CIELO-G Lesson Plan Guide

Lesson Information

Lesson Title:

Fellow Name:

Semester/Year:

Grade Level(s): *Specify if the lesson is appropriate for elementary, middle, or high school*

Subject/Topic:

Estimated Time: *(total duration of lesson; for example, 1 hour, 2 class periods, etc.)*

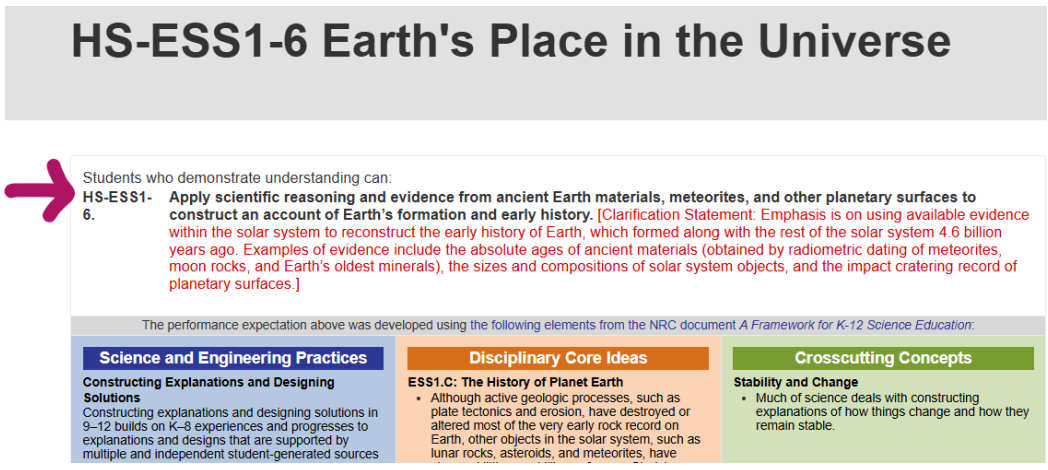
Keywords: *(3–5 words to help others find your lesson later)*

Lesson Overview

Tip: *In 2–3 sentences, describe:*

- *What students will learn.*
- *The central phenomenon or question that drives the lesson.*
- *The overall learning experience.*

Standards



HS-ESS1-6 Earth's Place in the Universe

Students who demonstrate understanding can:

HS-ESS1-6. **Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.** [Clarification Statement: Emphasis is on using available evidence within the solar system to reconstruct the early history of Earth, which formed along with the rest of the solar system 4.6 billion years ago. Examples of evidence include the absolute ages of ancient materials (obtained by radiometric dating of meteorites, moon rocks, and Earth's oldest minerals), the sizes and compositions of solar system objects, and the impact cratering record of planetary surfaces.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources

Disciplinary Core Ideas

ESS1.C: The History of Planet Earth

- Although active geologic processes, such as plate tectonics and erosion, have destroyed or altered most of the very early rock record on Earth, other objects in the solar system, such as lunar rocks, asteroids, and meteorites, have

Crosscutting Concepts

Stability and Change

- Much of science deals with constructing explanations of how things change and how they remain stable.

Next Generation Science Standards (NGSS) - use the link to search for standards by keyword, grade level, or discipline. Each Performance Expectation provides information about the grade level, discipline, and specific standard. For instance, MS-ESS2-1 represents the following information:

- HS = High School
- ESS = Earth and Space Science
- 1 = Earth's Place in the Universe (Disciplinary Core Idea)
- 6 = Performance Expectation number

Example:

- *HS-ESS1-6 Earth's Place in the Universe: Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.*

Tip: *Use the wording of the NGSS evidence statement(s) to help develop your learning objectives below. Your objectives should align with what students are expected to know and be able to do by the end of the lesson.*

Feel free to list other standards as well. For example, if teaching in Texas, list Texas Essential Knowledge and Skills (TEKS) instead of NGSS or in addition to them. Search by

Learning Objectives

By the end of this lesson, students will be able to (list as many or as few learning objectives as needed):

-
-
-

Tip*: Start each objective with an action verb (identify, explain, analyze, compare, develop, construct, etc.). Use the DOK Wheel as a reference when selecting verbs and designing learning objectives appropriate for your students' grade level and the purpose of the lesson.*

Materials and Safety Precautions

List all items needed to teach the lesson (physical and digital), including classroom supplies, equipment, technology, and lesson files.

Examples include: *student handouts or worksheets, presentation slides, lab equipment and supplies, models or specimens, measuring tools or sensors, computers or tablets, simulations or software, videos used during instruction, data tables or datasets, maps, images, diagrams, and any required safety equipment (lab coat/chemical-resistant apron, safety goggles, gloves, etc.).*

Tip*:* Be sure to gather and prepare all materials before the lesson and have enough available for each student or group, as appropriate for the activity. Check that technology and links are functional and approved at your school site.

5E Lesson Sequence - for more on the 5E model, click here

Engage (___ minutes)

How will you introduce the lesson and spark curiosity?

Phenomenon or Hook:

A phenomenon is something observable that students can explain using science. It should spark curiosity and encourage students to ask questions. For more information on phenomena-based learning, click here.

***Phenomenon examples**: photograph, video, demonstration, real-world event, graph, dataset, map, satellite image, news headline, physical object, or simple classroom observation. Whenever possible, choose a phenomenon that is relevant to your students or local community.*

Guiding Question(s):

Develop 1–3 open-ended questions to ask as you introduce the phenomenon. These questions should encourage students to observe, wonder, make predictions, or generate initial explanations that will be explored throughout the lesson. Avoid questions with a single correct answer.

Example 1: Water Cycle Phenomenon and Guiding Questions (ask sequentially, providing time for students to think and answer before moving onto the next question).

- Why did this occur?
- Why does ice split rocks?
- Why does ice expand when water freezes?
- Why do the water molecules move apart/why does this configuration take up more space?

Example 2: Phenomenon to introduce the concept of photosynthesis paired with a multiple choice question for a class poll.

Consider the biggest tree in the world, the giant sequoia.
Where does the dry mass (wood) of the tree come from?

A. Water
B. Air
C. Soil
D. It was in the seed

Explore (___ minutes)

Describe what students will investigate or do (hands-on). Include any setup or facilitation notes another fellow would need to successfully implement the activity.

Examples: *lab investigation, group activity, online simulations, problem-solving tasks, observation stations, reading articles or case studies*

Explain (___ minutes)

Guide students in explaining what they observed during the Explore phase. Introduce the scientific concepts, vocabulary, and terminology needed to accurately explain the phenomenon.

Examples: *class discussions, interactive slides, labeled diagrams, brief lecture, guided questioning, demonstrations, videos, or analyzing data from the Explore activity*

Elaborate (___ minutes)

Give students an opportunity to apply or extend what they learned in a new context. This activity should encourage students to make connections, solve problems, analyze new information, or deepen their understanding beyond the initial investigation.

Examples: *analyzing a new data set, applying the concept to a local/community environmental issues, comparing two phenomena, designing or improving a model, completing an engineering design challenge, creating a poster or infographic, developing a presentation, or solving a real-world problem*

Evaluate (___ minutes)

Describe how you will determine whether students met the lesson objectives (does not need to be a graded activity).

Examples include: *student explanations, discussions, reflections, models, presentations, quizzes, or teacher observations.*

Supplemental Resources (if applicable)

Note: This section is separate from the Materials section. Include any *additional* references, materials, or contacts that would help another fellow learn more, implement, adapt, or expand the lesson in the future.

Examples include*: websites, datasets, articles, videos, simulations, field guides, or subject matter experts.*