

4-ESS1-1 Earth's Place in the Universe

California Science Test—Item Content Specifications

# 4-ESS1-1 Earth's Place in the Universe

Students who demonstrate understanding can:

Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

[Clarification Statement: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.] [*Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.*]

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
| --- | --- | --- |
| Constructing Explanations and Designing Solutions  Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.  Identify the evidence that supports particular points in an explanation. | ESS1.C: The History of Planet Earth   1. Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. | Patterns  Patterns can be used as evidence to support an explanation.  Connections to Nature of Science  Scientific Knowledge Assumes an Order and Consistency in Natural Systems  Science assumes consistent patterns in natural systems. |

## Assessment Targets

Assessment targets describe the focal knowledge, skills, and abilities for a given three-dimensional Performance Expectation. Please refer to the Introduction for a complete description of assessment targets.

### Science and Engineering Subpractice(s)

Please refer to appendix A for a complete list of Science and Engineering Practices (SEP) subpractices. Note that the list in this section is not exhaustive.

6.2 Ability to evaluate explanations of phenomena

### Science and Engineering Subpractice Assessment Targets

Please refer to appendix A for a complete list of SEP subpractice assessment targets. Note that the list in this section is not exhaustive.

6.2.1 Ability to evaluate and revise a given explanation based on an accepted scientific theory and/or data provided

6.2.2 Ability to use data to support or refute an explanation of a phenomenon

### Disciplinary Core Idea Assessment Targets

#### ESS1.C.2

* Identify different rock layers found in an area
* Identify the ordering of rock layers
* Identify the presence of particular fossils in specific rock layers
* Identify the occurrence of events due to Earth’s forces
* Describe how fossil patterns can show that landscapes change over time
* Describe the relative order of the formation of rock layers
* Describe how irregularities in the patterns of rock layers indicate disruptions due to Earth forces

### Crosscutting Concept Assessment Target(s)

CCC1 Identify different patterns and use them to support an explanation

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides evidence of lower rock layers with marine fossils and upper rock layers with fossils of land plants presented along with an explanation that the landscape has changed over time:

* Describes the reasoning for how the data support the explanation (6.2.1, ESS1.C.2, and CCC1)

Task provides information about a canyon with different rock layers in the walls and a river at the bottom is presented along with an incorrect explanation of the phenomenon:

* Identifies different rock layers found in the area (6.2.1, ESS1.C.2, and CCC1)
* Identifies the flaw(s) in the explanation (6.2.1, ESS1.C.2, and CCC1)

Task provides an explanation that the landscape has changed over time:

* Identifies data that support the explanation (6.2.2, ESS1.C.2, and CCC1)
* Identifies the occurrence of events due to Earth’s forces that lead to change in landscape over time (6.2.2, ESS1.C.2, and CCC1)

Task provides an incorrect explanation about how the landscape has (or has not) changed over time:

* Identifies data (from a number of options) that refute the explanation (6.2.2, ESS1.C.2, and CCC1)

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* An earthquake in an area produces a fault in rock layers with the same layers being offset on opposite sides of the fault.
* Marine fossils are found in rock layers in a rock outcrop, indicating that the area was once below sea level.
* A canyon has different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.
* Fossils that appear in rock layers in different areas can be used to correlate similar changes over time in the layers.
* Fossils of different types of plants are found in different layers of an outcrop indicating changes in climate over time.

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Rock layers do not reflect different time periods.
* Landscapes do not change over time.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

4-ESS1-1 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/4-ESS1-1 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/4-ESS1-1%20Evidence%20Statements%20June%202015%20asterisks.pdf)

The *2016 Science Framework for California Public Schools Kindergarten through Grade 12*

Appendix 1: Progression of the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts in Kindergarten through Grade 12 <https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix1.pdf>

Posted by the California Department of Education, March 2021