Day 02 What Are Fossils?			
Literacy Strategy: practice skimming and scanning for specific information.		**Science Concept:** Fossils are the preserved remains of living things that provide a record of past life on Earth. Paleontologists excavate fossils to give us clues about what Earth's environment was like during the time those organisms lived.	
Reading TEKS: 3.9(D&F), 3.13(C)	**CCSS:** RI.3.5, W.3.7, W.3.8	**NGSS:** 3LS4-1	**Science TEKS:** 3(b)(1)(A),3(b)(2)(F)
Materials for Mini-lesson on Science-Based Disciplinary Literacies (referred to as Mini-lesson): chart paper, markers, sample inquiry chart (see page 7), Skimming and Scanning for Specific Information anchor chart.			
Materials for Science Inquiry Circles: team inquiry charts, pencils, variety of nonfiction texts for each group, access to websites and online books.			
Materials for Guided Science Investigation: see instructions beginning on page 5.			
Content Vocabulary: **Observation**—the action or process of looking at something or someone carefully to gather information. **Scientist**—person who is an expert in, or studies aspects (parts) of, the natural or physical world. **Team**—group of people with specific roles who work together to accomplish a goal. **Teamwork**—a collaborative effort to accomplish a goal or complete a task in the most effective or efficient way. **Collaboration**—two or more people working together to accomplish a goal or task. **Organisms**—living things that are able to carry on the functions (actions) needed to live, grow, and survive. **Fossil**—the preserved remains or traces of organisms found in the layers of the earth. **Paleontologists**—scientists who study fossils to learn about different aspects of extinct and living organisms. **Paleobotany**—the study of the fossils of ancient plants.			
Science and Literacy Connection: Scientists do a lot of reading as they expand their knowledge about a topic they are investigating. Being able to efficiently find the specific information they need is important.			

Mini-lesson—15 minutes

OVERVIEW

As a general rule, scientists engage in a lot of reading, including reading reports that others have written and articles about the topic they are studying. With this large volume of reading comes the need to be able to locate and read for specific information in a way that is efficient and effective. Today, learners will be introduced to a reading strategy often used by scientists: skimming and scanning for specific information. Yesterday, as you explored books about plants to decide which plant group interested you the most, you probably did not read every word in those books. You probably looked quickly at the

pages and stopped to look more closely at parts that were most important for your purpose. This is called “skimming and scanning.”

PROCEDURE

Each statement in quotation marks below contains suggested wording the teacher may choose to use for the lesson.

EXPLAIN THE STRATEGY

Tell what the strategy is (declarative knowledge)

- “Today we will learn a strategy that will help us quickly locate information in texts. That strategy is called skimming and scanning. Skimming and scanning means quickly looking across the text for key words. When I find those key words, I slow down and start reading. Skimming and scanning is the same thing I do when I stand in the cereal aisle at the grocery store and look for my favorite cereal. I don’t read every name of every single box of cereal. Rather, I skim and scan across the boxes, looking for the color of my cereal box. Sometimes I see boxes that are the same color as my favorite cereal, so to be sure I have the right one, I stop and read the name of the cereal. I use similar procedures when I skim and scan text for specific information.”

Tell when and why to use the strategy (conditional knowledge)

- “This strategy is important to scientists (as readers) because they often have lots and lots of materials to read. They are reading these materials to see what other scientists have said about their topic and to find answers to some of the questions they are asking. As a reader I know to use skimming and scanning when I’m looking for specific answers to the questions on my inquiry chart. I use skimming and scanning because I don’t need to read every single word on every single page of a text. I can also use skimming and scanning to locate specific information online.”

Tell how to employ the strategy (procedural knowledge)

While you model the strategy, you might want to say something like the following to learners:

- “I first read the question I am trying to answer. I then make a note of key words that the author of the text might use. This is the same as noting what color the box is of my favorite cereal. “
- “Next, I skim and scan the text for those keywords. I don’t read everything along the way; I just move my finger across the text, looking for those words. Sometimes the words appear in the pictures and captions or graphs, so I have to look at those too. “
- “Once I find the key words, I then slow down and read, paying attention to whether the text answers my question or not.”
- “If the text does answer my question, I make an entry on my inquiry chart. If it doesn’t, I either continue skimming and scanning or get a different text.”

Science Inquiry Circles—30 minutes

OVERVIEW

Scientists identify inquiry questions and record their data in an organized manner. Today learners will be introduced to the inquiry charts they will use as they investigate plant groups. You may want to model how to use the inquiry chart.

A sample of the inquiry chart is provided below (see page 7) and can be used to create a larger version on chart paper so that it can be easily seen by the whole class; alternatively, it can be displayed on a large screen with a projector.

A true inquiry allows learners to develop their own inquiry questions. The resources compiled for this inquiry investigation center around four main topics: plant life cycles, plant habitats, plant structures and adaptations, and plant classification. At this point, each team has chosen one plant group to learn more about. The teams will generate questions about their chosen plant group that can be answered by the available resources. For example, a group learning more about ferns might create questions about a fern's life cycle, habitat, structures and adaptations, and classification. Learners may develop additional questions that can be added to the inquiry charts. If children are having difficulty generating questions, the following sample questions might be used as examples, although children should be encouraged to make these questions their own rather than copying them word for word:

- What does your plant look like throughout its life cycle?
- What type of environment does your plant thrive in?
- What features of your plant allow it to survive and thrive in its habitat?
- What are the characteristics of your plant that make it a _____?
- Why does it belong in this group and not one of the other groups?

At this point, you may be wondering why students will select from these particular four plant groups (i.e., mosses, ferns, conifers, and flowering plants). These groups are intended to be representative examples of the much broader groups of plants that have existed on Earth (nonvascular plants, vascular plants, gymnosperms, and angiosperms). We selected these subgroups to highlight examples that children are likely to have encountered in their lives.

Each team will need an inquiry chart created on 11 x 17 paper. If you feel your learners need more space, you have the option to recreate these charts on a large piece of chart paper or butcher paper—be sure the size is manageable for storage and that the chart will be easy for the learners to record on**. NOTE: it is suggested that you have each group's inquiry chart created prior to starting the lesson.**

PROCEDURE

Each statement in quotation marks below contains suggested wording the teacher may choose to use for the lesson; teacher actions in parentheses.

Before Inquiry Circles

1. (Ask Equipment Directors to gather the team's inquiry chart and writing utensils. Once all items have been distributed, the teacher will tell each group which plant group they have been assigned.)
2. "Today we are going to start a guided inquiry. Now that you know which plant group you have been assigned, please write it in the top corner of the inquiry chart, along with each group member's name. You can see along the top of the inquiry chart that there are four column headers where you will write your inquiry questions, and there is also a column for other interesting facts."

During Inquiry Circles—20 minutes

3. "We have a variety of resources available for our inquiry. We have texts where we can find information about the life cycles, habitats, structures and adaptations, and classification of plants." (You might want to give a brief explanation of these terms as you guide children in generating questions.) "In your inquiry circles you will first come up with questions that you will answer as you find out more about your chosen plant group":
    - What would you like to know about your plant's life cycle? Decide as a group and write your question in the second column header on your inquiry chart.
    - What would you like to know about your plant's habitat? Decide as a group and write your question in the third column header on your inquiry chart.
    - What would you like to know about your plant's structures and adaptations? Decide as a group and write your question in the fourth column header on your inquiry chart.
    - What would you like to know about your plant's classification? Decide as a group and write your question in the fifth column header on your inquiry chart.
    - You can add additional findings in the column titled "Other Interesting Facts."
    - If you have more questions about your plant group, you can add additional columns.
4. "Take a few moments to discuss **what you already know** about your plant group. Perhaps you know something about the environment in which different members of the group grow or something about the group's physical characteristics. The Lab Director will lead the discussion. Be sure that everyone has a chance to share. Do not write anything on your inquiry chart just yet." (While teams are working, walk around the room and assist learners as needed.)
5. "Everyone should assist the Data Scientist in recording what you already know in the correct column. For example, if you already know something about your plant group's life cycle, you record it in the first column. If you know something about the environment in which you find the plant group, record it in the second column. If you know something that doesn't fit into these inquiry questions, record it in the 'Other Interesting Facts' column." (While teams are working, walk around the room and assist learners as needed.)

After Inquiry Circles—10 minutes

6. "As we conclude our inquiry circles for today, each team will have a chance to share what they already know about their plant group and what they accomplished and learned. The Lab Directors will lead the discussion about today's results, and the Data Scientists will share your responses with the class." (You may want to post a list of questions on the white board (or they may be projected) for learners to use as a guide during their group discussions. You may use the following questions and add any of your own for group discussion based on your class needs. Suggested questions: What did you already know about your plant group? What problems did you encounter? How did you resolve those problems?)

7. (After all learners have shared, thank them for their hard work and point out any excellent behaviors that you observed. If you notice any problems in the groups during the lesson, take a moment to point them out, and explain your expectations for all future inquiry circles. Collect all inquiry charts or have learners put them in their normal classroom place for ongoing work so they can easily access them.)

Guided Science Investigation—30 to 45 minutes

OVERVIEW
Today the paleobotany teams conduct excavations in their fossil digs.

GUIDING QUESTIONS
How will we plan our excavation? What will we find buried?

BACKGROUND INFORMATION
Fossils are the remains or impressions and traces of plants and animals that lived long ago. Fossils can provide evidence of organisms that are now extinct and give us clues about what Earth's environment was like during the time the organisms lived.

Excavating fossils is a slow and careful process. Paleontologists make a plan for where they will dig and what kind of tools or machinery they will need. Often, a dig is the result of an accidental finding of a part of a fossil! Once they begin to unearth a fossil, scientists use great care in the process to ensure that they do not damage any parts of a fossil or fossils they cannot yet see. Part of this process includes recording information about the fossil and the excavation site and safely preserving and packing any fossil parts for transporting. Some excavations can take years to complete!

SAFETY
Children should wear goggles during the excavation.

MATERIALS
Each team member will need:
- science notebook
- goggles

Each team will need:
- the paper grid plan they made in the previous class
- Student Fossil-Dig Instructions (paper copies or electronic access)
- 4 craft sticks
- 1 premade fossil site in an aluminum pan
- 1 small, flat paint brush
- 2 paper plates

Teacher will need:
- premade fossil dig (1 per team)
- Student Fossil-Dig Instructions (paper copy or electronic access)

SETUP

- Student Fossil-Dig Instructions (in the Day 2 folder) may be copied, one for each team, or projected on a device.
- For each team, prepare a bag of supplies that includes 1 copy of the Student Fossil-Dig Instructions (unless using electronically), 4 craft sticks, 4 flat paint brushes, 4 paper plates.

- Place the premade fossil digs and supply bags in a central location for distribution; each team should excavate the same tray they studied on Day 1.

DAILY OBSERVATIONS

Students will make careful observations of the fossil pieces they find.

PROCEDURE

Engage

1. Ask, *Who's ready to dig for fossils? What do you think you will find?*
2. Remind the teams about the plans they made yesterday for the dig; they should have the paper grid ready to use. Team members should decide the order in which they will dig before they begin.
3. Read the instructions for the dig to the class. Emphasize the importance of recording the information asked for in the instructions, including drawings. Then, ask if there are any questions.
4. Let the class know they have 20 minutes for the excavation.
5. Ask children to put on their goggles and distribute the fossil digs!

Explore

6. As children excavate their sites, move between the teams to monitor their actions and ask questions about their discoveries. (*What are you finding in the soil? What does it look like? Is it what you expected?)*
7. As children begin to unearth the pieces of the fossils, they may begin to guess what it is or ask you to confirm their findings. It is possible they have begun to put pieces together to figure out what they have. However, do not reveal any information; allow them to make discoveries on their own as they work.
8. When time is up, have the children stop digging. They should have all excavated pieces of the fossil(s) on the plates.

Explain

9. Ask the Data Scientist from each team to report on their excavation. Ask, *Can you describe what you found? Did everyone find a fossil or part of one? If not, why not?* Allow other members of the team to share their observations or explanations as well.
10. Some children may have asked why the fossil is broken or in many parts. Explain that even in real-life excavations, fossils are rarely found intact. Erosion and other factors play a role in whether an organism is preserved or not.

11. Add that scientists often have to put together many pieces to get an idea of what the organism was. Sometimes, not all the pieces are found!
12. Announce that tomorrow they will finish their work with the dig and share their discoveries with the class.

Elaborate

13. Extend the learning by viewing this short video about paleobotany: https://www.youtube.com/watch?v=FxnDUeL5908
14. Tell the class that tomorrow after they have completed their work with the dig, they will view a slideshow about different types of fossils and how they are formed.

Evaluate

15. Did learners communicate details or interesting information about their fossils to demonstrate careful observations?
16. Did learners raise new questions about fossil plants?
17. Are learners including new science vocabulary in their responses or explanations?

INQUIRY CHART

Names of Group Members and Plant Group	What does your plant look like throughout its life cycle?	What type of environment does your plant thrive in?	What features of your plant allow it to survive and thrive in its habitat?	What are the characteristics of your plant that make it a _____? Why does it belong in this group and not in one of the other groups?	Other Interesting Facts
What we know:					
Source 1 (Books: Title and Author; Websites: Name and Web Address)					
Source 2 (Books: Title and Author; Websites: Name and Web Address)					
Source 3 (Books: Title and Author; Websites: Name and Web Address)					
Source 4 (Books: Title and Author; Websites: Name and Web Address)					

Expanded Standards
Reading TEKS: 3.9 Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts—genres. The learner recognizes and analyzes genre-specific characteristics, structures, and purposes within and across increasingly complex traditional, contemporary, classical, and diverse texts. The learner is expected to (D) recognize characteristics and structures of informational text, including (ii) features such as sections, tables, graphs, timelines, bullets, numbers, and bold and italicized font to support understanding; and (F) recognize characteristics of multimodal and digital texts. 3.13 Inquiry and Research: listening, speaking, reading, writing, and thinking using multiple texts. The learner engages in both short-term and sustained recursive inquiry processes for a variety of purposes. The learner is expected to (C) identify and gather relevant information from a variety of sources.
CCSS: RI.3.5 Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently. W.3.7 Conduct short research projects that build knowledge about a topic. W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.
NGSS: 3-LS4-1 Some kinds of plants and animals that once lived on Earth are no longer found anywhere. Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments.
Science TEKS: 3(b)(1) Scientific investigation and reasoning: The learner conducts classroom and outdoor investigations following home and school safety procedures and environmentally appropriate practices. The learner is expected to (A) demonstrate safe practices as described in Texas Education Agency–approved safety standards during classroom and outdoor investigations using safety equipment as appropriate, including safety goggles or chemical splash goggles, as appropriate, and gloves. 3(b)(2) Scientific investigation and reasoning: The learner uses scientific practices during laboratory and outdoor investigations. The learner is expected to (F) communicate valid conclusions supported by data in writing, by drawing pictures, and through verbal discussion.