

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

Students who demonstrate understanding can:

- 4-ESS1-1. 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.]

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 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.

Disciplinary Core Ideas

ESS1.C: The History of Planet Earth

- 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.

Crosscutting Concepts

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.

Observable features of the student performance by the end of the grade:

1	Articulating the explanation of phenomena
a	Students identify the given explanation for a phenomenon, which includes a statement about the idea that landscapes change over time.
b	From the given explanation, students identify the specific aspects of the explanation they are supporting with evidence.
2	Evidence
a	Students identify the evidence relevant to supporting the explanation, including local and regional patterns in the following: <ol style="list-style-type: none"> Different rock layers found in an area (e.g., rock layers taken from the same location show marine fossils in some layers and land fossils in other layers). Ordering of rock layers (e.g., layer with marine fossils is found below layer with land fossils). Presence of particular fossils (e.g., shells, land plants) in specific rock layers. The occurrence of events (e.g., earthquakes) due to Earth forces.
3	Reasoning
a	Students use reasoning to connect the evidence to support particular points of the explanation, including the identification of a specific pattern of rock layers and fossils (e.g., a rock layer containing shells and fish below a rock layer containing fossils of land animals and plants is a pattern indicating that, at one point, the landscape had been covered by water and later it was dry land). Students describe* reasoning for how the evidence supports particular points of the explanation, including: <ol style="list-style-type: none"> Specific rock layers in the same location show specific fossil patterns (e.g., some lower rock layers have marine fossils, while some higher rock layers have fossils of land plants). Since lower layers were formed first then covered by upper layers, this pattern indicates that the landscape of the area was transformed into the landscape indicated by the upper layer (e.g., lower marine fossils indicate that, at one point, the landscape was covered by water, and upper land fossils indicate that later the landscape was dry land).

		iii. Irregularities in the patterns of rock layers indicate disruptions due to Earth forces (e.g., 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).
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