

Learning Objective: Fossil Record

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. Organize Earth's history based on where fossils are found in the strata.
2. Understand the difference between relative and absolute age.
3. Date the earth's strata based on index fossils.
4. Understand rock formation based on the Law Of Superposition and Cross-cutting Relationships.

Time Required: 75 minutes

Materials Needed:

- Teacher computer with internet access
- Projector/Smartboard
- 1 computer/laptop/iPad per student with internet access
- Organizing the Fossil Record Handout (attached)

Teacher Preparation:

- Create Playlist 1, a 30 minute [playlist](#) in [Legends of Learning](#) with the following games found in the Fossil Record learning objective (in order):
 - *The Archean Treasure*
 - *Layard History - Through Rocks and Time*
- Create Playlist 2, a 10 minute playlist in Legends of Learning with 5 [assessment questions](#) from the Fossil Record learning objective
- Have the legends of learning game *Time Stacker: Unearth the Past* ready to show on the projector/Smartboard

Engage (10 minutes):

1. On the project/Smartboard [show the legends of learning game](#) *Time Stacker: Unearth the Past*.
2. Demonstrate the game for the class. Be sure to move the bar and add layers slowly. As the game progresses have the students think about the following questions with a partner.
 - a. Game Lesson 1 & 2:
 - i. How do rock formations form?
 - *Usually one on top of the other.*
 - ii. Which formation do you think is the oldest, youngest?
 - *The one at the very bottom is oldest, and the top is youngest.*
 - b. Game Lesson 3-5:
 - i. How does knowing which strata a fossil is found in help determine its age?
 - *If you know the relative age of the strata the fossil will have a similar relative age.*
 - ii. Where are the fossils of the most modern organisms usually found?

- *In the strata closests to the top.*
3. Throughout the game questions will pop up. Have the class participate to see if they can answer the questions as a group.
 4. Explain to the class that in this lesson they will learn about the relationship between rock strata and creating the fossil record.

Explore (30 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 *The Archean Treasure*, students should fill out the Organizing the Fossil Record 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 *Layard History - Through Rocks and Time*. This game will help test their knowledge.

Explain (20 minutes):

1. Review answers to Organizing the Fossil Record Handout by drawing diagrams on board or using Smartboard.
2. As you review the questions and diagrams on the board also use the following parts of the game *Time Stacker: Unearth the Past* to help drive instruction.
 - a. Lessons 7 and 8 will show how Cross-Cutting works
 - b. Lesson 16 and 17 shows index fossils

Elaborate (5 minutes):

1. Explain to the students that relative dating is very inaccurate and that scientists will also use radiometric dating as well. This gives them a more accurate idea of how old a fossil or a rock layer is.
2. Show the video on how scientist complete this:
<https://www.youtube.com/watch?v=54e5Bz7m3do>
3. Ask the students how both relative and absolute dating can be used together to determine that ago of objects.

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.



Organizing the Fossil Record

Name / Pd: _____

Directions: While playing the first game in Legends of Learning called *The Archean Treasure*, answer the questions below.

Before you start “digging”

1. What do you think the different colored layers represent?

Throughout your “digging” answer the following questions:

2. What are fossils and how are they created?

3. As you dig down deeper into the rock layers what is happening to the ages of the rocks?

4. Absolute Dating vs. Relative Dating - compare the two using the chart:

Absolute Dating	Relative Dating

5. How is the Law of Superposition used to date fossils?

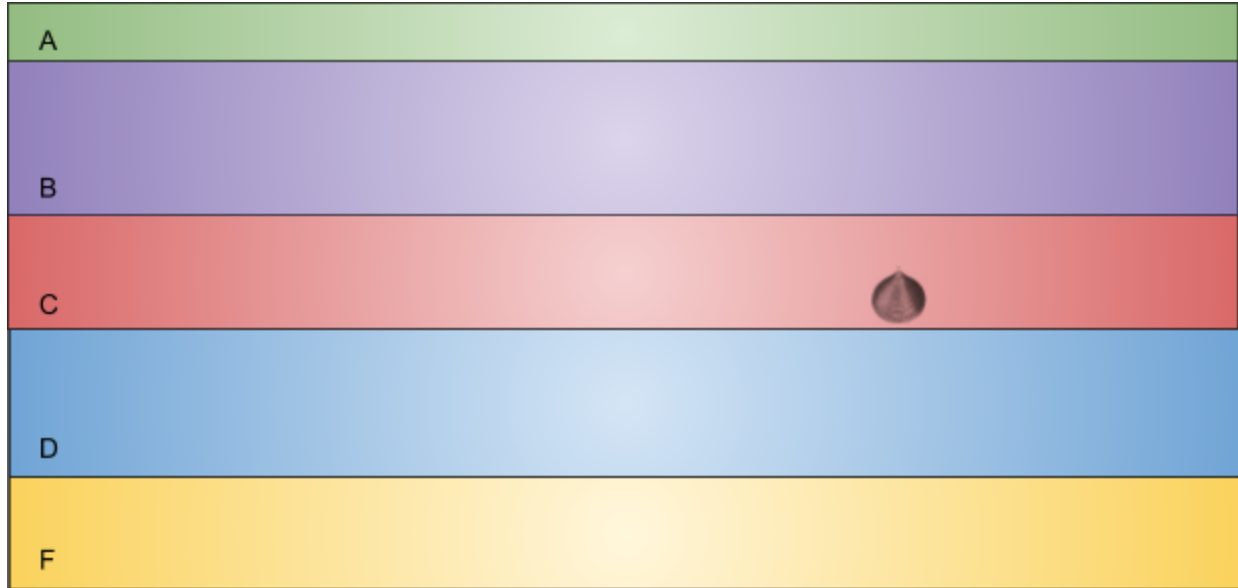
6. How can the Law of Cross-cutting Relationships interfere with the Law of Superposition?

7. A gap in the rock layers is known as :

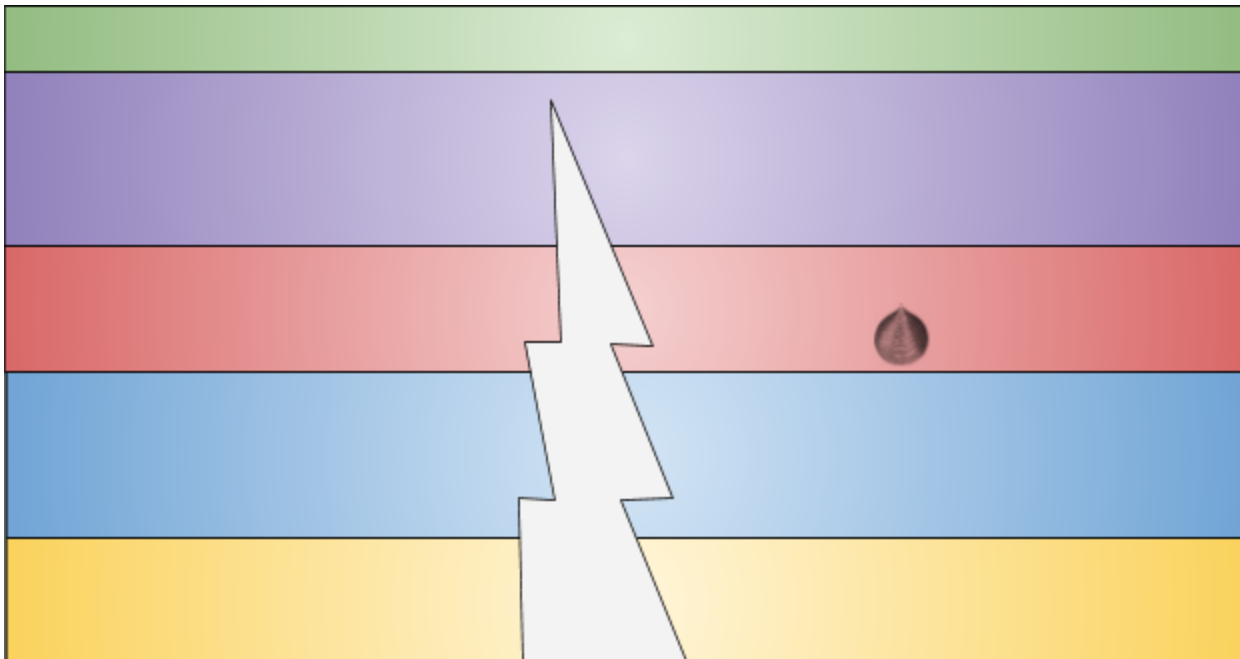
8. What is an index fossil and how is it used to determine the age of a rock layer?

Organizing the Fossil Record

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1. Which rock layer is the youngest? _____ Oldest? _____
2. How could the index fossil found in stata C be used to determine its age?
3. Using the letters A-G label the diagram from youngest to oldest rock formation.



4. How does this diagram represent the Law of Cross-cutting relationships?