Mini-Map for SCI.EE.8.ESS.SolSys-3

Subject: Science
Earth and Space Science (ESS)
Grade band: 6–8

Grade-Level Expectation

DLM Essential Element	DLM Disciplinary Core Idea Family[1]	Framework Disciplinary Core Ideas
SCI.EE.8.ESS.SolSys-3 Use a model to explain the relationships between the orientation of Earth's axis in relation to the Sun, Earth's motion, and the seasonal patterns in the number of daylight hours.	Earth and Space Science – Earth in the Solar System	ESS1.A: The Universe and Its Stars ESS1.B: Earth and the Solar System PS3.B: Conservation of Energy and Energy Transfer

[1] DLM Science Essential Elements organize Disciplinary Core Ideas (defined in the *Framework for K-12 Science Education*) into DCI families. By combining similar concepts within a domain, science content from the general education standards is reduced in depth, breadth, and complexity to provide access for students that qualify for the DLM alternate assessment.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target[2]
Understand the function or action an object typically performs.	Use a representation to describe Earth's motion in space (i.e., its rotation on an axis and revolution around the Sun).	Use a representation to relate Earth's motion (i.e., its rotation on its axis and its orbital revolution around the Sun) to the cyclical nature of daytime, nighttime, days, and years.	Use a model of the Earth-Sun system to explain seasonal patterns in the number of daylight hours a specific part of Earth experiences in relation to the relative amount of direct sunlight it receives, its orientation in relation to the Sun, and Earth's location in its orbit around the Sun.

[2] The target linkage level description is a measurement target that describes the expectations (content and performance) of the Essential Element for assessment purposes.

Essential Element Three Dimensions

Each Essential Element is defined in the three dimensions described in the *Framework for K-12 Science Education*: disciplinary core ideas (DCIs), science and engineering practices (SEPs), and crosscutting concepts (CCCs). The table below lists the details of each dimension from the individual DLM Essential Element descriptions, with color-coding of dimensions corresponding to the Next Generation Science Standards (NGSS). The first row (in blue) lists the SEP(s) used to construct the Essential Element and describes ways each SEP could be incorporated. The second row (in orange) describes the science concepts within the DCI family related to this Essential Element. The third row (in green) lists the CCC(s) associated with the Essential Element and explains how each might be incorporated in the grade band (quoted from NSTA, 2013, matrix of CCCs). Note that the SEP is presented first here (rather than second, as it is in the full list of Essential Elements) to reflect the emphasis on practices in instruction and across the linkage levels. The final row (in white) includes examples of how the three dimensions could work together to support instruction for the Essential Element. These examples provide ideas for integrating the dimensions and are not exhaustive, nor are they intended to limit instruction.

Science and Engineering Practices	**Developing and Using a Model:** Modeling in grades 6–8 builds on K–5 experiences and progresses to developing and using models (e.g., diagram, drawing, physical replica, diorama, dramatization, storyboard) that represent relationships, events, and systems in the natural world. • Develop and use models to identify, describe, and compare components of a system. • Use models to explain and predict relationships between variables and components of a system. **Constructing Explanations and Designing Solutions**: Constructing explanations and designing solutions in grades 6–8 builds on K–5 experiences and progresses to constructing explanations about processes or relationships in the natural or designed world. • Use information, data, or models to construct descriptions and explanations of processes and relationships in the natural world.
Disciplinary Core Ideas	**Earth in the Solar System** • Light energy is spontaneously transferred from the Sun to Earth (see SCI.EE.8.SolSys-1). • Earth orbits, or revolves around, the Sun. • Earth rotates upon an axis that is tilted. • As Earth orbits the Sun, Earth's tilt in relation to the Sun (toward or away from the Sun) results in seasonal patterns in the number of daylight hours.

Crosscutting Concepts	**Patterns**: Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them. • Macroscopic patterns are related to the nature of microscopic and atomic-level structure. • Patterns in rates of change and other numerical relationships can provide information about natural and human designed systems. • Patterns can be used to identify cause and effect relationships. • Graphs, charts, and images can be used to identify patterns in data. **Systems and System Models:** A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems. • Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. • Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems. • Models are limited in that they only represent certain aspects of the system under study.
How three dimensions support instruction for this Essential Element	Models help students explore relationships within the Sun-Earth system and understand how they explain seasonal patterns in daylight hours on Earth. Students identify patterns in the number of daylight hours in relation to Earth's orientation and motion with respect to the Sun. These patterns help build student understanding of relationships, such as those between the tilt of the Earth and the amount of sunlight a part of the Earth receives from the Sun. Students use models to understand systems related to the tilt of the Earth on its axis and its motion around the Sun.

Instructional Resources

Resources
Learning modules and additional science instructional resources can be found at https://www.dlmpd.com/science/
A glossary defining key science terms found in the Essential Elements can be found at DLM Glossary for Science Learning Maps.

Link to Text-Only Map

SCI.EE.8.ESS.SolSys-3 Use a model to explain the relationships between the orientation of Earth's axis in relation to the Sun, Earth's motion, and the seasonal patterns in the number of daylight hours.