



## Ages of Rock Lesson Plan Overview

*Guiding Question:* How Do Scientists Figure out and Sequence Major Events in Earth’s History?

*Grade Levels:* 6-8

*Introduction:* This lesson plan consists of six lessons designed to help students construct an explanation of the geologic time scale based on personal connections (development of personal and schoolyard timelines and comparison to Earth’s timeline), science concepts (relative dating methods that include Law of Superposition and index fossils) and nature of science ideas (there is a diversity of scientists and geologic sites students observe in the Shape of Life videos and scientists use a variety of methods and tools). A variety of modalities are employed. Students go outside and observe the schoolyard, watch videos, create a “geologic site in a cup,” utilize technology for geologic time scale interpretations, work in small groups and participate in whole class discussions throughout the lessons.

*NGSS Performance Expectation:* 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. The main scientific and engineering practice in this performance expectation is constructing explanations and designing solutions. The primary crosscutting concept is scale, proportion and quantity.

*Lessons Overview:*

Lesson	Description	Learning Objectives
Schoolyard Geology  Duration: 60 min	This lesson is the first in a series in which students investigate the geologic time scale and how it’s used to make sense of and sequence major events in Earth’s immense history. Students explore their own schoolyard in this lesson and make observations to infer the history of the schoolyard. Back in the classroom, students share their observations, sequence events on a schoolyard timeline and debrief their experiences.	After this lesson, students will be able to: <ul style="list-style-type: none"> <li>• Distinguish observations from inferences.</li> <li>• Use observations and inferences to reconstruct the history of a place.</li> <li>• Sequence events along vertical timelines.</li> </ul>

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<p><b>Major Earth Events, Part One</b></p> <p>Duration: 45-60 min</p>	<p>In this lesson, students watch the <i>Cambrian Explosion</i> video, construct personal and Earth timelines (vertical to mirror the geologic time scale which will be introduced in future lessons), and begin to explore the scale of time embodied in Earth's history.</p>	<p>After this lesson, students will be able to:</p> <ul style="list-style-type: none"> <li>• Construct timelines for both self and Earth and sequence major events along each of them.</li> <li>• Describe the Cambrian Explosion as a major event in Earth's history.</li> <li>• Recognize that the scale between the schoolyard, personal and Earth's timelines are different but some of the same science ideas can be used to understand them all.</li> </ul>
<p><b>Major Earth Events, Part Two</b></p> <p>Duration: 80 min</p>	<p>In this lesson, students explore the Cambrian Explosion and other major Earth events, construct a scale for Earth's history and sequence some of Earth's major events along a timeline. Students consider what evidence exists for these events and then compare Earth's history to schoolyard and personal history.</p>	<p>After this lesson, students will be able to:</p> <ul style="list-style-type: none"> <li>• Sequence the Cambrian Explosion along a timeline with other major life and physical events in Earth's history.</li> <li>• Recognize that physical evidence exists that helps scientists reconstruct the history of a place.</li> <li>• Compare Earth's history to schoolyard and personal history, especially in terms of scale.</li> </ul>
<p><b>Classroom Geology</b></p> <p>Duration: 100-120 min</p>	<p>This lesson challenges students to create and interpret a representation of Earth's history using relative dating methods that include the Law of Superposition and index fossils. First students participate in an interactive presentation that introduces the geologic timescale. Then they design and create a representation of Earth's rock layers that tells a story in Earth's history. Finally, students switch "sites" with another student group and try to figure out the story being told.</p>	<p>After this lesson, students will be able to:</p> <ul style="list-style-type: none"> <li>• Explain how the Law of Superposition is used to relatively date Earth's strata, or rock layers, and help sequence major Earth events.</li> <li>• Describe how index fossils are used to relatively date Earth's strata, or rock layers, and help sequence major Earth events.</li> <li>• Recognize the geologic timescale as a framework for organizing and sequencing Earth's history.</li> </ul>

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<p><b>Deep Time Detectives: What Does a Paleontologist Do?</b></p> <p>Duration: 60-75 min</p>	<p>Students view three paleontologists in action in <i>Paleontologists: Paleontologists Study Tracks and Traces</i> video as the scientists discover fossils and interpret geologic sites. Each student is assigned a “Spotlight Scientist” to focus on and then meet in small groups with students representing the other two scientists. Students share the geologic time highlighted in each scientist vignette and add it to their Earth’s timeline and do a gallery walk focused on the nature of science.</p>	<p>After this lesson, students will be able to:</p> <ul style="list-style-type: none"> <li>• Recognize that not all scientists look alike, wear white coats and work in labs--they are diverse individuals.</li> <li>• Describe the kind of work paleontologists do while finding evidence of Earth’s history in fossil records and rock layers.</li> <li>• Relatively age the fossils highlighted in the video compared to other Earth events.</li> </ul>
<p><b>Ages of Rock</b></p> <p>Duration: 180 minutes (four 45-minute classes)</p>	<p>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.</p>	<p>After this lesson, students will be able to:</p> <ul style="list-style-type: none"> <li>• Demonstrate how the geologic time scale is used to organize Earth’s history.</li> <li>• Interpret the geologic timescale for an audience using medium of choice.</li> <li>• Practice creatively communicating science concepts.</li> </ul>