FIFTH GRADE: SPHERES

Standards Bundle

Standards are listed within the bundle. Bundles are created with potential instructional use in mind, based upon the potential for related phenomena that can be used throughout a unit.

5- ESS2-1 Develop a model to describe the interaction of geosphere, biosphere, hydrosphere, and atmosphere. (SEP: 2; DCI: ESS2.A; CCC: Systems) [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [*Assessment Boundary: Assessment is limited to the interactions of two systems at a time.*]

Content Overview

This section provides a generic overview of the content or disciplinary core ideas as an entry point to the standards.

All of Earth's features, everything on land (soil, sediments, rocks, and landforms), water, air, and all living things on Earth interact with each other. In this bundle, students can explore Earth's major systems and see how these systems' spheres interact with each other.

Phenomena

Phenomena can be used at varying levels of instruction. One could be used to anchor an entire unit, while another might be more supplemental for anchoring just a unit. Please remember that phenomena should allow students to engage in the SEP and use the CCC/DCI to understand and explain the phenomenon.

- The eruption of Mount St. Helens.
- The movement of tectonic plates pushing against one another.
- Clouds forming, changing, and precipitating.
- The mountain tops are covered with clouds.
- Plants at different elevations of a mountain.

Storyline

This section aims to decode not only the DCI connections but also the SEP and CCC in a detailed account of how they possibly fit together in a progression for student learning, including both rationale and context for the bundle.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models ● Develop a model using an example to describe a scientific principle.	**ESS2.A: Earth Materials and Systems** ● Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.	**Systems and System Models** ● A system can be described in terms of its components and their interactions.

Earth is a complex system that consists of four major subsystems: the geosphere, hydrosphere, atmosphere, and biosphere. Students can examine the components in each Earth system and how those components interact with one another. Students can develop models to examine how each Earth system interacts with other Earth systems.

The *geosphere*, for example, consists of soil, solid rock, molten rock, and sediment (sand, silt, and clay), which make up the continents and the ocean floor. The soil holds and *transfers energy* in the form of heat into the atmosphere (air). The soil also supports the *biosphere* (living things) by providing shelter for animals and insects and providing a rich environment for plant roots to reside.

The *hydrosphere* consists of the oceans, ponds, lakes, streams, and all ice on Earth. Water continuously moves through and interacts with the geosphere, atmosphere, and biosphere via the water cycle. Students can obtain and evaluate information to determine that even though oceans hold most of the water on Earth, the ocean supports a variety of ecosystems and organisms, shape landforms, and influences climate. The Earth's landforms interact with the wind and clouds in the atmosphere causing *weather patterns* to occur.

Earth's *biosphere* consists of plants and animals, including humans. The biosphere is dependent upon the other major earth systems and the resulting interactions between them for survival. For example, growing plants use nutrients from the soil and release oxygen into the atmosphere. The animals take in oxygen and release carbon dioxide into the atmosphere, which is taken in by plants.

Formative Assessment

Formative assessment is crucial because all learners benefit from timely and focused feedback from others. It promotes self-reflection, self-explanation, and

social learning. It can also make learning more relevant. Each of the questions below might be used throughout the formative assessment process. Specific prompts may focus on individual practices, core ideas, or crosscutting concepts, but, together, the components need to support inferences about students' three-dimensional science learning as described in a given bundle, standard, or lesson-level performance expectation.

SEP Developing and Using Models

- Make a rough sketch of at least two of Earth's spheres interacting.

SEP Engaging in Argument from Evidence

- How can you tell where one sphere ends and the other begins?

CCC Systems and System Models

- Why are leeward sides of mountains drier than windward?
- Describe some impacts of natural events, such as volcanic eruptions or earthquakes, on Earth's spheres.

Performance Outcomes

These are statements of how students use knowledge and are similar to the standards in how they blend DCI, SEP, and CCC, but at a smaller grain size. These are potential outcomes for instruction as it plays out in lessons and activities in the classroom. It is important to also think of these as smaller outcomes that build toward the larger goal of mastering the standards.

- **Develop a model** using two *spheres* to demonstrate how they *interact* and influence the surface of the earth and its processes.
- **Construct an argument** to explain how a geographic feature *influences a sphere*.
- **Develop a model** that shows how energy in the geosphere produces *volcanic or earthquake activities below the surface*.