Schoolyard Geology
Lesson by Lacey Moore

Related Video Titles:
- *Cambrian Explosion*
- *Paleontology: Paleontologists Study Tracks and Traces*

Activity Subject: schoolyard geology, observations and inferences

Grade Level: 6-8 grades

Introduction
This lesson is the first in a series in which students investigate the geologic time scale and how it's used to make sense of and sequence major events in Earth's immense history. Students explore their own schoolyard in this lesson and make observations to infer the history of the schoolyard. Back in the classroom, students share their observations, sequence events on a schoolyard timeline and debrief their experiences.

Assessments   Worksheet

Time   60 minutes

Group Size   Varies; individuals, small groups, whole class

Materials
- "Schoolyard Geology" Worksheet (three pages)
- Clipboard or notebook to write on outside
- Extra paper

NEXT GENERATION SCIENCE STANDARDS

MS-ESS1-4 Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history. *[Clarification Statement: Emphasis is on how analyses of rock formations and the fossils they contain are used to establish relative ages of major events in Earth's history. Examples of Earth's major events could range from being very recent (such as the last Ice Age or the earliest fossils of homo sapiens) to very old (such as the formation of Earth or the earliest evidence of life). Examples can include the formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms, or significant volcanic eruptions.] [Assessment Boundary: Assessment does not include recalling the names of specific periods or epochs and events within them.]*

LEARNING OBJECTIVES

After this lesson, students will be able to:

- Distinguish observations from inferences.

- Use observations and inferences to reconstruct the history of a place.

- Sequence events along vertical timelines.

Preparation
1. Take a brief walk around the schoolyard looking for natural or human-designed features that students can observe and make inferences from about the history of the schoolyard. This may include things like vegetation, buildings, sidewalks and other infrastructure. Think about how you'll let students explore the schoolyard and set boundaries. One option is to move together as a whole class to various areas in the schoolyard (e.g., sports field, parking lot, landscaped area on the side of the school, etc.) keeping everyone within eyesight and allowing them to make observations individually or in small groups. You might choose only a couple key areas to take students to-ideally with an abundance of features, interesting history and distance from classrooms where other students may be disturbed.

2. Make double-sided copies of page one and two of the "Schoolyard Geology" Worksheet for each student. They will also need a blank piece of paper on which to illustrate the schoolyard setting. Make single-sided copies of page three of "Schoolyard Geology" Worksheet. (Note: Students can use the blank side to draw their schoolyard timeline.)

3. Before class, draw a chart on the board with the column headers "Feature," "Age," "Observation" and "Inference." Students will fill this in after exploring the schoolyard. Also draw a vertical timeline on the board or chart paper. You will construct a class timeline of the schoolyard's history.

Procedure

1. **INTRODUCE LESSON OBJECTIVE. (5-10 MIN)**
   Once students arrive, tell them that today they'll be doing some schoolyard geology and investigating the history of the schoolyard. Ask: *What kinds of features/objects might give us clues to the schoolyard's history?* Have them think-pair-share. Pass out pages one and two of the "Schoolyard Geology" worksheet and go over it briefly. Depending on students' prior knowledge, you may want to spend some time differentiating an observation versus inference. (An observation is gathering information using the five senses. An inference is an explanation for an observation and also includes past experiences and prior knowledge.)

   Before going into the schoolyard, ensure students understand the physical boundaries of this activity as well as norms of being out of the classroom during the period (keeping voices low near classrooms, staying within eyesight of teacher, staying on task and not disturbing other students while making observations, etc.). Remind students to take appropriate layers, a clipboard or notebook to write on and a pencil or pen.

2. **IN SMALL GROUPS, STUDENTS EXPLORE SCHOOLYARD. (20 MIN)**
   Students will be exploring the schoolyard, illustrating a location, and observing natural and human-designed features (e.g., buildings, plants, landscaping, pavement, etc.). They will age the features (number or description) as well as make inferences about what the feature/object may tell about the schoolyard's history. Give students a five-minute warning to wrap things up before going back into the classroom.

3. **STUDENTS SHARE OBSERVATIONS AND INFERENCES. (10 MIN)**
   As students arrive back in the classroom, ask a few students at a time to fill in the chart on the board (similar to the one on their worksheets) and list "feature," "age," "observations" and "inferences." Once you have at least five to seven features in the chart, have students go back to their seats. Go through the chart quickly to ensure students were able to differentiate observation from inference. (For example, an observation may be that there was a fire hydrant on schoolgrounds stamped with the year, "1966." An inference could be that the fire hydrant was manufactured then. Which means the school is likely not older than 1966. However, perhaps the age of the school dates to the 1960s.)

This is also a good time to introduce the idea of relative versus absolute dating. Ask students how they described the age of features/objects. Relatively dating something involves comparing its age to other features/objects (the painted crosswalk is younger than the school parking lot that it's painted on) and absolutely dating involves assigning a specific number to something (e.g., the fire hydrant likely was manufactured in 1966). Note: students will apply relative dating in future lessons. You may go through and solicit students' help to circle all of the relatively dated features in the class chart or challenge students to do it on their worksheets.

4. **CREATE CLASS TIMELINE OF HISTORY OF SCHOOLYARD. (10-15 MIN)**
   Pass out page three of the "Schoolyard Geology" worksheet. The class will be developing a timeline of schoolyard history based on student observations and inferences. Use the vertical line you drew on the board or chart paper and construct the timeline with the class. Follow the prompts on the worksheet to label the timeline, identify the top as present time and the bottom as the oldest time (either development of schoolyard site, construction of school and/or existence of ecosystem before school). Ask students to share some events that may have taken place in the schoolyard's history based on their observations and inferences. Chronologically sequence along the vertical timeline. Students should follow along, individually recreating the same timeline on their worksheet.

5. **DEBRIEF AND REFLECTION (10 MIN)**
   Facilitate a whole class discussion reflecting on the lesson. Questions may include:
   - How easy or difficult was it to determine the history of the schoolyard? Explain.
   - What might be some limitations of your schoolyard timeline? Anything else that would be helpful to know?
   - What questions do you still have about the schoolyard and its history?
   - What generalizations can you make about the clues or evidence that were the most helpful in reconstructing the history?
   - How do you think your schoolyard geology experience compares to what scientists do when reconstructing the history of a place or even the planet?

Name_____ Period/Class_____ Date_____

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Student's Edition
What can we infer about the history of a place (schoolyard) by making observations in the field?

1. Take a moment to explore the setting and make observations.

2. Illustrate the setting on a separate sheet of paper.

3. Try to discover the history of your schoolyard by making observations and inferences in the field. Choose three to five natural or human-designed features that may be clues for major events that took place in the schoolyard's past. Record your thoughts in the chart below.

Feature/Object	Age (description or number)	Observations (what you see, smell, feel, etc.)	Inferences (what might your observations tell you about the history of the schoolyard)	Questions I Have

Feature/Object	Age (description or number)	Observations (what you see, smell, feel, etc.)	Inferences (what might your observations tell you about the history of the schoolyard)	Questions I Have

4. Using your observations of the setting and features, can you infer major events in the history of the schoolyard? What was the setting like 50 years ago? 150 years ago?

5. In your chart, circle the features that were relatively dated. Put an "X" next to the features that were numerically (absolutely) dated.

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Student's Edition

Note: You will be using this timeline throughout the next few lessons.

Timeline of Schoolyard History
1. Create a timeline of your schoolyard below.
   - Draw a vertical line below or on a separate sheet of paper. Title it "Schoolyard Timeline."

   - The top of the timeline represents present time. Decide what the bottom of your schoolyard represents (development of schoolyard site, construction of school, existence of ecosystem/site before school) and label it. Record the date or guess at the age of that time.

   - Based on your observations and inferences in the schoolyard, add major events and/or features in the schoolyard's history in chronological order on the timeline. *Remember oldest events are closer to the bottom. Recent events are closest to the top.*