Lesson 1.2
Clues from the Past
Lesson Overview

In this lesson, students are introduced to observation and inference and look at the way geologists use them in their work. First, students familiarize themselves with observations and inferences through an everyday example: an image of a nest with pieces of eggshell inside. They describe what they observe and infer what may have happened. Next, the teacher introduces *Clues from the Past* and invites students to preview images and captions to think about what geologists might observe in their work. The teacher models making inferences, then pairs of students read the book. As they read, students record the observations and inferences that the geologist in the book made. Students then apply what they have learned by working in pairs to sort statements into those that are observations and those that are inferences. The purpose of this lesson is for students to develop an understanding of the differences between observations and inferences and to learn more about the work of geologists in the field.

**Anchor Phenomenon:** A rocky outcrop in Desert Rocks National Park has a fossil in it.

**Investigative Phenomenon:** There is a fossil embedded in rock.

**Everyday Phenomenon:** A bird’s nest has a broken shell.

**Students learn:**

- An observation is something you notice using any of the five senses.
- An inference is something you figure out based on observations and information you already know.
- Geologists use observations of fossils to make inferences about organisms that lived long ago.
- Making inferences when reading can help you understand informational text.
- Scientists use a variety of methods, tools, and techniques when they conduct investigations.
- Science findings are limited to what can be answered with evidence.
Partner Reading

Students read *Clues from the Past* to learn how geologists use observations and inferences in their work.

Instructional Guide

1. Read pages 3–4 aloud together. Call on volunteers to read the text aloud while the rest of the class follows along.

2. Highlight observations and inferences. Reread the last two sentences on page 4 aloud.

   To study dinosaurs, Coria has to make inferences. An inference is something he figures out by putting together what he can observe and what he already knows.

3. Set purpose for reading. Let students know that as they read, they should pay attention to the ways that Dr. Rodolfo Coria, the geologist in the book, made observations and inferences in his work.

4. Pairs read. Provide students with time to read the rest of the book with their partners.

5. Project and introduce notebook page 5. Have students turn to page 5, Reading About the Work of a Geologist: *Clues from the Past*, in their notebooks. Read aloud the instructions.

   - **Step 1:** Reread each page from *Clues from the Past* listed in the table below.
   - **Step 2:** For each page, record an observation that Dr. Coria made of *Argentinosaurus*.
   - **Step 3:** For each observation, record the inference that he made.
   - **Step 4:** In the last row, choose another observation and inference from the book to record. Be sure to record the page number in the first column.

   Remember that an inference is something you figure out using observations and information you already know. Dr. Coria made many observations of *Argentinosaurus*, and he made inferences based on what he observed together with what he knew. Let’s look back at his observations and inferences that you read about.

6. Model recording an observation from page 11 of *Clues from the Past*. Have a student read page 11 aloud.
What observation did Coria make of the fossil bones he found?
[He observed the sizes and shapes.]

Write “He observed the sizes and shapes of fossil bones” in the first column of the table on your projected notebook page. Have students do the same in their notebooks.

7. Model recording an inference.

What inferences did Coria make based on his observation?
[The bones were from the lower leg and backbone of a dinosaur. Argentinosaurus was big and walked on four legs.]

Write “The bones were from the lower leg and backbone of a dinosaur” in the second column in the table on your projected notebook page, and prompt students to write the same in their notebooks. Students may also record another inference if they wish. You might want to point out that students should use their own words to record the observations and inferences, rather than just copying them from the book.

8. Students reread and record observations and inferences. Circulate to assist as students work.

9. Discuss students’ responses on the notebook page. If time permits, call on partners to share and discuss their responses.

Teacher Support

Rationale

Pedagogical Goals: Informational Text
A major goal of the Amplify Science curriculum is to deepen students’ awareness of and experience with the genres of science writing they are likely to encounter in school and in their lives outside of school. This curriculum program is designed to address the Common Core State Standards for English Language Arts (CCSS-ELA) related to reading and writing informational text, with a specific focus on science text. Learning effective strategies and approaches for comprehension of informational text is extremely important for success in school, yet reading and writing these texts can be challenging for many students. The student books and related investigations in this curriculum program provide explicit, supportive instruction around how to tackle informational text.

Rationale

Literacy Note: Reading About Observations and Inferences in Clues from the Past
Clues from the Past explicitly describes the observations that Coria made of dinosaur fossils as well as what he inferred from his observations. Drawing conclusions about what an animal was like in the past based on observations of a fossil provides several excellent examples of inferential thinking for students. The purpose of rereading a portion of the text and recording Coria’s inferences is to ensure that students note these examples. This activity, as part of students’ introduction to observations and inferences, is highly scaffolded with students directed to specific places in the text. As they gain more facility with making inferences, students will practice making their own inferences while reading.
Instructional Suggestion

Providing More Support: Using Tables

In this unit, students often record information from books or investigations in data tables. If your students need more support in using tables to organize information, review how to use the table on page 5 of the Investigation Notebook before asking students to fill it in. You might point out students will use the left-hand column to record observations and the right-hand column to record inferences, and that each row should contain information from a particular page in the book. When you model completing the first row, you could ask students where you should record the observation and inference from page 11.

Rationale

Pedagogical Goals: Understanding the Nature of Science

One goal set forth by the Next Generation Science Standards (NGSS) is for students to understand the nature of science as a discipline and how scientific knowledge develops over time. The NGSS calls out eight understandings about the nature of science which are woven throughout the Amplify Science curriculum. This unit gives students an opportunity to experience the understanding that Scientific Investigations Use a Variety of Methods and that Science Addresses Questions About the Natural and Material World. In this lesson, Clues from the Past illustrates the idea that scientists use a variety of methods when they conduct investigations—specifically, geologists’ methods, tools, and techniques require gathering data from rocks and fossils and making evidence-based inferences about geological history. In addition, the book illustrates the idea that science findings are limited to what can be answered with evidence—Rodolfo Coria gathers evidence to support his claims about the Argentinosaurus.

Possible Responses

Page 11
Observation: He observed the shapes and sizes of the fossil bones.
Inference: The bones were of the lower leg and backbone. Argentinosaurus was big and walked on four legs.

Page 12
Observation: The fossils looked similar to other fossils he studied.
Inference: Argentinosaurus ate plants like the other big dinosaurs.

Page 13
Observation: The skulls have teeth with similar shapes to horses’ teeth.
Inference: Argentinosaurus teeth were good for eating plants.
## Reading About the Work of a Geologist: *Clues from the Past*

1. Reread each page from *Clues from the Past* listed in the table below.
2. For each page, record an observation that Dr. Coria made of *Argentinosaurus*.
3. For each observation, record the inference that he made.
4. In the last row, choose another observation and inference from the book to record. Be sure to record the page number in the first column.

<table>
<thead>
<tr>
<th>Observations of <em>Argentinosaurus</em></th>
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</thead>
<tbody>
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Partner Reading

Students read *Clues from the Past* to learn how geologists use observations and inferences in their work.

**Instructional Guide**

1. **Read pages 3–4 aloud together.** Call on volunteers to read the text aloud while the rest of the class follows along.

2. **Highlight observations and inferences.** Reread the last two sentences on page 4 aloud.

   Para estudiar dinosaurios, Coria tiene que hacer inferencias. Una inferencia es algo que él averigua juntando lo que puede observar y lo que ya sabe.

3. **Set purpose for reading.** Let students know that as they read, they should pay attention to the ways that Dr. Rodolfo Coria, the geologist in the book, made observations and inferences in his work.

4. **Pairs read.** Provide students with time to read the rest of the book with their partners.

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   Recuerden que una inferencia es algo que pueden resolver basándose en observaciones e información que ya conocen. El Dr. Coria hizo muchas observaciones del *Argentinosaurus*, y hizo inferencias basadas en lo que observó junto con lo que ya sabía. Volvamos a ver sus observaciones e inferencias sobre las cuales ustedes leyeron.
6. Model recording an observation from page 11 of *Clues from the Past*. Have a student read page 11 aloud.

¿Qué observación hizo Coria de los huesos fósiles que encontró? [Observó los tamaños y las formas].

Write “He observed the sizes and shapes of fossil bones” in the first column of the table on your projected notebook page. Have students do the same in their notebooks.

7. Model recording an inference.

¿Qué inferencias hizo Coria basándose en su observación? [Los huesos eran de la parte inferior de la pata y de la columna vertebral de un dinosaurio. El *Argentinosaurus* era grande y caminaba sobre cuatro patas].

Write “The bones were from the lower leg and backbone of a dinosaur” in the second column in the table on your projected notebook page, and prompt students to write the same in their notebooks. Students may also record another inference if they wish. You might want to point out that students should use their own words to record the observations and inferences, rather than just copying them from the book.

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Leer sobre el trabajo de un/a geólogo/a: Pistas del pasado

1. Vuelve a leer cada una de las páginas de Pistas del pasado enumeradas en la tabla debajo.
2. Para cada página, apunta una observación que el Dr. Coria hizo del Argentinosaurus.
3. Para cada observación, apunta la inferencia que hizo.
4. En la última fila, elige otra observación e inferencia para apuntar del libro. Asegúrate de apuntar el número de página en la primera columna.

<table>
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