

Patterns of Earth and Sky: Analyzing Stars on Ancient Artifacts (Grade 5)

Opportunities for Unit Extensions

Field Trips and Other Resources

If time allows, you may wish to complement the content of this unit by organizing a student experience such as a field trip, a guest speaker, or even a virtual field trip. For the content of the *Patterns of Earth and Sky: Analyzing Stars on Ancient Artifacts* unit, we recommend the following:

- After Lesson 1.1, you may consider organizing a field trip to a local museum with an archaeology exhibit. Have students focus on what they can learn about ancient cultures from the artifacts in the exhibit. For a list of museums that focus on archaeology in your region, conduct a web search using the phrase “archaeology museums in [your state]
- After Chapter 1, find a local scale model of the solar system. If there is not one available in your area, consider watching a video of the creation of one such model:
 - Conduct a web search for a video titled “To Scale: The Solar System”After viewing the scale model, you may choose to have a class discussion or a writing activity to debrief the experience by using prompts such as:
 - How did your thinking about the scale of the solar system change after viewing the scale model?
 - What was surprising about the scale model?
 - What was useful about the scale model?
 - What were the limitations of the scale model?
 - Thinking about where other stars are in relation to where the sun is, how does this change your thinking about the scale of the distances to other stars in space?
- After the conclusion of the unit, if you wish to enrich this unit with an experience outside the classroom, you may consider organizing a field trip to your local planetarium. For a directory of planetariums in your region, conduct a web search using the phrase “planetariums in [your state].”
- Anytime during this unit, you could invite a guest speaker to address students—an astronomer, or even an archaeologist. Guest speakers can inform students about career pathways in science and can be used as primary sources of information about stars or ancient artifacts. Guest speakers should be selected in such a way as to represent diverse demographic groups in terms of sex, gender, culture, ethnicity, race, sexual orientation, and persons with disabilities.

The experiences above could support the disciplinary ideas addressed in this unit, as well as practices such as Asking Questions and Obtaining, Evaluating, and Communicating Information and crosscutting concepts such as Scale, Proportion, and Quantity and Patterns.

Media and Library Research Extension

Part 1: Information Literacy and Library/Media Research

Information literacy involves students' facility with identifying points at which additional information is needed and subsequently seeking out, assessing, and making use of relevant information to further understanding. Information literacy is particularly beneficial in the domain of science learning as it enables students to extend their understanding of a phenomenon under investigation.

Supporting students with effective use of library and media resources within and beyond your school setting is a key avenue for cultivating information literacy skills. Students' development of information literacy includes the following four components (Note: These are adapted from the Model School Library Standards for California Public Schools):

- Component 1: Accessing information.
- Component 2: Evaluating information.
- Component 3: Using information.
- Component 4: Integrating information literacy skills into all areas of learning.

In the next section, we offer suggestions of instructional strategies and learning activities as part of a research project to support students with these components of information literacy and to enhance students' learning about the central phenomenon they investigate in this unit.

Part 2: Research Project

At the end of the unit, students can work together in various grouping options to conduct a research project. You might release more responsibility for the research to students and have them work in partners/small groups or individually.

Identify what additional information is needed.

- Ask students to share the sources of information they have used to figure out the central phenomenon in the unit (e.g., texts, photos, and videos).
- Set a question for further research.
 - **Option A:** Share a question relevant to the phenomenon that students have been investigating in this unit. For example: *In the Patterns of Earth and Sky unit, you discovered a daily pattern of sunrise and sunset. How does the time that the sun appears to rise and set change throughout the year, for a particular location? What does this have to do with daylight saving time? How did daylight saving time come about and why do some regions use it? Or: Dog Days of Summer introduced some ways that ancient civilizations used patterns of stars in the sky.*

Research how a particular ancient civilization used the stars and constellations, for example in agriculture or in navigation.

- **Option B:** Invite students to generate questions they are still wondering about with respect to the central phenomenon they investigated. Then, have students select the question they are most interested in researching.

Access information (Component 1)

- Invite students to share where they think they could find information to answer that question.
- Provide access to these sources (e.g., texts, magazines, newspapers, photos, videos, Internet) in your classroom, at your school library, or at the local public library. You might choose to collaborate with your school librarian on this project so that he/she can support your students in finding the resources most relevant to their research question.

Evaluate information (Component 2)

- Have students evaluate the information from each source by addressing the following questions as the information is collected:
 - Does this help us answer our question?
 - Which information that we collected is best for answering our question? Why do you think this?
 - What additional information do we need to help answer our question?

Use information (Component 3)

- Provide students with a culminating opportunity to use the information they have gathered to answer their question. You might choose to create your own culminating project or choose from the following suggestions:
 - Have the class create posters or a newsletter for the school.
 - Have the class create an informational video or performance for the school, their families, or the community.
 - Have students use the information they collect to create a specific project related to the content they are studying (e.g., If students are studying habitats and collecting information about this topic, you may ask them to think about the information they have collected and decide together how to use this information to help them decide where to place new plants on the school grounds to support the local habitat).

Integrate information literacy skills into all areas of learning (Component 4)

- Invite students to think of questions they have that are related to learning happening across other disciplines (e.g., math, social studies, and art) and provide opportunities for them to engage in library and media research in these domains.

STEAM Extension

STEAM—science, technology, engineering, art, and mathematics—is an educational approach of integrating art and design into science, technology, engineering, and mathematics (STEM)

disciplines. This integration is a natural extension of the ways that art and design overlap with STEM. Observing, visualizing, communicating, and problem-solving are all areas in which students can authentically engage in both art and STEM. A growing body of evidence shows that for students who are socially and economically disadvantaged, authentic engagement in the arts not only increases motivation and engagement, but also leads to greater academic achievement in STEM subjects. Integrating art and science can provide new opportunities for students who are typically underrepresented in STEM to understand and communicate science concepts, thus helping to address inequities in science and engineering.

Opportunities to engage in art and design happen naturally as students engage in science and engineering practices. Students engage in art as they draw careful observations of natural objects and events, develop models to communicate meaning, and think creatively to design solutions. When these natural connections to art arise in the STEM classroom, students should have the opportunity—supported through instruction—to create work of high artistic quality and to reflect not only on their science learning but also their artistic process. The following extension activity provides an additional opportunity for students to engage in STEAM.

In the *Patterns of Earth and Sky* unit, an ancient astronomical artifact motivates students to investigate daily and yearly patterns of stars. Give students an opportunity to apply what they have discovered about these patterns by creating their own astronomical artifacts. To introduce the task, project the images of ancient artifacts from Lesson 1.1. Then, invite students to create their own artifacts to represent the daily or yearly patterns of stars. Students could use pencil, pen, paint, clay, or found objects to create a two- or three-dimensional artifact. Once students have completed their artifacts, invite them to do a gallery walk to admire their peers' work.