

Geologic Time Lesson Guide

Lesson Guide | Description

Instructor: Dr. Michael T. Lewchuk

Grade Level: 6 - 12

Subject: Earth & Physical Science

Students will investigate the subdivisions of the Geologic Time Scale.

Wonder How:

Have you ever wondered how scientists and geologists know how old something is?

Goal:

Students will gather data and use ratios that will help them create a scale model of Geological time using simple materials found at home.

Lesson Guide | Lesson Guide Agenda

Lesson Guide Agenda:

- Vocabulary
- Materials List
- Geologic Time Scale
- Activity Instructions
- Challenge!
- ❖ Additional Resources
- Oklahoma Academic Standards

Lesson Guide | Vocabulary

<u>Eon</u> – An Eon is the fundamental division of time in Geology. The Earth's 4.6-billion-year history is divided into four Eons: Hadean, Archean, Proterozoic and Phanerozoic.

<u>Precambrian Supereon</u> – This is the combination of the Hadean, Archean and Proterozoic Eons. It is subdivided based on the physical properties of the Earth's surface and atmosphere.

<u>Hadean Eon</u> – The Hadean is the oldest Eon. It is generally described as the time when the Earth was so hot that it was all, or mostly all, molten liquid.

<u>Archean Eon</u> – The Archean Eon is generally described as the time when solid rock existed on the surface of the Earth, but little or no free oxygen existed in the atmosphere.

<u>Proterozoic Eon</u> – The Proterozoic is generally considered the Eon when free oxygen began to appear in the atmosphere. Microscopic life developed during the Proterozoic.

Lesson Guide | Vocabulary

<u>Phanerozoic Eon</u> – The Phanerozoic Eon is the most recent Eon in geologic history. It is subdivided into three Eras, the Paleozoic, Mesozoic and Cenozoic based on the type of living organisms. Most complex life evolved during the Phanerozoic.

<u>Era</u> – An Era is the second fundamental subdivision of geologic time. The Phanerozoic Eon is subdivided into three Eras: the Paleozoic, Mesozoic, and Cenozoic.

<u>Paleozoic Era</u> – This is the oldest Era dominated by marine life and plants on land. Land based animal life began to develop during this Era.

<u>Mesozoic Era</u> – The Mesozoic is the Era dominated by dinosaurs, birds and other land animals.

<u>Cenozoic Era</u> – The Cenozoic is the current Era. Mammals and insects dominate this Era. We live in the Cenozoic Era.

<u>Period</u> – A Period is a smaller subdivision of an Era. All three Eras have multiple Periods, each characterized by a particular dominant lifeform or climatic pattern. The most recent Period, the one in which we live now, is the Cenozoic.

Geological History: A Scale Model of Geological Time

Materials Needed:

Ruler or another measuring device.

Any object such as a piece of string or a length of any surface.

• This could be the length of a yard, park, sidewalk, room etc. – Something to mark distance.

Markers

Calculator

Note: If using a public space, please be respectful and do not use permanent markers or deface the area in any way. Please pick up your materials when you have completed the experiment.

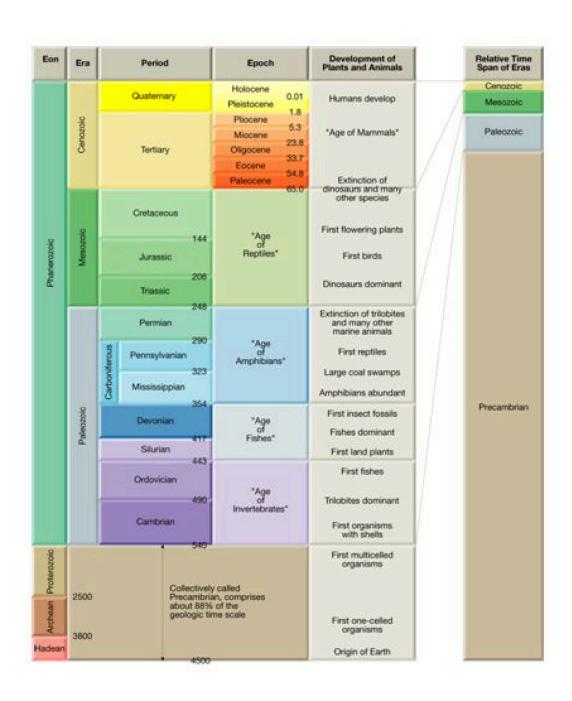
Watch the "Geological Time Scale" video before continuing to the challenge!

Be sure to print the "Building a Scale Model for Geologic Time Worksheet" found on HomeRoom to record the data.

If you have any questions throughout this lesson, please email <u>teachers@oerb.com</u>.

We would love to hear from you!

Lesson Guide | Geologic Time Scale



Lesson Guide | Activity Instructions

Instructions:

- 1. Measure out the length of the object that you plan to subdivide.
- 2. Record the lengths of each of the four Eons (Hadean, Archean, Proterozoic, Phanerozoic) in the worksheet provided.
 - a. Example: The data for the Hadean is filled in (based on a 75-inch piece of string), to help you get started.
- 3. Calculate the portion of the surface that represents each Eon and record this under the heading "Model Length" in the table.
 - a. Example: The Hadean is 600 of 4600 million years. If the object is 75 inches long, then the portion of the string that represents the Hadean is found by the ratio:

$$\frac{600 \text{ m.y.}}{4600 \text{ m.y.}} = \frac{x \text{ inches}}{75 \text{ inches}} \qquad x \sim 9.8 \text{ inches of Model Length}$$

Lesson Guide | Activity Instructions

Instructions:

- 4. From one end of the object, measure out the length representing the Hadean and place a mark at that distance.
- 5. Continue from that point to measure the length of the Archean, then the Proterozoic and finally the Phanerozoic.
 - a. If the math is done correctly, then the lengths of the four Eons should equal the total length of the object and the end of the Phanerozoic should be at the end of the object.
- 6. Next complete the table for the Phanerozoic Eras.
- 7. Mark the locations on the object, beginning at the spot marked for the start of the Phanerozoic. If the math is done correctly, then the Cenozoic should also reach the end of the object.
- 8. Finally, complete the table for the Periods in each Era.
- 9. Mark the appropriate locations within each Era.
 - a. It might be hard to mark the Quaternary unless the object is very long.

Challenge!

Complete this experiment and take some pictures of your Geological Time Scale.

If you have any questions about this challenge, please email <u>teachers@oerb.com</u>.

We would love to hear from you!

WANT TO WIN A PRIZE?

Share pictures of your experiment with us by emailing teachers@oerb.com and on Facebook/Instagram by tagging us @oerbok.

Be sure to include your name, grade, school, and teacher!

The teacher with the most student submissions will win a \$100 Amazon Gift Card!

Check out these additional resources!

- 1. Science | State Department of Education https://sde.ok.gov/science
- Mathematics | State Department of Education <u>https://sde.ok.gov/mathematics</u>

Lesson Guide | Oklahoma Academic Standards

- **6.N.3** Understand the concept of ratio and its relationship to fractions and percent and to the multiplication and division of whole numbers. Use ratios to solve real-world problems.
- **7.A.1** Understand the concept of proportionality in real-world and mathematical situations and distinguish between proportional and other relationships.
- **7.A.2** Recognize proportional relationships in real-world and mathematical situations; represent these and other relationships with tables, verbal descriptions, symbols, and graphs; solve problems involving proportional relationships and interpret results in the original context.

To learn more about the Oklahoma Academic Standards for Mathematics click here.

MS-ESS1-4 Earth's Place in the Universe.

HS-ESS1-6 Earth's Place in the Universe.

To learn more about the Oklahoma Academic Standards for Science click here.