



**Earth Systems Curriculum Pacing Guide**  
**Geologic Processes**

**Crosscutting Concepts:** Patterns; Cause and Effect; Systems and System Models; Stability and Change

**Topics:** Plate tectonics and impacts of volcanism and earthquakes; Formation of mountain ranges

Estimated Time: 4 weeks

Anchoring Phenomenon	Standard	Instructional Segment	Disciplinary Core Ideas	Science and Engineering Practices	Instructional Notes
<p>The students will view a video from the 2017 earthquake in Mexico. Students will start asking why, how, and what.</p> <p>A powerful 8.2-magnitude earthquake rocked Mexico. Show this video without sound.  <a href="#">8.2 Earthquake in Mexico</a></p>	<p><b>SES1.</b> b, c  <b>SES2.</b> a, b, c, d, e</p>	<p><b>Mapping Earthquakes</b></p>	<p>From <a href="#">A Framework for K-12 Science Education</a>:  <i>By the end of 12th grade</i></p> <p><b>ESS2.B: PLATE TECTONICS AND LARGE-SCALE SYSTEM INTERACTIONS</b></p> <ul style="list-style-type: none"> <li>The radioactive decay of unstable isotopes continually generates new energy within Earth’s crust and mantle providing the primary source of the heat that drives mantle convection.</li> <li>Plate tectonics can be viewed as the surface expression of mantle convection.</li> </ul> <p><b>ESS2.A: EARTH MATERIALS AND SYSTEMS</b></p> <ul style="list-style-type: none"> <li>Earth’s systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes.</li> <li>A deep knowledge of how feedbacks work within and among Earth’s systems is still lacking, thus limiting scientists’</li> </ul>	<ul style="list-style-type: none"> <li>Asking questions and defining problems.</li> <li>Developing and using models</li> <li>Constructing explanations</li> <li>Engaging in argument from evidence</li> <li>Obtaining, evaluating, and communicating information</li> </ul>	<p>Background  <i>Be flexible. If there is a strong more recent earthquake, then focus on that one rather than the one from Mexico in 2017.</i></p> <p>By the end of this unit, students are using the following language in their speaking and writing during EXPLAIN or ELABORATE. continental collision, subduction zone, mid-ocean ridge, transformation fault, hotspot, passive zone, folds, faults, volcanoes, trench, mid-ocean ridge, plate tectonic, radioactive</p>

			<p>ability to predict some changes and their impacts.</p> <ul style="list-style-type: none"> <li>● Evidence from deep probes and seismic waves, reconstructions of historical changes in Earth’s surface and its magnetic field, and an understanding of physical and chemical processes lead to a model of Earth with a hot but solid inner core, a liquid outer core, a solid mantle and crust.</li> <li>● The top part of the mantle, along with the crust, forms structures known as tectonic plates.</li> <li>● Motions of the mantle and its plates occur primarily through thermal convection, which involves the cycling of matter due to the outward flow of energy from Earth’s interior and the gravitational movement of denser materials toward the interior.</li> <li>● The geological record shows that changes to global and regional climate can be caused by interactions among changes in the sun’s energy output or Earth’s orbit, tectonic events, ocean circulation, volcanic activity, glaciers, vegetation, and human activities. These changes can occur on a variety of time scales from sudden (e.g., volcanic ash clouds) to intermediate (ice ages) to very long-term tectonic cycles.</li> </ul>		<p>decay, sedimentary, igneous, metamorphic, seismic waves, composition of Earth, geosphere, hydrosphere, atmosphere, density, convergent, divergent, transform, fossils, paleomagnetism, seafloor age Pangea</p>
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This instructional segment will connect to Segment Four: Earth’s Composition and Structure.