

## Unit plan over Fossils/ Fossil Record

Grade: 7 Lesson plan 1		Subject: Life science / fossils	
Materials: Reading material provided through the link; <a href="https://clarkscience8.weebly.com/fossil-formation.html">https://clarkscience8.weebly.com/fossil-formation.html</a> .		Technology Needed: - Youtube video	
<b>Instructional Strategies:</b> <input type="checkbox"/> Direct instruction <input type="checkbox"/> Guided practice <input type="checkbox"/> Socratic Seminar <input type="checkbox"/> Learning Centers <input type="checkbox"/> Lecture <input type="checkbox"/> Technology integration <input type="checkbox"/> Other (list) <input type="checkbox"/> Peer teaching/collaboration/cooperative learning <input type="checkbox"/> Visuals/Graphic organizers <input type="checkbox"/> PBL <input type="checkbox"/> Discussion/Debate <input type="checkbox"/> Modeling		<b>Guided Practices and Concrete Application:</b> <input type="checkbox"/> Large group activity <input type="checkbox"/> Independent activity <input type="checkbox"/> Pairing/collaboration <input type="checkbox"/> Simulations/Scenarios <input type="checkbox"/> Other (list) Explain: <input type="checkbox"/> Hands-on <input type="checkbox"/> Technology integration <input type="checkbox"/> Imitation/Repeat/Mimic	
<b>Standard(s)</b> <b>Performance Standard MS-LS4-1:</b> Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.		<b>Differentiation</b> <b>Below Proficiency:</b> Have the student read with a proficient student who can assist and clarify/ have the teacher assist the student and read with him/her during the individual reading time Participate in discussions that will help clarify the expectation of the lesson <b>Above Proficiency:</b> Help other student in reading Participate in discussions that will help clarify the expectation of the lesson  <b>Approaching/Emerging Proficiency:</b> Participate in discussions that will help clarify the expectation of the lesson  <b>Modalities/Learning Preferences:</b> Participate in discussions that will help clarify the expectation of the lesson	
<b>Objective(s) the student should be able to ...</b>  - define fossil. - describe the different ways fossils are formed.  <b>Bloom's Taxonomy Cognitive Level:</b> - Remember - Understand			
<b>Classroom Management- (grouping(s), movement/transitions, etc.)</b> - In pairs during the engage and explain part of the lesson - In groups of three or in pairs during the explore part		<b>Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules and expectations, etc.)</b> - Students must follow the fingers rule to participate or if they need to ask a question or a bathroom break. (raise one finger if they have a question, 2 for water break , three for restroom break, 4 for any other emergency and the teacher can speak with the student in private). - students are expected to maintain an indoor noise level during (thin, pair, and share). - students are expected to have appropriate behavior, be cooperative and respectful for each other	
<b>Minutes</b>	<b>Procedures</b>		
	<b>Set-up/Prep:</b> Prepare all the videos for the lesson, and print out the reading material  <ul style="list-style-type: none"> <li>Have the students watch the video provided <b>before class</b> and submit their answer to the following question online (<b>what is a Fossil?</b>)</li> </ul>		

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	<a href="https://www.youtube.com/watch?v=qYwQoj0fUf4&amp;feature=emb_logo">https://www.youtube.com/watch?v=qYwQoj0fUf4&amp;feature=emb_logo</a>
15	<p><b>Engage: (opening activity/ anticipatory Set – access prior learning / stimulate interest /generate questions, etc.)</b></p> <ul style="list-style-type: none"> <li>• <b>Ask students:</b> What is a fossil? (pair, think, share) ( A <i>fossil</i> is a remainder of something that lived a long time ago, such as an ancient plant or animal. Most fossils actually come from species that are now <i>extinct</i>.)</li> <li>• Then <b>pose this question:</b> ("With so many organisms that die everyday, why is it that only a small percentage of organisms that ever lived actually become fossils?") <a href="https://clarkscience8.weebly.com/fossil-formation.html">https://clarkscience8.weebly.com/fossil-formation.html</a></li> </ul> <p>Let the students discuss in pairs then their answer. (Pair, think -write their individual response-, share)</p> <ul style="list-style-type: none"> <li>• Do the <b>frontloading activity</b> before reading the text in pairs (<b>Take a stand</b>) provided with the unit plan. (The teacher will read/ show the following statements. Some of the statements will be true and other statements will be false. - Students will move to the corner labeled (agree) or to the corner labeled (disagree) depending on their stand.</li> </ul>
25- min	<p><b>Explain and Explore:</b> <b>Students are given a reading text to read individually, then discuss it with their reading partner <u>highlighting the main points</u> (teacher will walk around and check on the student’s understanding)</b></p> <ul style="list-style-type: none"> <li>• The reading material (text) will be provided from the following website/link: <a href="https://clarkscience8.weebly.com/fossil-formation.html">https://clarkscience8.weebly.com/fossil-formation.html</a></li> <li>• The reading Lexile range is 1010L - 1200L</li> <li>• The teacher will provide a video/recording (done through Canvas or blackboard) of the article as a further support for EL or Special need students and will help the students to process the concept better.</li> <li>• After reading the text in pairs have each student fill out the form while reading (Assignment 1a: Your Exit Ticket)</li> <li>• Emphasize on the following “<b>Fossilization</b> (fossilized) - to convert into a <u>fossil</u>; replace organic with mineral substances in the remains of an organism” (from the text)</li> <li>• <b>Following the reading the teacher will explain the different methods of fossilization (categories of fossil type chart) and review some limitations for fossilization using the link <a href="https://clarkscience8.weebly.com/fossil-formation.html">https://clarkscience8.weebly.com/fossil-formation.html</a></b></li> </ul>
5min	<p><b>Review (wrap up and transition to next activity):</b> short quiz is provided with the unit plan</p>
<p><b>Formative Assessment: (linked to objectives)</b></p> <ul style="list-style-type: none"> <li>• Progress monitoring throughout lesson- clarifying questions, walking around the students while reading and sharing their understanding and clarifying any challenge</li> <li>• Exit ticket form filled out</li> <li>• Quiz</li> </ul> <p><b>Consideration for Back-up Plan:</b> have the chart printed for all the students and share it with them incase or a technology error</p>	

Reflection: Will be filled after class

## Frontloading Activity: Take a Stand

### (In class activity)

Before Reading the material in the following website/link, students will do Take a Stand Activity.

<https://clarkscience8.weebly.com/fossil-formation.html>

#### Assignment Instructions

- The teacher will read/ show the following statements. Some of the statements will be true and other statements will be false.
- Students will move to the corner labeled (agree) or to the corner labeled (disagree) depending on their stand.

- **Fossilization is the formation of real-life fossils a synthesized replica of the organism.**
- **Hard parts such as teeth, bones, shells, wood tissue, must escape destruction after death to be fossilized.**
- **Fossilization always takes place in sedimentary rocks.**
- **Erosion is helpful in exposing parts of fossils buried deep inside sediments of rock.**
- **Decomposers and scavengers are biotic factors which help organisms to form fossils.**
- **Quick burial is an abiotic factor that affect the possibility of forming fossils.**

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- **Coprolites are trace fossils that provides evidence of the diet of the extinct organisms.**
- **Soft - bodied organisms are very uncommon to find as fossils.**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Possible Points: \_\_/2

## Assignment 1a: Your Exit Ticket

**Reading** Read and study the material in the following website/link:

<https://clarkscience8.weebly.com/fossil-formation.html>

**Assignment Instructions**

Fill in the chart to below

<b>What is fossilization?</b>	<b>What are the different conditions needed for fossilization to happen?</b>	<b>Mention some examples of different kinds of fossilization methods.</b>

What are some of the limitations that could cause the remains of an organism not to become fossilized?

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Name: \_\_\_\_\_

Date: \_\_\_\_\_

Possible Points: \_\_\_/8

## Quiz 1

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### Assignment Instructions

Choose the correct answer for each of the following questions

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1. Which body part(s) is most likely to be fossilized?
  - Muscles
  - Fat tissue
  - Bones /teeth/ shells
  - Organs
2. Which of the following would be a limitation for the fossilization process? (choose all correct answers)
  - Decomposers (bacteria)
  - Scavengers
  - Organism buried rapidly
  - Erosion moving down and breaking the organism remains
3. Choose the factors that aid fossilization (choose all correct answers)
  - quick burial of the organism
  - the presence of minerals in the water.
  - Natural disasters
  - Erosion and weathering
  - The presence of hard structures such as bones and shells
  - Scavengers
  - Decomposers
4. Cast fossils are typically mold fossils that are filled in with minerals. True / False

**Unit plan over Fossils/ Fossil Record**

<p><b>Grade: 7</b> <b>Lesson plan 2</b></p>	<p><b>Subject: Life science / fossils</b></p>
<p><b>Materials:</b></p> <ul style="list-style-type: none"> <li>- collect materials for making a fossil (clay, different molds or items to make fossils, white glue). Poster paper and markers for the mind map</li> </ul> <p><b>Booklet with the reading material/ case study and activity are handed to the students (the material is provided at the end of this unit plan)</b> <small>8th Grade</small></p>	
<p><b>Instructional Strategies:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Direct instruction</li> <li><input type="checkbox"/> Guided practice</li> <li><input type="checkbox"/> Peer teaching/collaboration/cooperative learning</li> <li><input type="checkbox"/> Visuals/Graphic organizers</li> <li><input type="checkbox"/> PBL</li> <li><input type="checkbox"/> Discussion/Debate</li> <li><input type="checkbox"/> Modeling</li> </ul>	<p><b>Guided Practices and Concrete Application:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Large group activity</li> <li><input type="checkbox"/> Independent activity</li> <li><input type="checkbox"/> Pairing/collaboration</li> <li><input type="checkbox"/> Simulations/Scenarios</li> <li><input type="checkbox"/> Other (list)</li> <li><input type="checkbox"/> Hands-on</li> <li><input type="checkbox"/> Technology integration</li> <li><input type="checkbox"/> Imitation/Repeat/Mimic</li> </ul> <p>Explain:</p>
<p><b>Standard(s)</b></p> <p><b>Performance Standard MS-LS4-1:</b> Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.</p>	<p><b>Differentiation</b></p> <p><b>Below Proficiency:</b> Have the student read with a proficient student who can assist and clarify/ have the teacher assist the student and read with him/her during the individual reading time Participate in discussions that will help clarify the expectation of the lesson</p> <p><b>Above Proficiency:</b> Help other student in reading Participate in discussions that will help clarify the expectation of the lesson</p> <p><b>Approaching/Emerging Proficiency:</b> Participate in discussions that will help clarify the expectation of the lesson</p> <p><b>Modalities/Learning Preferences:</b> Participate in discussions that will help clarify the expectation of the lesson</p>
<p><b>Objective(s): students should be able to...</b></p> <ul style="list-style-type: none"> <li>- analyze a case study and explain their reasoning.</li> <li>- construct a mind map demonstrating their understanding about land and marine fossil formation</li> <li>- make a fossil model and make inference about it.</li> </ul> <p><b>Bloom's Taxonomy Cognitive Level:</b></p> <ul style="list-style-type: none"> <li>- Analysis</li> <li>- Application</li> <li>- Evaluation</li> </ul>	<p><b>Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules and expectations, etc.)</b></p> <ul style="list-style-type: none"> <li>- Students must follow the fingers rule to participate or if they need to ask a question or a bathroom break. (raise one finger if they have a question, 2 for water break , three for restroom break, 4 for any other emergency and the teacher can speak with the student in private).</li> <li>- students are expected to maintain an indoor noise level during (think, pair, and share).</li> <li>- students are expected to have appropriate behavior, be cooperative and respectful for each other</li> </ul>
<p><b>Classroom Management- (grouping(s), movement/transitions, etc.)</b></p> <ul style="list-style-type: none"> <li>- Students will be sitting in a round shape during the case study and the discussion</li> <li>- The second reading paragraph will be done in pairs, a class discussion/ mind map will follow</li> <li>- Then each pair will do the activity (each student will get to do his own model)</li> </ul>	

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Minutes	Procedures
10	Set-up/Prep: collect materials for making a fossil (clay, different molds or items to make fossils, white glue, wax paper to keep the working area clean). The case study, activity and the reading material will be handed to all students in a booklet copied from this text: <a href="https://www.greenwich.k12.nj.us/resources/gtsd-documents/doc_download/818-8th-grade-science.html">https://www.greenwich.k12.nj.us/resources/gtsd-documents/doc_download/818-8th-grade-science.html</a>
10 -15 min	<b>Engage: (opening activity/ anticipatory Set – access prior learning / stimulate interest /generate questions, etc.)</b> <ul style="list-style-type: none"> <li>- All students will be sitting in a circle. With the case study (The Morrison Formation) p.8. the Lexile rage for this is 1010L - 1200L</li> <li>-</li> <li>- Each student will take a 5min to read and interpret the graph. Then students need to read the question that follows. And we will discuss whether they agree or disagree in a round discussion, then they need to answer the question in this regard on the discussion board on google classroom. (tips for good conversation is creating a conversation map/ have a student drawing the map while everyone is participating to ensure that all students had turns in this discussion)</li> </ul>
20 min	<b>Explain :</b> <ul style="list-style-type: none"> <li>- Students will read a short paragraph (Analyze condition for Fossilization) p.10, they will answer the question below. Then students will pair, and we will discuss the question “which fossil record would likely show more diversity, land living- organisms or marine organisms?” (think pair share) (Lexile rage is 810L - 1000L)</li> <li>- Each pair is asked to make a graphic organizer (a mind map) on a poster to explain the diversity of land -organicism’s and marine organisms (the organism’s ability -body structure- to make fossils, and limitations from forming a fossil). key words/ vocabulary will be given to students to help them form a connection (mold and cast fossils, sedimentary rocks, scavengers, decomposers, extinction, trace fossils, whole body fossils, erosion, quick burial ...)</li> </ul>
10	<b>Explore:</b> <ul style="list-style-type: none"> <li>- Students <i>must hang their mind map poster in a specific place and proceed to work on the activity</i></li> <li>- Students will do a hands-on lab (Model fossil formation) for mold and cast fossils. The lab activity in the unit plan</li> </ul>
5min	<b>Review (wrap up and transition to next activity):</b> After the students finish working on their model, they are expected to clean the tables, through the wax paper away and place their fossils in a specific place to let it dry. They observe other students work (mind maps)
<b>Formative Assessment: (linked to objectives)</b> <b>Progress monitoring throughout lesson- clarifying questions, check-in strategies, etc.</b> <ul style="list-style-type: none"> <li>- Mind map with scaffolding</li> <li>- The teacher will be walking around the students will reading and sharing their understanding and clarifying any challenge</li> </ul>	
<b>Reflection (What went well? What did the students learn? How do you know? What changes would you make?):</b>	



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4. Observe the trace fossil and the permineralized fossil. What observations might scientists be able to collect from each type of fossil?

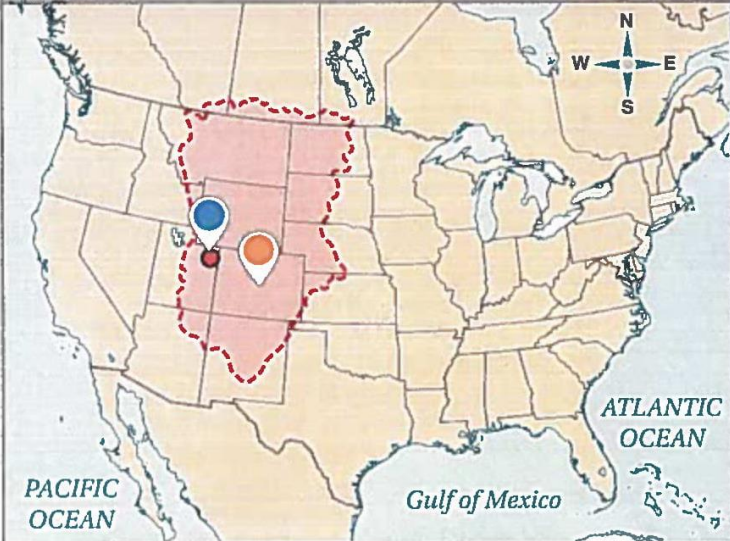


### Case Study: The Morrison Formation

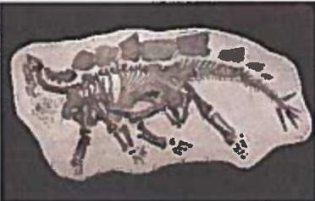
About 150 million years ago (mya), the area shown on the map was a large flood plain with many rivers. The conditions in this ancient flood plain environment were favorable for the quick burial of organisms that died there. It is now one of the most fossil-rich areas in the world. Many fossils of the organisms that died in this area are scattered and incomplete because of the movement of rivers, but not all were destroyed. Other locations have complete fossils.

**The Morrison Formation**


The Morrison Formation is a large area of sedimentary rock that is the most concentrated source of fossils in the United States. Some fossils are complete; others are mixed and jumbled together.



The map shows the United States with a red dashed outline indicating the Morrison Basin in the central-western region. A red dot marks the Carnegie Quarry in Colorado. A blue dot is located in the western part of the basin. A scale bar shows 0, 400, and 800 km and 0, 400, and 800 miles. A compass rose indicates North, South, East, and West. Labels for the Pacific Ocean, Atlantic Ocean, and Gulf of Mexico are present.



Sometimes scientists are able to find a complete fossil, such as this *Stegosaurus*.



Remains are often scattered and mixed together, such as these fossils in the Carnegie Quarry.

5. Does the high concentration of fossils in the Morrison Formation mean that more organisms lived here 150 mya compared to other parts of the country? Explain your reasoning.

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## Unit plan over Fossils/ Fossil Record

**STEP 10** What about the “fossilization process” made it difficult to accurately or completely identify the original item?



### EVIDENCE NOTEBOOK

6. The fossil shown at the beginning of the lesson is from an extinct whale. Under what environmental conditions did that fossil probably form? What can be learned from that type of fossil? Record your evidence.

## Analyze Conditions for Fossilization

Fossils of some species are very common and well known to scientists, while others are rare. This difference is due in part to the environment in which the organisms lived and died. For example, there are far more marine fossils than land fossils. One reason for the greater number of marine fossils is that many marine organisms have shells. The shells are very hard, do not decay easily, and are rarely eaten by other organisms. In contrast, soft-bodied animals, such as slugs, lack hard body parts. The bodies would quickly decay or be eaten by scavengers before they could be covered with sediments.



Marine fossils, such as these scallop and oyster fossils, formed in the sediment of the shallow sea in which they lived.

7. Which conditions most likely existed at the location in which these fossilized organisms once lived to enable so many fossils to form? Choose all correct answers.
- A. The ocean waters were very warm.
  - B. Many soft-bodied organisms lived there.
  - C. Many hard-bodied organisms lived there.
  - D. Sediments quickly covered the dead organisms, hiding them from scavengers.
8. Which fossil record would likely show more diversity, land-living organisms or marine organisms? Explain your answer.

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## Making a fossil Model

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### **Materials:**

Each student must have

- 2 two pieces of clay
  - wax paper
  - an item to make a fossil
  - white glue
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### **Assignment Instructions**

- Select two items to make a fossile
  - Mold the clay in your hands, press on it with the shape to make an imprint
  - Fill the mold with white glue then let it dry.
  - You can make trace, cast or mold fossils
  - After you are done with your trace/ mold fossil share your work with your friend and ask him/her if they can infer the kind of organism you used from the fossil.
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<p><b>Grade: 7</b> <b>Lesson plan 3</b></p>	<p><b>Subject: Life science / fossils</b></p>
<p><b>Materials:</b> Poster paper and markers for the Graffiti activity. Booklet with the reading material are handed to the students (the material is taken from this text: <a href="https://www.greenwich.k12.nj.us/resources/gtsd-documents/doc_download/818-8th-grade-science.html">https://www.greenwich.k12.nj.us/resources/gtsd-documents/doc_download/818-8th-grade-science.html</a>)</p>	
<p><b>Instructional Strategies:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Direct instruction</li> <li><input type="checkbox"/> Guided practice</li> <li><input type="checkbox"/> Peer teaching/collaboration/cooperative learning</li> <li><input type="checkbox"/> Visuals/Graphic organizers</li> <li><input type="checkbox"/> PBL</li> <li><input type="checkbox"/> Discussion/Debate</li> </ul>	<p><b>Guided Practices and Concrete Application:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Large group activity</li> <li><input type="checkbox"/> Independent activity</li> <li><input type="checkbox"/> Pairing/collaboration</li> <li><input type="checkbox"/> Simulations/Scenarios</li> <li><input type="checkbox"/> Other (list)</li> <li><input type="checkbox"/> Hands-on</li> <li><input type="checkbox"/> Technology integration</li> <li><input type="checkbox"/> Imitation/Repeat/Mimic</li> </ul> <p>Explain:</p>
<p><b>Standard(s)</b></p> <p><b>Performance Standard MS-LS4-1:</b> Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.</p> <p><b>Performance Standard MS-LS4-2</b> Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.</p>	<p><b>Differentiation</b></p> <p><b>Below Proficiency:</b> Have the student read with a proficient student who can assist and clarify/ have the teacher assist the student and read with him/her during the individual reading time Participate in discussions that will help clarify the expectation of the lesson</p> <p><b>Above Proficiency:</b> Help other student in reading Participate in discussions that will help clarify the expectation of the lesson</p> <p><b>Approaching/Emerging Proficiency:</b> Participate in discussions that will help clarify the expectation of the lesson</p> <p><b>Modalities/Learning Preferences:</b> Participate in discussions that will help clarify the expectation of the lesson</p>
<p><b>Objective(s) the student should be able to...</b></p> <ul style="list-style-type: none"> <li>- Infer the age of the fossils within sedimentary rocks based on the arrangements of the deposited layers.</li> <li>- Infer about the environment in which the animal lived in through its fossil.</li> <li>- Demonstrate their understanding of the fossil record through constructing a graffiti</li> </ul> <p><b>Bloom’s Taxonomy Cognitive Level:</b></p> <ul style="list-style-type: none"> <li>- Comprehension</li> <li>- Synthesis</li> </ul>	

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<p><b>Classroom Management- (grouping(s), movement/transitions, etc.)</b></p> <p style="text-align: center;">Students will be working in pairs for most of this lesson</p>	<p><b>Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules and expectations, etc.)</b></p> <ul style="list-style-type: none"> <li>- Students must follow the fingers rule to participate or if they need to ask a question or a bathroom break. (raise one finger if they have a question, 2 for water break , three for restroom break, 4 for any other emergency and the teacher can speak with the student in private).</li> <li>- students are expected to maintain an indoor noise level during (thin, pair, and share).</li> <li>- students are expected to have appropriate behavior, be cooperative and respectful for each other</li> </ul>
<b>Minutes</b>	<b>Procedures</b>
<b>10</b>	<p>Set-up/Prep: The case study, activity and the reading material will be handed to all students in a booklet copied from this text:</p> <p><a href="https://www.greenwich.k12.nj.us/resources/gtsd-documents/doc_download/818-8th-grade-science.html">https://www.greenwich.k12.nj.us/resources/gtsd-documents/doc_download/818-8th-grade-science.html</a></p>
<b>10 min</b>	<p><b>Engage:</b></p> <ul style="list-style-type: none"> <li>- Present a picture of fossils in different sedimentary rock layers and pose the following questions: which fossil would be the oldest? which fossil would be the newest? (discuss how they formed their answers) picture provided in the unit plan</li> <li>- Ask students to write a conclusion on their notebook regarding the age of the sediments (youngest / oldest) and the time it was deposited (most recently / the earliest)</li> </ul>
<b>20 min</b>	<p><b>Explain :</b></p> <ul style="list-style-type: none"> <li>- In pairs students will be given a short text (p. 17) (Lexile range: 1010L - 1200L) they will read it first individually, then read it in pairs and answer the question below the text it. “what type of data a scientist gets from studying a coprolite?” (think – write their answer- pair share)</li> <li>- Ask students to do a KWL chart on their notebook before about the Fossil Record.</li> <li>- Have students in pairs read the paragraph over fossil record and patterns in the fossil record (p. 17). (Lexile range: 1010L - 1200L)</li> <li>- while reading the text, I will ask the students to highlight any word that they did not understand, and I will be walking between groups and reading with students who need more support.</li> </ul>
<b>10</b>	<p><b>Explore:</b></p> <ul style="list-style-type: none"> <li>- After reading the paragraph ask each student pair to construct a graffiti on a poster paper. the graffiti must contain the following: what is fossil record, what sort of information it tells us (when and where organisms lived, their environment, size, shape, and their evolution, how much organisms have changed overtime or has extinct), what are the limitations found in the fossil record ? what patterns found in the fossil record and examples of the fossil record (include bones, shells, exoskeleton, imprints, petrified wood, DNA remnants)</li> </ul>
<b>5min</b>	<b>Review (wrap up and transition to next activity):</b>

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Ask students to hang their work and compare the different graffiti's made by the students. Ask students to complete the KWL chart and bring it back to school the next day for any clarification.

**Formative Assessment:** (linked to objectives) Progress monitoring throughout lesson- clarifying questions, check-in strategies, etc. through the graffiti work, the discussion and their ability to form a conclusion

**Reflection (What went well? What did the students learn? How do you know? What changes would you make?):**



## EXPLORATION 3

## Analyzing Fossil Data

Scientists have gathered a lot of data about fossils. When scientists organize, analyze, and interpret the data, they observe patterns. These patterns provide information about the types of organisms that have lived on Earth. A fossil can provide information about where the organism lived, the type of environment it lived in, and what it looked like. Scientists may also be able to infer how a species moved, whether it lived alone or in groups, what it ate, and whether it raised its young.

18. What types of data might a scientist get from studying coprolites?



Coprolites, or “dung stones,” are fossilized animal wastes. They may include bones, scales, and plant parts that were not completely digested.

## The Fossil Record

The collection of all known fossils and their placement in order from earliest to most recent is known as the **fossil record**. Therefore, the fossil record is the history of life on Earth as it is preserved by fossils. Scientists continue to revise their understanding of the fossil record as they find new information. However, the fossil record has limitations. Not all organisms that have lived on Earth are represented in the record. Many species left no fossils, or Earth processes destroyed their fossil remains.

While the fossil record does not contain fossils of all organisms that ever lived, it does provide evidence that life on Earth has been very diverse and has changed over time. Scientists have discovered that some organisms in the fossil record are similar to living organisms today, while others are quite different. For example, we know about trilobites from fossils, but no trilobites are alive today.

## Patterns in the Fossil Record

Some large-scale patterns can be observed in the fossil record. For example, 95% of all discovered fossils are marine organisms, mostly shellfish. Only 0.012% of discovered fossils are vertebrates. So, the fossil record of marine organisms is far more complete than that of land animals or plants.

Scientists also observe that some fossils are complete skeletons or remains of organisms. Other fossils show only parts of organisms. Complete fossils are rare because the remains of dead organisms are usually eaten or scattered by predators and scavengers. The remains of organisms that died in water were most likely scattered in the direction of the water flow.

Another pattern in the fossil record is that the older the fossil, the more different its body structure is compared to current living organisms. Also, there are many instances where a species disappears from the fossil record, never to reappear. These species are said to be extinct. **Extinction** is when all members of a species die out.

**Unit plan over Fossils/ Fossil Record**

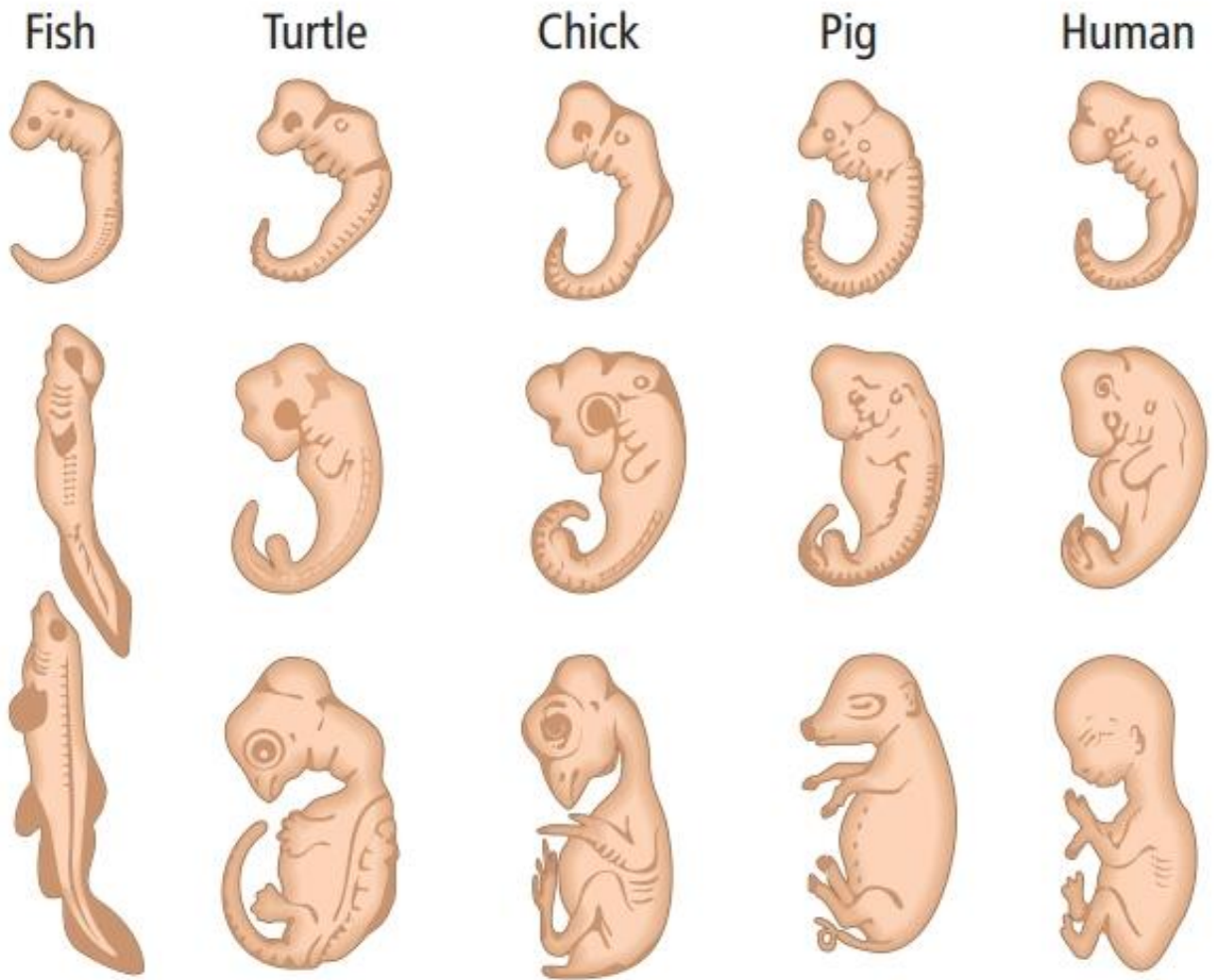
<p><b>Grade: 7</b> <b>Lesson plan 4</b></p>	<p><b>Subject: Life science / fossils</b></p>
<p><b>Materials:</b> The student notebook</p>	
<p><b>Instructional Strategies:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Direct instruction</li> <li><input type="checkbox"/> Guided practice</li> <li><input type="checkbox"/> Peer teaching/collaboration/cooperative learning</li> <li><input type="checkbox"/> Visuals/Graphic organizers</li> <li><input type="checkbox"/> PBL</li> <li><input type="checkbox"/> Discussion/Debate</li> </ul>	<p><b>Guided Practices and Concrete Application:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Large group activity</li> <li><input type="checkbox"/> Independent activity</li> <li><input type="checkbox"/> Pairing/collaboration</li> <li><input type="checkbox"/> Simulations/Scenarios</li> <li><input type="checkbox"/> Other (list)</li> <li><input type="checkbox"/> Hands-on</li> <li><input type="checkbox"/> Technology integration</li> <li><input type="checkbox"/> Imitation/Repeat/Mimic</li> </ul> <p>Explain:</p>
<p><b>Standard(s)</b></p> <p><b>Performance Standard MS-LS4-3</b> Analyze displays of pictorial data to compare patterns of similarities and differences in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.</p>	<p><b>Differentiation</b></p> <p>Below Proficiency: Have the student read with a proficient student who can assist and clarify/ have the teacher assist the student and read with him/her during the individual reading time Participate in discussions that will help clarify the expectation of the lesson</p> <p>Above Proficiency: Help other student in reading Participate in discussions that will help clarify the expectation of the lesson</p>
<p><b>Objective(s) the student should be able to...</b></p> <ul style="list-style-type: none"> <li>- explore embryonic development across species as evidence for evolution.</li> <li>- complete the end of topic assessment</li> </ul> <p><b>Bloom's Taxonomy Cognitive Level:</b> Analysis</p>	<p>Approaching/Emerging Proficiency: Participate in discussions that will help clarify the expectation of the lesson</p> <p>Modalities/Learning Preferences: Participate in discussions that will help clarify the expectation of the lesson</p>
<p><b>Classroom Management- (grouping(s), movement/transitions, etc.)</b></p>	<p><b>Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules and expectations, etc.)</b></p> <ul style="list-style-type: none"> <li>- Students must follow the fingers rule to participate or if they need to ask a question or a bathroom break. (raise one finger if they have a question, 2 for water break, three for restroom break, 4 for any other emergency and the teacher can speak with the student in private).</li> <li>- students are expected to maintain an indoor noise level during (thin, pair, and share).</li> <li>- students are expected to have appropriate behavior, be cooperative and respectful for each other</li> </ul>



**Unit plan over Fossils/ Fossil Record**

<b>Minutes</b>	<b>Procedures</b>
<b>10</b>	Set-up/Prep:
<b>15 min</b>	<p><b>Engage:</b></p> <p>Ask students to present the KWL chart and ask for any further clarification they had</p> <ul style="list-style-type: none"> <li>- Start by showing the class a picture of embryo development across different species</li> <li>- Students are asked to compare and contrast the different species using a Venn diagram on their notebook.</li> <li>- Students think (write their answer), pair, share the answer to the question: What is the reason behind the similarities in these embryos? The answer I am looking for is that all these species descended from a common ancestor.</li> </ul>
<b>15 min</b>	<p><b>Explain:</b> show the students a video Evolution the Evidence of Embryology by Randall Niles : <a href="#">(88) Evolution - Evidence from Embryology - YouTube</a></p> <ul style="list-style-type: none"> <li>- Have the students read the questions before the video</li> <li>- Have the students answer the questions after watching the video</li> <li>- Have students share their answers in pairs and then share it to the class</li> </ul> <p><b>The idea behind the video is that closely related embryo forms shared a more recent common ancestor.</b></p>
<b>15</b>	<b>The end of unit short assessment.</b>
<p><b>Formative Assessment:</b> (linked to objectives) Progress monitoring throughout lesson- clarifying questions, check-in strategies, etc</p> <p>Supporting students during the think pair share.</p> <p>Summative assessment is included</p>	
<p><b>Reflection (What went well? What did the students learn? How do you know? What changes would you make?):</b></p>	

Unit plan over Fossils/ Fossil Record



Embryo development across different species

Unit plan over Fossils/ Fossil Record

Name : \_\_\_\_\_

Date: \_\_\_\_\_

Possible Points : \_\_/4

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Assignment  
Instructions

After watching the video answer the following questions.

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1. How did Ernst Haeckel work contribute to Charles Darwin's Theory of Evolution?
2. What did Haeckel's drawings show?
3. What was the problem with Haeckel's drawings?
4. Mention one of the main points of Haeckel's drawings.

End of Topic Assessment 1

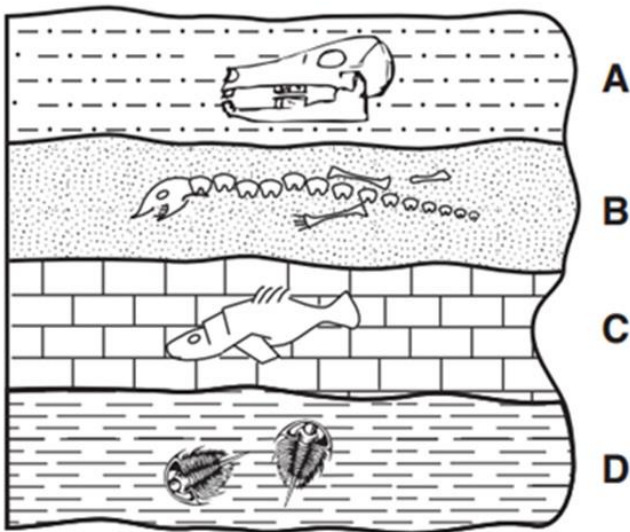
Name: \_\_\_\_\_

Grade: \_\_\_\_\_/16

Date \_\_\_\_\_

- 
- Assignment Instructions**
- This assessment will take 15 min
  - There will be 5 questions
  - This assessment is not an open book/resource
- 

**Question 1: Observe the diagram and answer the questions below. (4 points)**



- What type of rock is this? \_\_\_\_\_
- In which layer the oldest fossils were formed? \_\_\_\_\_  
Explain your answer: \_\_\_\_\_
- Millions of years ago this area was filled with water, looking at this diagram find an evidence for this information \_\_\_\_\_

**Question 2: Describe the process of fossilization. (2 points)**

**Question 3: Mention two ways an animal's body can be preserved entirely. (2 points)**

**Question 4: Choose the correct answer/s. (7 points)**

**a. An imprint of an animal's body on the rock is a**

- Trace fossil
- Mold fossil
- Cast fossil

**b. What are some limitations for fossilization? (choose all correct answers)**

- Decomposers (bacteria)
- Scavengers
- Organism buried rapidly
- Erosion moving down and breaking the organism remains
- Hard body structures such as bones and shells

**c. The fossil record can help us in knowing which of the following (choose all correct answers)**

- The ancient environment the organism existed in
- Where the organism lived
- The organisms color
- It shows up how certain organisms are related
- The organism's behavior

**Question 5: Comparative embryology and the fossil records are evidence of \_\_\_\_\_ (2 points)**

**Bonus question:**

**Why it is hard to find fossils in igneous or metamorphic rocks? \_\_\_\_\_**

**Good Luck!**

**Unit plan over Fossils/ Fossil Record**  
**End of Topic Alternative Assessment**

Name: \_\_\_\_\_

Date \_\_\_\_\_

Grade: \_\_\_\_\_/16

**Assignment Instructions**

Create a PowerPoint presentation over the different ways fossilization can occur and mention the limitations that prohibits fossilization from happening.

Make sure to incorporate information about the Fossil Record and the importance it holds as an evidence to evolution.

- Follow the rubric to help you in prepare for this assignment.

<b>Criteria</b>	<b>Fossil Formation</b>	<b>Types of fossils</b>	<b>Fossil record</b>	<b>Evidence for evolution</b>
1 point	Mentioning that a fossil is just a replica or the organism	Mentions two types of fossils	Mention the definition of the fossil record	Mention that the fossil record is an evidence to evolution
2 points	Define the process of fossilization	Mention three types of fossils	Mention definition and examples of the fossil records	
3 points	Define the process of fossilization and give out examples	Mention all types of fossils covered in class	Mention definition and examples of the fossil records, and explain the gaps in the fossil records	Explain how the fossil record is an evidence to evolution
4 points	Mention in detail how each type of fossil is formed	Mention in detail the different types of fossils providing pictures	Mention definition and examples of the fossil records, explain the gaps in the fossil records and explain what kind of information the fossil record provide.	

## Unit plan over Fossils/ Fossil Record