Britannica Expedition:LEARN!

Teacher Toolkit

Sequence and Patterns: Grades 3–5

OVERVIEW:

Both scientific and historical reasoning rely on a student's ability to make sense of chronology in order to identify patterns and relationships that allow them to identify scientific rules or historical themes. A "sequence" refers to an ordered list of numbers or elements that follow a specific rule or pattern, while a "pattern" is the underlying rule or repetition that governs the arrangement of elements within a sequence; essentially, a pattern describes the "how" behind a sequence, allowing you to predict the next element based on the established order.

Social Studies Mini-Lessons

Chronology in History

Background: Sequencing, or the ability to place events in chronological order, is essential to the study of history. Without understanding when and in what sequence events occurred, students cannot effectively analyze the relationships between those events. A strong sense of chronology provides the mental framework needed for deeper analysis and evaluation of historical events. The following list offers potential instructional strategies for building students' understanding of chronology.

- Distinguish between past, present, and future time.
    - Distinguishing between these time periods helps students comprehend historical events, make connections to current events, and predict or analyze potential future outcomes. This helps students see cause-and-effect relationships over time and gain a clearer perspective on how the past influences the present and future.
- Identify the order (beginning, middle, end) of a historical narrative or story.
    - Historical narratives can engage and motivate students while providing them with practice in placing events in the order in which they occurred.
- Construct a historical narrative with a clear order.
    - Working backwards, students can trace the origin and development of an event or idea over time. For example, using the Expedition: Learn! lesson "What was the American Revolution," students can start with the first shots fired at Lexington and Concord and work backwards to construct a narrative about what led to that moment.

- Measure and calculate calendar time.
    - Build students' understanding of how time is measured by introducing fixed points of the calendar system, such as BC and AD or BCE and CE.
- Compare calendar systems and measures of time.
    - It is essential that students learn about and compare various calendar systems, including the Roman, Muslim, and Hebrew calendars.
- Interpret dates presented in timelines.
    - Refer to the *Expedition: Learn!* lesson "Using Timelines."

Science Mini-Lessons

Sequence and Patterns in Science

Background: Sequencing and patterns in science are easy to observe. From life cycles to the cycle of the sun, moon, and seasons, students recognize patterns and cycles even before starting school. In grades 3–5, students are expected to explore these patterns more deeply by examining their similarities and differences. Patterns help students sort, classify, communicate, and analyze rates of change in both natural phenomena and human-designed products. Additionally, patterns are key in making predictions. The following list offers potential instructional strategies for building students' understanding of sequencing and patterns.

- Use models and diagrams to represent cycles and sequences.
    - Providing students with graphic organizers and templates scaffolds the cognitive load so that they can focus on the order in which things unfold.
- Recognize patterns from sequencing.
    - Chronology and sequence in science differ from other subjects. Rather than events unfolding in a linear fashion, science often involves repeated cycles of events. Using familiar concepts like seasons or phases of the moon helps students learn how sequencing is used in science. Consider using the following *Expedition: Learn!* lessons to support students in sequencing cycles that repeat over time.
        - "What Is the Rock Cycle?"
        - "Life Cycles of Animals"
        - "Life Cycles of Flowering Plants"
        - "Understanding the Water Cycle"
- Identify similarities and differences within patterns.
    - Recognizing similarities and differences within cycles and patterns can help students sort and classify concepts, objects, and ideas, which deepens their knowledge of scientific principles.
- Use patterns to make predictions.
    - Patterns provide scientists with clues about what will happen in the future. For example, meteorologists use patterns to predict weather. Consider using the following lessons within *Expedition: Learn!* to develop students' ability to use patterns to make predictions.
        - "Patterns of Motion"
        - "Patterns of Daily Change"
        - "Seasons and Weather"
        - "Responding to Seasonal Changes"
        - "Patterns of Earth's Features"
- Use sequence and patterns to explain and define rates of change.
    - "Rate of change" refers to how quickly something changes over time. Students use rates of change to support their analysis of data and to develop scientific arguments.

Check for Understanding

If you observe ...	Then try ...
students having difficulty identifying the order in which events occurred	providing students with a graphic organizer to actively engage them while they read. In addition, provide students with clue words that help signal chronology and encourage them to use the words to place the events in order. For an additional scaffold, have students record the various events on sticky notes or note cards that can be easily rearranged as they encounter additional information.
students struggling to recognize patterns in natural phenomena (like moon phases, lifecycles, tides, or plant growth)	asking students to create a visual timeline or chart that tracks the pattern over time. Incorporate physical models, such as a lunar phase wheel or a plant growth chart, to help students visualize the sequence and pattern. For extended practice, they could observe the phases of the Moon or track plant growth over several weeks.
students confusing cycles with one-time events	present students with examples of cyclic events (e.g., water cycle, seasons) and one-time events (e.g., volcanic eruption). Use Venn diagrams to compare and contrast cycles with one-time occurrences. Encourage students to label events as cyclical or non-cyclical and explain why they belong in each category.