discuss questions like (you may want to write a couple on the board): *What do you notice? How does this compare to scientists’ geologic time scale? What audience do you think it is designed for? Why? What is effective about how it’s communicated? What isn’t accurate? Do you like it? Why or why not?*

2. REVIEW RUBRIC AND EXAMPLES OF CREATIVE REPRESENTATIONS OF THE GEOLOGIC TIMESCALE. (20 MINUTES)

Tell students that artistic representations can be effective ways of communicating science concepts to an audience. Also, by creatively expressing those concepts, the creators__ be they scientists, students, artists or others__ gain a deeper understanding of those ideas and content.

Pass out “Ages of Rock” rubric and “Ages of Rock” Audience Feedback and go over them briefly with students. Then show a few of the following examples to give students ideas: *Watch Earth’s History Play Out on a Football Field*-NPR Skunk Bear (video): <https://www.npr.org/2016/11/22/502920622/watch-earths-history-play-out-on-a-football-field>

- *4 Billion Years in Under 10 Minutes*-SciShow (video):
<https://www.youtube.com/watch?v=DHWavJf4SLE>
- *History of Life as we know it* (infographic):
<https://auntieshmem.files.wordpress.com/2015/10/graphs-net.jpg>
- *The Geological Timescale*-Cambrian Science (video):
<https://www.youtube.com/watch?v=r10oh1NHKv4>
- *The History of the Earth in 12 Hours* (infographic):
<https://i.pinimg.com/originals/d6/d0/13/d6d013c7ce5ccb0623b0e4efd5b142bd.jpg>
- *History of Planet Earth from the Big Bang to Modern Humans* (infographic):
<https://i.pinimg.com/564x/63/e3/b0/63e3b01e450a60814af42df9841801c6.jpg>

Suggest various communication media that students may use to create their geologic timescales. Large posterboard and markers, flyers hand drawn or in PowerPoint, songs, acted out play (filmed in iMovie or live), a screencast in Educreations, story in Adobe Voice or presentation in Prezi, PowerPoint or Google Slides are all possibilities for students depending on available resources. There is no need to feel like you have to provide support for all of these methods. Part of the process is students figuring it out and troubleshooting. The rubric will work with any of them.

3. STUDENTS CREATE OWN REPRESENTATIONS. (90 MINUTES)

Allow students to work in groups of two or three. (Too large of a group doesn't work as well for a project like this.) Suggest they use the Earth's timeline they created in *Earth's Major Events* lessons and "Geologic Time Scale" worksheet (also included in this lesson) as resources for creating their representation. Set a timer to help students make it through the stages of creation (e.g., brainstorm, storyboard if necessary, film/create actual product and practice sharing it) and circulate to help students troubleshoot. Give students at least two class periods for creation (a minimum of 90 minutes). Once students finish, remind them to show it to an audience of family members or friends and have at least one person fill out "Ages of Rock" Audience Feedback Form.

4. STUDENTS SHARE REPRESENTATIONS. (45 MINUTES)

Give students 10 minutes to set up their artistic representations around the room (e.g., poster, flyers, computers with presentations, screencasts, etc.). Do a gallery walk and have half of the groups stand by their representations for 15 minutes. Then switch and have the other groups stand by their representations. Students should circulate, view several representations, ask questions and give feedback. (Depending on your students, you may want to formalize this and include a peer review feedback form or have students use sticky notes with feedback to leave at representations.) Decide how you will assess students: will students turn in their representations or can you do fill out student rubrics during the gallery walk?



Ages of Rock - Page-4 Procedure - Teacher's Edition

5. DEBRIEF AS WHOLE CLASS. (15 MINUTES)

Once all students have presented, pose the focus question of this series of lessons again: *How do scientists figure out and sequence major events in Earth's history?* Have students answer it again and add to what they have written (or drawn) in the previous lessons. Remind them not to cross out or correct previous answers but just draw a line under previous ideas and continue answering the question based on new understanding. After students have had a chance to answer the question, facilitate a review of this and previous lessons with questions like:

- What was the most interesting idea or activity in this series of lessons? Why?
- What surprised you about the Earth's time scale and how it's organized? Explain.
- What did you learn about what it's like to be a scientist and the nature of science?
- How effective do you think Schoolyard Geology and Classroom Geology were as models illustrating science and Earth's process(es) (relative dating methods and geologic time scale)?
- What questions do you still have or what do you wonder?
- Any other comments or suggestions for this series of lessons?

Resources

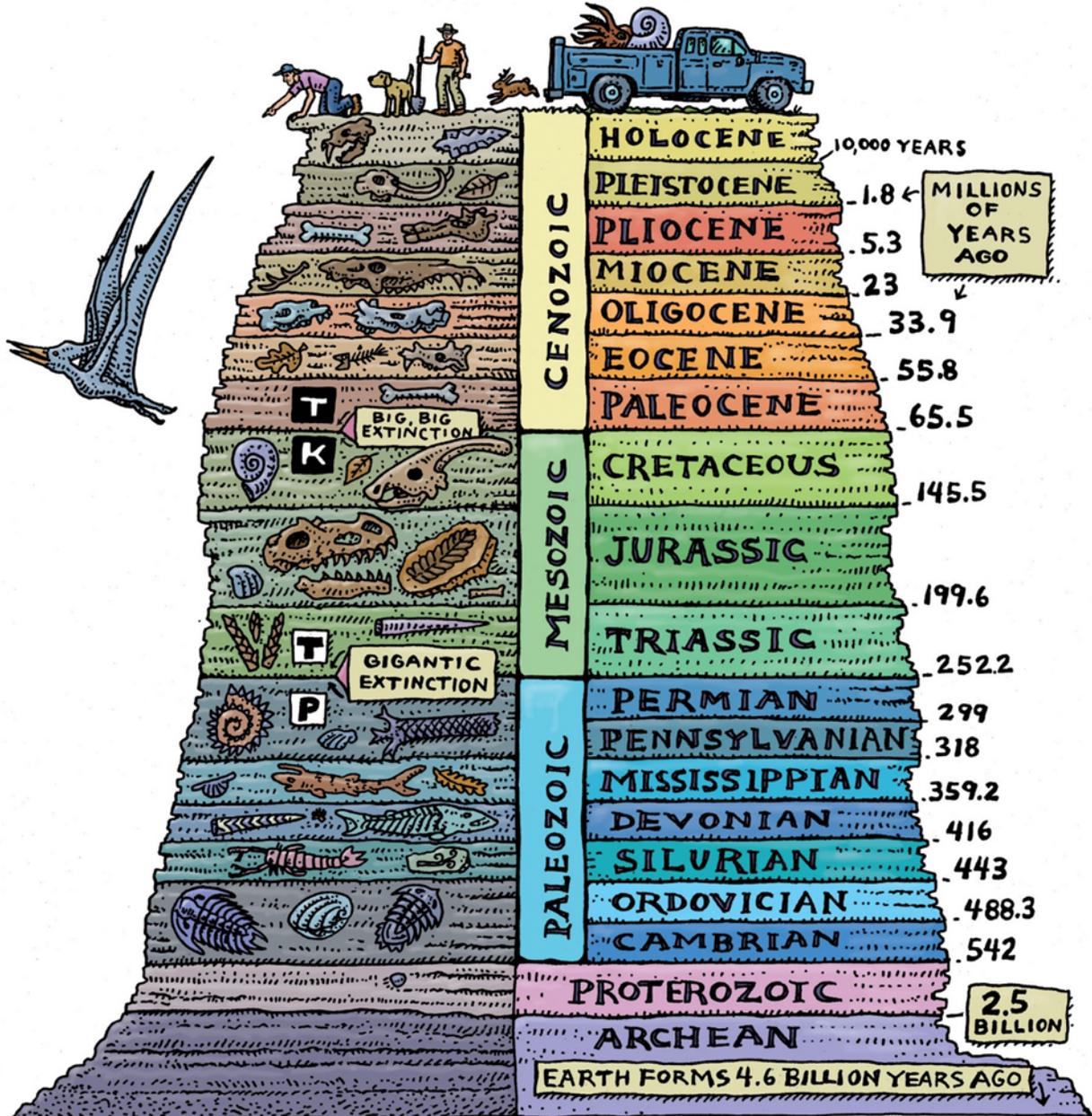
Read more about the importance of the creative expression of science in these two articles:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4302945/>

<https://fisheries.org/2016/02/how-does-creativity-fit-into-science-communication/>

Explore the geologic time scale from the perspective of New York

city: <https://www.nytimes.com/2018/01/27/opinion/rambling-through-time.html>





Name _____ Period/Class _____ Date _____

Ages of Rock Rubric-Page 1
Student's Edition

Goal: Demonstrate how the geologic time scale is used to organize Earth's history

Criteria	Score	Score (1-4)	Comments (why the score)
<p><i>Creativity and Innovation</i></p> <ul style="list-style-type: none"> • Demonstrates effort and original thought in selection of medium and style • Conveys content effectively 	<p>Exceeded: 4 Fully Satisfied: 3 Partially Satisfied: 2 Did Not Satisfy: 1</p>		
<p><i>Science Content</i></p> <p>References or includes the following:</p> <ul style="list-style-type: none"> • min 5 major Earth events • methods of relative dating (Law of Superposition and index fossils) 	<p>Exceeded: 4 Fully Satisfied: 3 Partially Satisfied: 2 Did Not Satisfy: 1</p>		
<p><i>Effective Communication</i></p> <ul style="list-style-type: none"> • Appropriate language, analogies, medium for intended audience • Relevant to place, community and/or daily life 	<p>Exceeded: 4 Fully Satisfied: 3 Partially Satisfied: 2 Did Not Satisfy: 1</p>		
<p><i>Collaboration</i></p> <ul style="list-style-type: none"> • Worked well in a group • Responsible for fair share of work 	<p>Exceeded: 4 Fully Satisfied: 3 Partially Satisfied: 2 Did Not Satisfy: 1</p>		



Name _____ Date _____ Period/Class _____

Ages of Rock Audience Feedback-Page 1 Student's Edition

Audience Name (Print):

What did you like about this representation of the geologic time scale? What did you learn?



Signature:



Name _____ Date _____ Period/Class _____

Ages of Rock Audience Feedback-Page 1 Student's Edition

Audience Name (Print):

What did you like about this representation of the geologic time scale? What did you learn?

Signature:



Name _____ Date _____ Period/Class _____

Ages of Rock Audience Feedback-Page 1 Student's Edition

Audience Name (Print):

What did you like about this representation of the geologic time scale? What did you learn?

Signature:

Geologic Timescale-Page 1
Student's Edition
(Far right column is millions of years ago)

		EON	ERA	PERIOD	EPOCH	Present
Phanerozoic	Cenozoic	Quaternary		Holocene		0.01
				Pleistocene		
		Tertiary	Neogene	Pliocene		2.6
				Miocene		5.3
				Oligocene		23.0
			Paleogene	Eocene		33.9
				Paleocene		55.8
						65.5
		Mesozoic	Cretaceous		145.5	
	Jurassic		199.6			
	Triassic		251			
	Paleozoic	Carboniferous	Permian		299	
			Pennsylvanian		318	
			Mississippian		359.2	
		Devonian		416		
		Silurian		443.7		
		Ordovician		488.3		
		Cambrian		542		
	Precambrian	Proterozoic		2500		
Archean		4000				
Hadean						