

**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.**

<p><u>PE</u> 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.]</p>	<p><u>DCI</u> • 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.</p>	<p><u>CCC</u> • Patterns – Patterns can be used as evidence to support an explanation.</p>	<p><u>Practices</u> Constructing Explanations and Designing Solutions – <i>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.</i> Identify the evidence that supports particular points in an explanation.</p>
<p><u>Activity</u> Small Groups: Sort through the Grand Canyon rocks and fossils. Rocks can be set aside, and fossils can be set on the respective <a href="#">fossil information card</a> as they are identified.</p>	<p><u>Question</u> Where do we find fossils?</p>	<p><u>Objectives / Next Steps</u> • Rocks are found in sedimentary strata, or layers of sedimentary rock. Layers may be distinct or blended. • Successful fossil identification requires both good resources and problem-solving skills.  <i>What can fossils tell us?</i></p>	<p><u>Notes</u> Grand Canyon rock/fossil <a href="#">models</a> can be downloaded for 3D printing. They can be placed in “ant farms” for students to observe strata order, or the color order can be provided for “pre-collected” fossils.</p>
<p>Small Groups: Verify fossil identification with an expert. Then, use the fossil maps on each card to identify the name of each colored layer.</p>	<p>What can fossils tell us?</p>	<p>• Fossils show what types of life existed when that rock formed. The types of life at any one point in time are distinct.</p>	<p>A larger <a href="#">fossil strata diagram</a> is available for student notes, and a Grand Canyon fossil strata <a href="#">answer key</a> is available.</p>

<p>Whole Class: With the help of the small groups, review the correct correlation between colored layers and named Grand Canyon strata. As each layer is positively identified, ask students which layers are marine and which are terrestrial.</p>	<p>What can fossils tell us? [Continued]</p>	<ul style="list-style-type: none"> <li>Fossils also show what the environment was like. For example, large numbers of fossilized terrestrial creatures indicate a non-marine environment.</li> </ul> <p><i>Who finds fossils? [Optional]</i></p>	<p>As a reflection, students might compare and contrast one marine fossil and one terrestrial fossil. The students can describe the living creature that made the fossils as well as the environment that they lived in.</p>
<p>Whole Class: Ask students who might dig up rocks most often. Who might have the most opportunity to find fossils? How can fossils help miners find the best rock?</p>	<p>Who finds fossils? [Optional]</p>	<ul style="list-style-type: none"> <li>Fossils are most often found by miners, who value rock economically as well as academically.</li> <li>Because the types of life at any point in time are distinct, fossils can help identify layers of economically-valuable rock.</li> </ul> <p><i>Why is science often taught through simulation rather than the real thing? [Optional]</i></p>	
<p>Whole Class: Ask students to compare and contrast their experience with what real-world geologists do. How is this simulation realistic? How is it not realistic?</p>	<p>Why is science often taught through simulation rather than the real thing? [Optional]</p>	<ul style="list-style-type: none"> <li>Plastic fossils are easier to come by than more-fragile, real-world fossils.</li> <li>Fossils are not easy to identify without help or experience. Only parts of some organisms may be preserved, and individual organisms may differ from characteristics which describe most members of their class / family / genus / species.</li> <li>Geologists might use different tools to examine fossils in rock.</li> <li>...</li> </ul>	