

Grade 4	FOSSILS: Use & Comparison	4th Grade Science Standard IV - Fossils (lesson 1 of 5)
Science Standard(s): Science Standard 4 Objective I		
Content Objective(s):		Language Objective(s):
<p>The students will work as partners to identify 4 defining features of fossils [size, color, shape, texture] in a simulated fossil dig in order to compare them to familiar objects as a way to help identify each 'find.'</p> <p><i>I can work with partners to describe 4 defining features of fossils [size, color, shape, texture] to compare them with familiar objects and identify each 'fossil.'</i></p>		<p>The students will record adjectives associated with the 4 defining features and will use them in sentence frames to make comparisons and to identify each fossil.</p> <p>I can record 2 or more adjectives associated with all 4 defining features and will use them in sentence frames to make comparisons and to identify each 'fossil.'</p>
<p>Essential Questions: What is a fossil? What can we learn from fossils?</p>		<p>Required Academic Vocabulary for Word Wall: Listen: archaeologist, fossils, tools, map, defining feature, size, color, shape, texture, identify Speak: archaeologist, fossils, tools, map, defining feature, size, color, shape, texture, identify Read: archaeologist, fossils, tools, map, defining feature, size, color, shape, texture, identify Write: archaeologist, fossils, tools, map, defining feature, size, color, shape, texture, identify Sentence Frames: ____ is (bigger/smaller) than _____; it is the size of _____. ____ is (redder/darker) than _____; it is the color of _____. ____ is (rounder/flatter) than _____; it is the shape of _____. ____ is (rougher/slicker) than _____; it is the texture of _____. The size, color, shape, & texture of this fossil identify it as _____.</p>
<p>Materials:</p> <ul style="list-style-type: none"> • Objectives written ahead of time • Defining Features sheet [one per student] • MAP grid [one per student] • Fossil Boxes [shoe box, sand, fossils] (fossils: real fossils, plaster casts, cleaned turkey & chicken bones, plastic insects trapped in hot glue, etc.) • Paint brushes [one per group] • 5 Sentence Frames written ahead of time 		<p>Additional Lesson Vocabulary: bigger, smaller, redder, darker, rounder, flatter, rougher, slicker,</p>

Opening: (5 minutes)

- Establish or Reinforce Management Routines/Procedures. Expectations in place and method to have the students respond to you. [i.e. Magic Word 'fossil' – when I say the magic word you will __, __, & ____. Ready? 'Fossil!']

T: "Have you ever discovered something in a sandbox, on the playground, in your desk, or somewhere else that was from long ago?" [wait, then invite responses]

- Introduce the Essential Questions for Fossils & Establish a purpose for the Fossil unit of study –[5 lessons] Have this information written ahead of time to post before the class or prepare to record it on the board as it is discussed.

T: "The essential questions for this unit relate to fossils, relics of long ago. Let's read them together. What is a fossil? What can we learn from fossils?"

S: What is a fossil? What can we learn from fossils?

T: "These will be the questions we learn about for the next five lessons. I want to see what connection you already have to fossils. I will ask three questions to find out more. Please do not answer aloud until all have been asked and then you have been given a chance to share. The questions are 1-What is a fossil? [wait] 2-Have you ever seen a fossil? [wait] 3-What does a fossil look like? [wait] You will have 30 seconds each to share with a partner your answers to these three questions. That will be a total of 1 minute for the two of you to share. Point to your partner so that I know you are ready to begin. When I say 'fossil' you may share. Good, everyone is pointing to a partner so I know that you're ready. 'Fossil.'" [invite responses as students wish to share whole class.]

- Come up with a class definition of what a fossil is. Write down some of the responses already shared and invite any additional ones so that the students can discuss and come to consensus on what they would like to include. Write the final result on the board.

T: "We want to include the most important parts of your descriptions in a class definition of a 'fossil.' [work through the process mentioned in the bullet above] Good, we have decided that a definition for fossils that we can support is the following; 'Fossil: the remains or evidence of an ancient organism.' Let's read this together. 'Fossil: the remains or evidence of an ancient organism.' "

S: 'Fossil: the remains or evidence of an ancient organism.'

- Post or write content & language objectives where they can be seen and referred to. Guide students to understand the expectations for the lesson before continuing on. Use non-examples as demonstrated below to draw attention to detail.

T: "Here are the objectives for the lesson. They will help us know exactly what we are expected to do so that we can meet this goal during the next 30 minutes. Please look at the content objective first as I read it aloud to you. "Today I will work with a partner to describe 4 defining features of fossils [size, color, shape, & texture] to compare them with familiar objects and identify each 'fossil.'" You will work alone for this task? [wait...no] no? You will find 10 features of the fossils [wait...no] no? How many features? [wait...four] What are these four? [wait...] show me with your hands that you understand these four defining features as you say them aloud with me. Size [hands small to large], color [point to different colors], shape [hands to show round, flat, curved...] and texture [rub surface of desk, clothing, carpet to distinguish]. All of that is to help us compare. Now read the objective again with me and use your actions to demonstrate the meaning of the lesson goals."

S: Today I will work with a partner to describe 4 defining features of fossils [size, color, shape, & texture] to compare them with familiar objects and identify each 'fossil.'

T: "Now, follow along as I read the language objective. I can record adjectives associated with all 4 defining features and will use them in sentence frames to make comparisons and to identify each 'fossil.' [wait] So we are going to use verbs to compare? [wait...no] no? Adjectives then... connected to size, color, shape, & texture. How about a quick example. I have a brother whom you don't know. I will use comparison adjectives to describe him as he is compared to me. Then you can maybe identify him, like in a picture with other people. My brother is taller than I, has blonder hair, he has a nose that is more pointed than mine and his hair is curlier

than mine. I used four comparison adjectives of size, color, shape, & texture. These same types of adjectives will be used to describe fossils during today's lesson. Please read the language objective aloud thinking of the goals you are committed to make happen."

S: Today I will record adjectives associated with all 4 defining features and will use them in sentence frames to make comparisons and to identify each 'fossil.'

Introduction to New Material (Direct Instruction): (10 minutes)

- Share basic vocabulary related to the science of fossils so that it can correctly be associated with the simulation task the students will engage in. Structure this instruction around the 6 questions illustrated on one hand [fingers & palm]. Use the hand as a reference and/or draw it on the board. Invite students to follow along with their own finger-association as they are familiar with doing from prior exposure.

T: "A good way to organize what we will be expected to learn and do during this study of fossils is to ask ourselves a few questions and then see if we can find the answers to them. Today we will use our hand with the 6 questions to guide our study. Who? – What? – When? – Where? – Why? – How? [demonstrate with hand] 1- Who finds and studies fossils? What is the name given to the scientists who make this their main job? 2- What are the objects discovered and the tools used to do the work? (these would be nouns) What are the methods used to discover them and study them? (these would be verbs) 3- When did the plants and animals represented by the fossils live on the earth? When were they discovered? 4- Where did these organisms live on the earth? Where were they discovered? 5- Why are fossils useful to us? Why are they a link to discovering about things that lived somewhere a long time ago? 6- How does the study of fossils work? How do they give clues of what happened during a time and place that we can never go back to? Please use your own hand to ask the one-word questions aloud while you consider some of the possible questions you would ask about the study of fossils. [demonstrate with the hand and repeat with the class] Who? – What? – When? – Where? – Why? – How?"

S: Who? – What? – When? – Where? – Why? – How?

- Now take the time to review some of the details of these questions as a chance to help the students retain the key vocabulary and concepts that will shape what they retain from the lesson activity. Address the 6 questions two-at-a-time: who&what, when&where, and why&how. Write them on the board that way as a guide to help the students follow the instructional piece. Record the key vocabulary answers after each question word.

T: "First we will discuss the questions Who? & What? The scientists who discover and study fossils are called ARCHAEOLOGISTS. [record beside the question Who?] Please say that with me in syllables. Then we will repeat it three times: soft, medium, loud. This will help our mouths learn to pronounce the new term. Ready? ...magic word [wait] 'Fossil' AR-CHAE-E-OL-O-GIST, archaeologist, archaeologist, archaeologist."

S: AR-CHAE-E-OL-O-GIST, archaeologist, archaeologist, archaeologist.

T: "These special fossil scientists, archaeologists have certain nouns and verbs connected to them in answer to the next question What? I would list fossils and tools [write fossils, tools & records beside What?] as the main associated nouns. There are different kinds of fossils as you will discover in today's 'fossil dig' and will learn the names of in the next lesson. Some of the tools archaeologists use are like picks and shovels for digging and brushes to remove the dirt from the fossils. So, we could also write the verbs of What? archaeologists do as 1-dig & clean. They do this very carefully so they do not ruin the fossil. Then they 2-map, and 3-observe & record information in order to 4-identify the fossils. [write these 4 verbs beside What?] Please take a moment and say these nouns and verbs with me and perform some action that goes with each one."

S: fossils, tools, records, [actions included] dig & clean, observe, record, identify.

- Perform actions with each of the words to help the students comprehend and retain the information. Fossils (cupped hands as if holding), tools (turning wrist), records (two hands as if holding a paper), dig & clean (scooping & dusting off motion), map (finger motion in the air as if plotting on a grid), observe & record (hold cupped hand up to eye for closer look & writing motion one hand on the other), identify (an 'Aha' look & quick writing motion as if giving it a name or label).

T: "The answers to Who? & What? are pretty specific and we can learn the words that are connected. For the next two questions When? & Where?, they describe the setting and surroundings of the fossils, just like the

setting in a story. The answers to these questions are different for different fossils and are often unknown. When did the plant or animal live on the earth? Where did it live and move and grow? Those are questions that have to be inferred or concluded by help from the two remaining questions. However, about when they were discovered and where they were discovered those are details that archaeologists keep careful track of. That is why they keep records to record the date of discovery and the location on a map. [write date beside When? and map beside Where?] The answers to when & where can be answered for here & now, but are more difficult to answer for there & then, meaning a long time ago. Think of when & where you know of fossil discoveries happening.” [wait...invite to share]

- The last piece of new material relates to Inferences, perhaps the most important concept the students will retain during the fossil unit. Help them make the connection to previous learning in language arts etc. about drawing conclusions, inferring from information given etc.

T: “The last two questions are Why? & How? These questions really help us to consider the importance of fossils to the scientific world and what they can tell us. Why are fossils useful to us? They help us to learn the answers to the ‘then and there’ of long ago because they are evidence that those times and places existed even when we cannot go back to visit them. [write evidence of ‘then and there’ beside Why?] How does the study of fossils work? How do they give clues of what happened during a time and place that we can never go back to? This is when we begin to look at the defining features of each fossil and draw conclusions about its identity. How it is done is by looking and weighing and measuring and then guessing. [write observe defining features & identify beside How?] What were the defining features we listed in our objectives for today’s lesson? “

S: size, color, shape, texture

- Review the information shared on defining features during the opening with the objectives. Be fairly brief as the students demonstrate comprehension of the key defining features: size, color, shape, & texture.

T: “We have already discussed some of the defining features that will be used to define the ‘fossils’ that we dig up today. These are size, color, shape, & texture. The other important words we’ll learn as we go are the types of words associated with these descriptions. For size we can use very general terms like big or little. We can also give more detail such as the weight, height, length of an object. That’s the same for each of the other defining features, there are some general terms and then some more specific. Today’s task will give you some flexibility to choose which terms describe each fossil the best, using all the vocabulary that you can.”

- Refer to the questions and answers you have listed on the board to help students review the chunks of information they have received during this lesson. This chart may be a helpful tool. Review as follows.

WHO?	archaeologist
WHAT?	fossils, tools, records/ dig & clean, map, observe & record, identify
WHEN?	dates [then & there]/[here & now]
WHERE?	maps [layers of rock]
WHY?	evidence of then & there
HOW?	observe defining features & identify

T: “Please look one more time at the 6 questions listed here and the types of fossil answers that we have provided. As a check for understanding I will call out the questions at random and I want you all to provide the answers. Ready? [wait] When?”

S: dates

T: “Who?”

S: archaeologist

T: “How?”

S: observe defining features & identify

T: “Where?”

S: maps

T: “Why?”

S: evidence

T: "What?"

S: fossils, tools, records

T: "the other What?"

S: dig & clean, map, observe & record, identify

T: "Excellent. These four steps will help us become archaeologists in the next part of our lesson."

Guided Practice: Simulated Fossil Dig (15 minutes)

- Teacher Note: Create fossil boxes before class begins. Fill a shoe box with a layer of sand and bury a variety of fossils. Fossils can include real fossils, plaster casts, cleaned turkey or chicken bones, plastic insects trapped in hot glue, etc.
- Explain the task of the fossil dig and hold up the necessary materials to explain. The fossil box, the brushes etc. Write the four steps from What? on the board in a more prominent place or just bring attention to where they are already written.

T: "Today we are going on our own fossil dig. I will explain how we will do this. If you remember the four verbs from What? we do with fossils 1-dig & clean, 2-map, 3-observe & record, 4-identify then you will be prepared to carry out your own fossil dig. While I demonstrate will you hold up a finger for each of these four steps you consider that I am explaining."

- Demonstrate holding 1 finger up, then 2, 3, & 4 as you say the steps aloud. Invite students to participate.

S: 1- dig & clean [1 finger], 2- map [2 fingers], 3- observe & record [3 fingers], & 4 – identify [4 fingers]

T: "You will be given a box of sand which has some fossils inside for you to find. Real archaeologists have to be very careful when they dig fossils. We don't want to damage the fossils. They use tools to help them carefully remove the fossil from the surrounding rock without damaging it. Today we will be using paintbrushes for our tools. The handle of the paintbrush can be used to dig in the sand and find fossils. Once a fossil is located, use the bristles to carefully brush away the sand."

- Pause and make sure that students are holding up one finger for step number one, 'dig & clean'

T: "Archaeologists also keep very careful records. First, they create a grid around the area in which they will be digging, so they know where fossils are found. You have a grid on your recording page where you will draw a sketch of each fossil as it is found, so we know where it was in the box."

- Point out the grid the students have to record their findings and show how the different points correlate with the fossil box. Make sure that students are holding up 2 fingers for step 2- map the fossil location. Reinforce their efforts.

T: "Once a fossil is removed from the ground, archaeologists make a record of its size, color, shape, texture, and any defining features that help us know what it is. Let's talk a bit more about defining features. How will you be able to tell the difference between a leaf imprint, a foot imprint, and a leg bone? A leaf will have veins, a foot print will be deeper and may show toe or claw marks, a leg bone will be cylindrical. We'll record these defining features in the chart beside the grid."

- Point out the chart with the defining features listed in the left-hand column. Students should be holding up 3 fingers to show that it is step 3- observe & record.

T: "Use your observations and defining characteristics to make a guess for each fossil's identity. That is when you really get to be detectives, one of the jobs of archaeologists. You will determine what the fossil is by comparing it to familiar objects around you and will record that information on the same chart with the defining features."

- Point out the chart with the defining features and note the spot to record the identification. Students should be holding up 4 fingers to show that it is step 4- identify.

T: "Once you've had time to find, dig, remove, and record information about your fossils, we'll share our findings using sentence frames that highlight the comparison of the fossils to other familiar objects."

- Distribute the fossil boxes to the tables where the groups sit. [likely no more than 8 different boxes, 5 or 6 idea due to material preparation]. Remind the students not to touch them until they are told to do so. Then

gather them in a fishbowl formation to model the task. Review the procedure for 'fishbowl.'

T: "Thank you for being responsible with the materials. In order to show you what each step looks like I will ask you to join me in our 'fishbowl.' Remember the ones closest to the table should kneel so that those behind can still see into the fishbowl, or what I'm doing at the table. Table ___ will you show us that you remember how to come form the fishbowl, when I say the magic word [wait] 'fossil.' [wait] Excellent. Now, the odd number tables can join us...[wait]...fossil! [positive reinforcement] And now the even number tables may join us... [wait] when they get here we will all be ready to begin...fossil!"

- Modeling Cycle: teacher does, teacher w/ student, two students do, whole class
- Refer to the four steps that will be modeled and explicitly describe the materials needed and the process involved.

T: "I will use the fossil box, and the recording sheet with the grid and the chart to model ONLY the first two steps. As a review: 1- dig & clean [1 finger], 2- map [2 fingers], 3- observe & record [3 fingers], & 4 – identify [4 fingers]. What are the first two steps I am going to model?"

S: 1-dig & clean...2- map

- Non-examples may be incorporated for effect and to remind students...like being fast & sloppy in the process. Take the paint brush, handle-end, and begin in one corner of the box to gently scoop the dirt aside and talk aloud about what you are observing and the care you are taking for the task. As your tool bumps a fossil express excitement and yet demonstrate and explain the added caution taken to dig it out intact. Remove it carefully with your fingers once it is unburied. Handle it carefully and brush away the sand for the cleaning process.

T: "That is the way an archaeologist should dig and clean a fossil when it is discovered. I am not done with modeling because I said I would do step number 2 also, which is map. Here is my grid and I need to draw this fossil and label it as #1, because it is the first one I found. I think I'll draw it in the middle of the grid...[no!] No? Who can explain why I should not draw the fossil in the center of the grid? [wait...share] Good, I need the grid to be an accurate representation of where I found the fossils, and this was in the top left corner, so that is where I will draw a simple symbol to represent fossil 1, and I'll label it #1 to help me with my comparisons in the chart. Now, I want to see if you remember the process for just those two steps."

- Invite a student with model behavior or one who needs encouraged to focus to be your student model. Very briefly coach him/her through the process as the other students describe and demonstrate without materials to their partners in whisper voices.

T: "___ is going to convince me that all the students were focused and know how to be archaeologists who can 1-dig & clean and 2-map all of the fossils correctly. He/she'll dig another fossil out of this same box because there are often more fossils where you find one. ___ may choose where to dig, but must remember where so it can be recorded correctly on the grid. Now before I say the magic word and let ___ be our class representative of a good archaeologist using the correct tools and processes I need your help to describe the process with correct vocabulary. I will be listening to see if you know the correct terms. If you have not yet learned them you may not have a chance to be archaeologists today because archaeologist have to study a lot before they get to go out on a fossil dig. Using Whisper voices you will use at least 4 key words we've learned to describe what ___ is doing. What kind of voices...and how many words...?" [wait]

S: whisper voices and at least 4 key words

- Have the helping student to dig with handle-end of brush, remove fossil, clean it, and map it with label #2 on the grid. Listen to hear that students use words such as archaeologist, map, grid, tool, clean, dig, label....

T: "Wonderfully done. Now we have fossil #2 discovered and labeled on the grid. It is time to model the last two steps so that you can work with your table partners to discover lots of fossils in your own fossil boxes...I know you can't wait, but we have to know how to 3- observe & record & 4- identify the fossils in the chart here beneath the grid. Before I do, will you all stand and take a stretch break and tell your neighbor what kinds of fossils you predict you are going to discover today. Please do not walk around, just stand and talk...30 seconds...fossil! [wait 30 seconds, listen to predictions & invite a few to share if you consider there is time.] What are steps 3 & 4 we are going to review?"

S: '3-observe and record 4- identify the fossil

- Model the next two steps with the appropriate materials & the correct processes. The key is for students to

complete each of the four steps for every fossil as it is found. You will want to emphasize that the first two were done alone only to chunk the information and make sure they were solid on their understanding. Refer to the Defining Features Chart, but clarify if needed that the sentence frames are for latter after the fossil dig has been completed.

T: "Here is the chart for the defining features. You can see that there are numbers listed in the columns to correspond with the number of fossils found. This first two, #1 & #2 are the ones we have already discovered. With these two columns and the defining features rows I will model and then ask another archaeologist assistant to help me model before we all begin our digs as partners. What tools will you need to complete steps 3 & 4, 3- observe & record & 4- identify?"

S: The defining features chart, pencil, and fossils to observe

- Hold up or point to the materials as they are referred to...prompting responses as needed. Perhaps a hand lens can be used as well and should be explained to the students.

T: "I'll begin with this fossil #1...I need to observe it with the purpose of identifying its four defining features of size, color, shape, & texture and then to identify what type of organism I think it is. Hmm..."

- Model thinking aloud as you turn the fossil, touch it, and observe it with your eye and through the hand lens. Then ask yourself what adjectives would be good to describe size..big/little/tiny... and record them in the box beside the row 'size.' Then repeat the same thinking process for color, shape, & texture. Model using a variety of vocabulary terms.

T: "I have recorded at least 2 adjectives for each of the four defining features as our language objective says we will. Do any of you have other adjectives you thought of to describe fossil #1 that I have not yet recorded here in the boxes? [wait, invite to share, & record] Those were great additions, I am impressed with the descriptive vocabulary you are using. I encourage you to be as exact as you can with the words that you know. You will be able to talk with your partners as you do this observation and recording so it will help you to brainstorm new words. Every archaeologist partner should be recording the observations in his/her own chart. Then there is this last piece for step 4- identify. The first sentence frame is in its own box because it is not for the comparison activity, but just to complete the steps of the fossil dig. If you can see from where you are in the fishbowl, on the count of three read this frame with me.... [wait] 1, 2, 3, 'The size, color, shape, & texture of this fossil identify it as ____.'"

S: The size, color, shape, & texture of this fossil identify it as ____.

T: "Drum roll [pound on the desk].....and fossil #1 is revealed to us today as.... [something absurd – non example]!"

S: 'NO!'

T: "Why not? [wait, invite response] Oh, because the things I recorded here for size, color, shape, & texture [refer specifically to the adjectives] do not lead me to conclude that fossil #1 is [the non example], but something else. I think it will help if I use the sentence frame to remind me that archaeologists are very, very careful in the conclusions they draw based on all of the evidence. Let's try it together and I will fill in a more correct identification for fossil #1."

S: The size, color, shape, & texture of this fossil identify it as ____.

T: "The size, color, shape, & texture of this fossil identify it as [an insect-whatever it is]. Now, I have successfully finished the last two steps for fossil #1. I need a group of apprentice archaeologist to show that they have studied enough to do the same for fossil #2."

- Choose 2 or 3 different helpers to observe (only one selected as lead to hold it) and then all recording on a sheet – at least pretending to do so this time. Coach them through the same steps as you modeled, referring to fossil #2 for adjectives and then the lead student gets to identify the object after they all read the sentence frame together.

T: "I like how the partners were all recording and suggesting adjectives while the lead took the closest look. Then you all said the sentence frame together, but the lead archaeologist finished it with his own identification...and one that made sense based on the adjectives you recorded. Good work. When would the other partners get to be the lead? [wait..share] Yes, with fossil #3 and so forth, in fact you will take turns digging and if you are the one to uncover the fossil than you complete all of the steps for that fossil as the lead. Then you hand the digging tool to another archaeologist and it's his turn to dig and complete steps 1-4. The others

still participate and record, but they are the followers. Any questions?"

- Dismiss the students to return to their own tables, insure they have chosen one student to be the lead and then they may begin their fossil dig, being careful to follow all steps. You may check their work informally by observing and questioning different groups what step they are on. Provide positive reinforcement and pacing comments as they work. Read aloud some especially good adjectives for the benefit of the class to trigger their own creative descriptions.

Independent Practice: Comparison Sentence Frames (10 minutes)

T: "A comparison is a way to relate what you know about two different things. Most often we describe the things that are the same and those that are different. Today we will use the descriptive adjectives of size, color, shape, & texture to liken the fossils to other familiar objects around us. In order to do this we will use four sentence frames, one for each of the defining features. What are those defining features?"

S: size, color, shape, texture

Sentence Frames:

- ___ is (bigger/smaller) than _____; it is the **size** of ____.
- ___ is (redder/darker) than _____; it is the **color** of ____.
- ___ is (rounder/flatter) than _____; it is the **shape** of ____.
- ___ is (rougher/slicker) than _____; it is the **texture** of ____.

- Modeling Cycle: teacher does, teacher w/ student, two students do, whole class
- Teacher will model sentence frame for size, then invite a helper for color. Afterwards two students will model shape and the whole class will model texture before being dismissed to practice the task as a group.
- Project the chart with adjectives listed for fossils 1-5 and cover the middle rows where color, shape, & texture are so that the focus is on adjective of size only.

T: "You can see all of the different adjectives here describing the sizes of the different fossils. These will be the words we use in our sentence frames, with the -er ending of comparison added before placing a familiar object in the blank. Here you can see the sentence frame: "___ is (bigger/smaller) than _____; it is the size of ____." This will guide me to know what to say about the fossils' size. I am going to start with fossil #1 and then I will use the same frame for fossils #2, #3, #4, & #5. I don't have to use bigger or smaller if I want to use more descriptive words like 'heavier' or 'more massive than,' but bigger and smaller are good beginning words. Here is my sentence: Fossil #1 is bigger than [pause] I have to think of something small...maybe a raisin....bigger than a raisin; it is the size of [pause] something a bit bigger like... an egg...but not a big or tiny egg...how about a chicken egg. I like it: "Fossil 1 is bigger than a raisin; it is the size of a chicken egg." [show actions with your fingers to demonstrate a raisin and a chicken eggs' sizes respectively] Repeat my sentence with me, please showing me the sizes of a raisin and a chicken egg."

S: Fossil #1 is bigger than a raisin; it is the size of a chicken egg.

T: "Now, I would let the other partners in my group make up four more size comparisons for fossils 2,3,4,&5 with the same sentence frame, but other objects and possibly other adjectives than 'bigger.' After all partners had completed the size comparisons then it'd be time to do the color comparisons. The sentence frame for color follows the same format as the size one with blanks for objects that are different and similar, but the adjective is not 'bigger,' but one with color like darker, redder, greener, lighter, etc. I need a very skilled archaeologist who can make this kind of detailed comparison of his new found fossil from 'then & there' to the objects he knows from the world of 'here & now.' Who thinks they are that skilled? I'll be a partner archaeologist to the lead to help him if he gets stuck."

- Uncover the next row of the defining features chart for color.
- Choose a student and work with him to make sure he completes the process using the format of the sentence frame.

T: "I can read the sentence frame with my partner to help him know what the pattern is, but where the blanks are I'll say 'blank,' except for the first blank where it says fossil #2. Like this: "Fossil #2 is (redder/darker) than ___ blank ___; it is the color of ___ blank ___." Now, ___ you have to think of the adjective you'll use. Here in the chart our group wrote dusty as our color adjective. We can make that fit the frame. "Fossil #2 is dusty...no it is..."

S: dustier

T: "Good. Fossil #2 is dustier...because we are comparing how they look in their color and dusty is related to color or tone. Now, what is less dusty than fossil #2?"

S: my pencil

T: "Excellent. I like how you chose an object that is close by and is very familiar to you. Now, you need to find a different object that completes the sentence frame showing what is equally dusty to fossil #2. What can you come up with?"

S: a spider web

T: "That will work. I think it helps me understand what this unfamiliar fossil is like a little better because of the way you connected it to something I do know, a spider web, maybe one of those old ones that has gotten real dust stuck in it giving it the color of dust. Can you read the whole sentence now?"

S: Fossil #2 is dustier than my pencil; it is the color of a spider web.

T: "Let's repeat that together:"

S: Fossil #2 is dustier than my pencil; it is the color of a spider web'

T: "After you've had your turn as the lead for the color comparison sentence frame, what do your partners need to do? [wait.. share] Yes. You'll take turns describing the fossils' color by comparing them to other things of similar and different color. I caution you to not describe them all by the dusty dirty look that being buried made them look like. What evidence do you have of what the fossil color would have been like for the plant or animal it came from in the world of 'then & there?' These are just some deeper ideas to keep in mind as you learn to be archaeologists. Now we've completed our color comparisons, it's time for a lead archaeologist with an assistant to demonstrate the shape comparison following the sentence frame."

- Choose two students. One to lead and the other to assist in the process, especially making suggestions of different objects. Assist only as necessary for clarification. Ask them to model with fossil #3 for a variety of descriptions.

*S2: Fossil #3 is (rounder/flatter) than blank; it is the **shape** of blank.*

S1: Fossil #3 is flatter than my glue stick; it is the shape of a popsicle stick.

T: "That is good. It gets tricky when we say the fossil is the shape of the pop sickle stick, because it is not long like a stick at all, but its thickness resembles a popsicle stick more than a glue stick. If you want to substitute the word thickness for the word 'shape' in the sentence frame you may, or you might just choose to describe a different aspect of the shape altogether like it being round and flat. Instead of flatter, we'll use rounder. 'Fossil #3 is less round than a coin; it is as round as an olive.' Do you see how that could work? The important thing is not to make your comparison perfect, but to use good description words and comparisons, so don't be afraid to try new words and be creative. We do want to be as correct in our descriptions as possible, so we'll not just make up shapes that don't connect at all."

T: "Now you will take a quick turn with your partner finishing the last comparison practice with the texture sentence frame. I'll give you the model and you find the objects you want to put into the frame. Look closely at these adjectives listed here in the chart for the texture of fossil #4 and look at the fossil too so you can compare it to something else. "Fossil #4 is slicker than blank; it is the shape of blank." Ready? Think first & then share with a partner [wait] Fossil!"

- Invite students to share their ideas and comment as much as would be instructive to the class.

T: "'Fossil #4 is slicker than my coat; it is the texture of my snow boots.' That is one possibility. 'Fossil #4 is rougher than the carpet; it is the texture of sandpaper.' This is another example, but is probably not describing the same fossil #4, it may be from another group. The same fossil #4 would most likely not be both slick and rough, unless it is two different parts of the same fossil, then I can understand the two different comparisons."

T: "All four defining features have a matching sentence frame that you should follow as you take turns describing the all of the fossils' sizes, colors, shapes, & textures. Once you have completed that then you may dig in the fossil box some more, gently discovering if there are any more fossils, beyond the five you already uncovered. What are you expected to complete before you dig some in the fossil box?"

S: the comparison sentence frames for size, color, shape, & texture.

- Release the students to work with their partners to share the sentence frames and check for understanding in the type of vocabulary used to compare the fossils. Ensure they are focused on the task.

T: "Ready? You will have about 5 minutes to complete the comparison sentences....there are 20..5 fossils times 4 defining features equals 20 sentences, or about 15 seconds per sentence. Let's begin. Fossil!"

Closing: (5 minutes)

- Review the questions WHO? WHAT? WHEN? WHERE? WHY? HOW? In relation to fossils as a way to assess their retention of key vocabulary and processes in fossil discovery.
- Review the objectives, inviting students to read them and consider if they accomplished everything they said they would.

T: "Please read the content objective with me so we can determine if we've met it. "Today I will work with partners to describe 4 defining features of fossils [size, color, shape, & texture] to compare them with familiar objects and identify each 'fossil.'"

S: I can work with partners to describe 4 defining features of fossils [size, color, shape, & texture] to compare them with familiar objects and identify each 'fossil.'

T: "Tell your partner what we did to meet that objective. [wait, share] Now let's read the language objective together. 'I can record 2 or more adjectives associated with all 4 defining features and will use them in sentence frames to make comparisons and to identify each 'fossil.'"

S: I can record 2 or more adjectives associated with all 4 defining features and will use them in sentence frames to make comparisons and to identify each 'fossil.'

T: "And what about this objective...it required a lot of vocabulary to describe and compare. How did we meet that goal? [wait, share] We just completed our first fossil dig – complete with all four steps and some in depth comparison. Congratulations! You have all passed archaeologist training! You are quickly becoming expert archaeologists who can make key inferences about the past based on what you discover. That will prepare us to learn about four different kinds of fossils in our next two lessons and then do some research on the real fossils scientist have found from the past. Now, archaeologist school is out of session, if you turn in your assignments – the grid and charts used in today's class."

- Collect the pages and review them for assessment purposes and keep them for reference in the subsequent lessons.

Assessment:

Informal observation and use of sentence frames & the work recorded in the charts

Extra Ideas:

Let students bury their fossils again in the sand of the fossil box.