

“Eons and Eons of Ozarks Long Ago” Lesson Plan

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Lesson Summary: In this lesson students will read tables of information that describe the general geological history of the Missouri Ozarks. Afterwards they will be provided copies of the tables that have been cut up. The students will work in small groups to reconstruct the geological past of Missouri by attempting to put the tables back in order.

This curriculum was written to accompany the educational video “*Karst in the Ozarks.*” Students should watch the video before beginning the lesson. It is available online at <http://www.watersheds.org> .

Missouri Show Me Standards:

Process Standard: 1.6

Students in Missouri will demonstrate within and integrate across all content areas the ability to apply, discover, and evaluate patterns and relationships in information, ideas, and structures.

Science Contents Standards – Strand 5 Earth Systems:

SC5.15a (classify water bodies)

SC5.2A4bdc (identify major landforms / bodies of water relate to forming process)

SC5.2C8c (internal and external Earth processes of rock cycle)

SC2.2B7a (gravitation forces)

SC5.2A5abc (sedimentary rocks & weathering)

SC5.2A6abcd (sedimentary rock formation, weathering, volcanoes)

SC5.2D6Cab (fossil formation & changes in environments)

SC4.3A4a. (Common Missouri fossils)

SC4.3A6a (extinction of past organisms)

SC5.28ab (geological time and rock and fossil inferences)

Related Vocabulary:

Limestone	Radiometric dating	Carbon dioxide
Dolomite	Igneous rocks	Carbonic acid
Plutons	Precambrian Era	Calcite
Fossils	Horizontality	Sinkholes
Trilobite	Molds & casts	Losing streams
Bivalves (Brachiopods)	Sedimentary rocks	Springs
Gastropods	Relative dating	Cave decorations
Crinoids	bryozoans	
Mastodons	Blastoids	

Related Web Links / Background Information:

<http://www.dnr.mo.gov/pubs/pub660.pdf> [Crinoids & Brachiopods]

<http://www.dnr.mo.gov/pubs/pub665.pdf> [Collecting Missouri Fossils]

<http://www.dnr.mo.gov/pubs/pub683.pdf> [Elephant Rocks]

<http://www.dnr.mo.gov/pubs/pub663.pdf> [Geologic Time Scale]

<http://www.dnr.mo.gov/pubs/pub655.pdf> [Missouri's Ozarks]

<http://www.dnr.mo.gov/pubs/pub664.pdf> [Missouri – The Cave State]

<http://www.dnr.mo.gov/geology/docs/gcwinter9.pdf> [Missouri Geologic Column about geological maps]

<http://pubs.usgs.gov/gip/geotime/radiometric.html> [USGS – Radiometric Time Scale background]

<http://geomaps.wr.usgs.gov/parks/gtime/radiom.html> [USGS – Dating Rocks background]

<http://pubs.usgs.gov/gip/geotime/relative.html> [USGS – Relative Time Scale background]

<http://pubs.usgs.gov/gip/fossils/contents.html> [USGS – Rocks, Fossils, and Time, short online book]

<http://www.mostateparks.com/mastodon.htm> [Missouri: Mastodon State Park]

http://www.paleoportal.org/index.php?globalnav=time_space§ionnav=state&name=Missouri
[summarized Missouri over the past four geologic eras]

http://owensville.k12.mo.us/~SMART_Lessons/4/Judy%20Andrews/science/GLE%20fossils/Fossils.pdf

[This is a PDF file that has simple clear background about the Missouri fossils listed in the GLEs with web links for more information]

<http://www.watersheds.org/earth/Sinkholes.html> [watershed.org sinkhole formation movie]

References: Missouri Geology:

Three Billion Years of Volcanoes, Seas, Sediments, and Erosion - by A.G. Unklesbay and Jerry D. Vineyard
[Copyright 1992 University of Missouri Press, Columbia, Missouri 65201] ISBN 0-8262-0836-3

Required Materials:

- Meter sticks (5 total)
- Handout: "Eons and Eons of the Ozarks of Long Ago"

Visuals:

- Map of Missouri geology or projected internet image
- <http://www.dnr.mo.gov/geology/adm/publications/map-GenGeoMap.pdf>

Optional Materials:

- Missouri Fossils (see vocabulary list for types)

Safety Considerations: None

Time Requirements:*Preparation:*

- The students need to have seen the “*Karst in the Ozarks*” video. In addition, they need to have some background knowledge about rock formation and the rock cycle.
- If doing the described lesson warm up, 5 one-meter sticks will need to be gathered.
- The teacher will need to prepare copies of the table sections from the lesson that they desired to use. They will also need to also have these same tables cut up and placed in an envelope for each small group of students to reconstruct.
- The teacher needs to become familiar with the topic by utilizing the web links. The teacher may decide to use them as readings for background information.

Lesson Warm Up:

Ask the students if they have traveled to any of the following locations in Missouri: Elephant Rock State Park, Johnson Shut-Ins State Park, Ozark National Scenic Riverways or Mastodon State Park. Ask them about seeing any sedimentary rock layers along bluffs or road cuts in Missouri as well.

If students have traveled to any of these locations, let them share what they observed or remembered from the geology of the area. Point out their location on the Generalized Geology of Missouri Map.

Tell the students that these locations and many others tell clues about the geological past of Missouri. Tell them that they will learn about some of these clues in the activity today.

In addition, explain that the activity is going to span vast amounts of time back to the Earth’s formation. Explain that scientists have evidence that the Earth is 4.5 billion years old.

-Take 5 one-meter sticks and lay them side by side where the students can see the sticks. Have a student find where 4.5 meters would be.

- Explain that this represents a timeline for the Earth’s history if each millimeter equaled one million years, which is the same as each meter sticks representing a billion years (one billion is equal to 1000 million). Tell them that the St. Francois area was formed over 1.2 billion of years ago. Have them find where that would be located on the meter sticks (going from left to right).

Have students share what they remember about the geological history of Missouri from the “*Karst in the Ozarks Video*.” Explain that the word “eons” means vast amounts of time and that it is difficult to comprehend these time spans, but we can tell about the past with our own eyes by looking at rock layers and scientists can by using assorted technologies.

Eons and Eons of Ozarks of Long Ago Lesson:

Choose the sections of the “Eons and Eons of Ozarks Long Ago” that meet class objectives. Have the students read over the assigned table(s). Tell students to place close attention to the events and their orders when reading the table(s). After the students have had plenty of time to read and discuss the assigned tables, take them from the students. Provide the students the same table(s); however have them cut up according to sections in the table. Tell the students to work together to reconstruct the events; assist students as needed. Return the completed table(s) to the student and let them make corrections and discuss the activity.

Lesson Wrap Up:

After students have reconstructed their tables and made corrections, sum up the activity by having students share what they have learned. If enough time is available, have the students create an A to Z list for the geological history of Missouri. For each letter of the alphabet, have students determine one word that begins with that letter that relates to the geological past of Missouri. For example, for the letter “D,” students could use the word “dome.” To decrease the time of the lesson wrap up, assign each student a letter or two from the alphabet and then have them pick out related word. Have students share their A to Z in order. Have them attempt the wrap up without using the tables!

Modifications:

The lesson difficulty could be decreased by making the following adaptations:

- Do the activity with only one table.

The lesson difficulty could be increased by making the following additions:

- Students could combine the illustrations, rhymes, and motions to any sections of the tables.
- Students could read and discuss how radiometric dating of rocks occurs (see web link above).

Assessments:

To assess the students learning, have them answer the following question.

- Explain how Missouri has changed over time. Provide 5 specific pieces of evidence.