Earth Systems Curriculum Pacing Guide

The Nature of Our Universe; The Formation of Our Solar System and the Planets

Crosscutting Concepts: Cause and Effect; Scale, Proportion, and Quantity; Systems and System Models; Energy and Matter; Stability and Change

Topics: Formation of the universe, our galaxy, and our solar system; Elemental foundations of planets; Tools of Astronomy; Stars and Stellar evolution; Differences between inner and outer planets; Importance of the habitable zone within a star system, Cosmology; Our Sun, Earth, Moon system

Estimated Time: 4 weeks

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<th>Anchoring Phenomenon</th>
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<th>Disciplinary Core Ideas</th>
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<td><strong>Hurricanes, but more specifically,</strong> The Great Red Spot on Jupiter</td>
<td>SES1. a Teacher, I've Shrunk the Solar System</td>
<td>From <em>A Framework for K-12 Science Education: By the end of 12th grade</em></td>
<td>ESS1.A: THE UNIVERSE AND ITS STARS</td>
<td>• Constructing explanations • Obtaining, evaluating, and communicating information</td>
<td>Background: By the end of this unit, students are using the following language in their speaking and writing during EXPLAIN or ELABORATE. • Nebular hypothesis • The Sun - our star • Terrestrial planets • Gas planets • Dwarf planets • Asteroids • Comets • Geocentric theory • Heliocentric theory</td>
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Students will use their mapping skills to estimate the size of the Great Red Spot while studying a to-scale model of the solar system.
ESS1.B: EARTH AND THE SOLAR SYSTEM
- Kepler’s laws describe common features of the motions of orbiting objects, including their elliptical paths around the sun.
- Orbits may change due to the gravitational effects from, or collisions with, other objects in the solar system.
- Cyclical changes in the shape of Earth’s orbit around the sun, together with changes in the orientation of the planet’s axis of rotation, both occurring over tens to hundreds of thousands of years, have altered the intensity and distribution of sunlight falling on Earth. These phenomena cause cycles of ice ages and other gradual climate changes.

ESS1.C: THE HISTORY OF PLANET EARTH
- Radioactive decay lifetimes and isotopic content in rocks provide a way of dating rock formations and thereby fixing the scale of geological time.
- Continental rocks, which can be older than 4 billion years, are generally much older than rocks on the ocean floor, which are less than 200 million years old.
Tectonic processes continually generate new ocean seafloor at ridges and destroy old seafloor at trenches. Although active geological 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 changed little over billions of years. Studying these objects can provide information about Earth’s formation and early history.

This instructional segment will connect to Resources and Our Environment