

Earth Science Unit 1

Outline for Lesson 3: Geologic Time Scale

Grades: 7th & 8th

Lesson Objectives

As a result of the lessons in this unit, students will be able to:

- Organize the blocks of time in the geologic time scale from broadest to most specific (eon, era, period, epoch, age)
- Recognize the differences in the time spans of each block of time (or division) (i.e. the blocks are not equal in time, such as every eon is not 1 million years)
- Relate major geologic events and/or major biological events to the divisions in the geologic time scale
- Describe the evolution of life on earth from basic cells to complex organisms
- Identify the current eon, era, period, and epoch
- Explain the scientific evidence used to develop the geologic time scale, such as relative age of rock strata and index fossils and the use of radioactive dating to determine absolute time
- Describe the process of fossilization with evidence of casts/molds, petrification, and imprint fossils.

Lesson Outline

Note: Prior to the beginning of this unit on geologic time, students completed a unit studying the Laws of Stratigraphy through an analysis of various rock layers and formations. Classroom lessons, textbook notes, EDPuzzle videos, and the Rock Detective project were used to build student knowledge of relative dating and index fossils in determining the age of rocks on Earth to provide clues to Earth's history. Students will explore plate tectonics and related topics (earth's structure, earthquakes, and volcanoes) in our next unit in Earth Science.

Activity 1 – Introduction to the Geologic Time Scale and Fossils

This activity requires students to read a section in the textbook to fill out a note worksheet and take notes as they watch a video on EDPuzzle. The video is a basic introduction to fossils and how they form. The notes are assessed during class discussions with the video being assessed by the teacher-created video quiz completed as they watch the video.

Lesson Resources: [Earth Science Unit 1 Text](#), [Earth Science Unit 1 Class Notes](#), [EDPuzzle Fossils video](#)

Activity 2 – Who's on First – Sequencing Activity

During this classroom lesson, students will complete two sequencing activities to learn how scientists use the fossils found in various rock strata to determine the history and relative age with regards to the geologic time scale. Assessment of student knowledge will be completed through classroom observations, completion of the activity worksheet, and participation in the classroom discussion following the activity.

Lesson Resource: [Who's on First](#) (created student activity page to go along with their activity cards)

Activity 3 –Piecing Together the Puzzle – Interactive Science Notebook Activity

During this activity, students will work together to create a scale model of the geologic time scale from Earth's "birth" to the current day. The teacher will provide the materials for the activity and lead the students in a class discussion to help them sequence the events in the correct order. After completing the class activity, students will create their own model of the geologic time scale that recreates the classroom model developed in class during Lesson 3. Students will label the basic diagram and work in small groups to organize the "puzzle" pieces into the correct eon, era, or period.

Lesson Resource: [Piecing Together the Puzzle](#) (Available on the [Earth Science page of the Science Spot's Classroom](#).)

Lesson Assessments

Unit Pre-Test – Students completed a pre-test (survey) to provide data related to their background knowledge of the geologic time scale, laws of stratigraphy, and fossilization. The data was analyzed to determine the specific lessons that would need to be completed before students would be able to attain the unit objectives (based on the Next Generation Science Standards and performance expectations listed at the end of this document.)

Informal Assessments – Ongoing assessments will be completed through teacher observations, classroom discussions, and interaction with students as they work individually or in small groups to complete the unit lessons. The use of [Legends of Learning](#) games targeting the learning standards will provide additional data to identify gaps in student knowledge and/or misconceptions the students may have. Additional instruction and/or lessons will be provided as needed to address these limitations with individual students, small groups, or whole-class instruction.

Formal Assessments – Students will complete a post-test at the end of the unit to determine their level of mastery of the unit objectives and learning standards. Student work will also be analyzed through the evaluation of the artifacts created by the lessons in the unit and/or written or oral responses to teacher prompts related to the targeted scientific concepts.

Connections to the 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.

Observable features of the student performance for this standard include:

- Students will be able to explain the use of relative age in determining the sequence of rock strata and fossils as outlined in the laws of stratigraphy (superposition, cross-cutting relationships, lateral continuity, and horizontality)
- Students will be able to articulate a statement with supporting scientific evidence that relates how events in the Earth's 4.6 billion-year-old history are organized relative to one another using the geologic time scale. Examples of scientific evidence would include:
 - Rock layers (strata) and relative age
 - Fossil record with regards to relative age, index fossils, and radiometric dating
 - Major geologic events, such as the formation of mountain chains, formation of ocean basins, volcanic eruptions, glaciations, asteroid impacts.
 - Major biological events, such as the appearance of a new group of organisms, abundance of specific group, and/or the extinctions of groups of organisms

MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

Observable features of the student performance for this standard include:

- Students will identify and describe the evidence necessary for constructing an explanation regarding the speed and scale of changes to earth's surface and its resulting affects on natural resources and the living organisms alive at various points in time.
- Students will use reasoning, along with the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. They will be able to connect the evidence and support an explanation for how geoscience processes have changed the Earth's surface at a variety of temporal and spatial scales.

Science as Inquiry – Content Standard A

As a result of activities in grades 5-8 and grades 9-12, all students should develop:

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

Grades 5-8 abilities necessary to do scientific inquiry:

- Identify questions that can be answered through scientific investigations.
- Design and conduct a scientific investigation.
- Use appropriate tools and technology to gather, analyze, and interpret data.

- Develop descriptions, explanations, predictions, and models using evidence.
- Think critically and logically to make the relationships between evidence and explanations.
- Recognize and analyze alternative explanations and predictions. -Communicate scientific procedures and explanations.
- Use mathematics in all aspects of scientific inquiry.

Grades 5-8 understandings about scientific inquiry:

- Different kinds of question suggest different kinds of scientific investigations.
- Current scientific knowledge and understanding guide scientific investigations.
- Mathematics is important in all aspects of scientific inquiry.
- Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations. -Science advances through legitimate skepticism.
- Scientific investigations sometimes result in new ideas and phenomena for study, generate new methods or procedures for an investigation, or develop new technologies to improve the collection of data.
- Identify questions and concepts that guide scientific investigations.

Note: Common Core math standards will be addressed in unit lessons related to mathematical computations, scale measurements, and relative dating. Common Core standards related to literacy will be targeted through written responses on student activity pages as well as written portions of the student artifacts.