

Learning Objective: Geologic Time

NGSS Standard: (MS-ESS1.C.1) The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale.

Objective:

Students will be able to:

1. Analyze the geologic time scale.
2. Explain the creation of the geologic time scale.
3. Understand the difference between geologic time and human time scales.
4. Compare and contrast relative and absolute dating.

Time Required: 75 minutes

Materials Needed:

- Teacher computer with internet access
- Projector/Smartboard
- 1 computer/laptop/iPad per student with internet access
- Roll of toilet paper
- Creating a Geologic Timescale Handout (attached)

Teacher Preparation:

- Create Playlist 1, a 30 minute [playlist](#) in [Legends of Learning](#) with the following games found in the Geologic Time learning objective:
 - *Fossil Hunt*
 - *Lisa the Geologist*
- Create Playlist 2, a 10 minute playlist in Legends of Learning with 5 [assessment questions](#) from the Geologic Time learning objective
- Before class, mark up the toilet paper roll with major eras and events that took place on the geological time scale. Do this carefully. You must know how many sheets are on the roll to mark it correctly. Use the following as a [guide](#).

Engage (5-10 minutes):

1. Lead a 1 minute discussion about how scientist use absolute dating to figure out the age of rock stratum.
2. Explain to the students that scientists organize this information (along with a lot of other information) into what is called a geologic timescale.
3. Have two students hold the roll of toilet paper. And have one student start to unravel it slowly. As they unravel it point out some of the major events that are taking place.
4. Once the roll is completely undone (this could take several times around the classroom, you may need a larger room such as the auditorium or gym) ask the students to compare the age of Earth versus the age of living things.
 - a. Answer: The Earth is much much older and living things have barely been around.
5. Ask students to then compare the amount of time humans have been alive to the time all living things have been on Earth.

- a. Humans have been around for only a very small percentage of the time.
6. Explain to students: "I have just demonstrated an example of a geologic time scale. During your lesson today, you will learn how these time scales were created."

Explore (40 minutes):

1. Have your students [sign in to Legends of Learning and enter your teacher code](#).
2. [Launch](#) Playlist 1 to your students.
3. As students complete *Fossil Hunt*, students should fill out the Creating a Geologic Timescale Handout.
4. Assist students as needed during game play, pause playlist if you need to address content or questions to entire class.
5. If students finish the first game and worksheet early they can continue on in the playlist and try the game *Lisa the Geologist*. This game will help test their knowledge.

Explain (10 minutes):

1. Review the answers to the handout Creating a Geologic Time by recreating the chart on the whiteboard. Have your chart go horizontal instead of vertically like the students.
2. As you review that chart and answers clarify any misconceptions that students may have.

Elaborate (5 minutes):

1. The geologic time scale is often used to show how life evolved on Earth. But what would this time scale look like in a different form, like a 24 hour day?
2. Show the students the following video (stop after 1:35):
https://www.youtube.com/watch?v=H2_6cqa2cP4
3. Ask: What are some major differences between the geologic time scales discussed in class and the one on the video?
 - a. *The one on the video did not break the timeline up into eras.*
4. Ask: *Why do you think it took so long for humans to evolve?*
 - a. *Answers will vary, many students may discuss the climate of Earth.*

Evaluate (10 minutes):

1. [Launch](#) Playlist 2 to your students. When they finish the assessment questions, any time left is freeplay.
2. [Analyze student results](#) to determine what concepts need to be a focus for reteaching.



Creating a Geologic Timescale

Name / Pd: _____

Directions: While playing the first game in Legends of Learning called *Fossil Hunt*, fill in the chart below.

The following chart will indicate how a Geologic Time Scale is created based on climate change, evolution of life, sudden changes, and absolute dating. For each stratum, fill in the correct spot on the chart.

Stratum	Drawing of the fossil	Sudden / Major Event	Radiometric Dating	Presumed Era
1				
2				
3				
4				
5				
6				
7				

8				
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Directions: Use the chart to answer the following questions:

1. When you found a fossil, what clues were given that helped you place the fossil in the correct time frame?
2. What conclusion can you draw about a fossil that exists in the second strata of earth and a fossil that exists in the fourth strata of earth?
3. As you went deeper into the Earth's strata the rocks/fossils become (*older / younger*) and the organisms that you found became (*less / more*) complex.
4. Each change in era is usually accompanied by a sudden/major event that took place on Earth. Why do you think that two go together?
5. How does the creation of the geological time scale (like your chart) use both absolute and relative dating?