Mini-Map for SCI.EE.12.LS.Org-1

Subject: Science
Life Science (LS)
Grade band: 9–12

Grade-Level Expectation

DLM Essential Element	DLM Disciplinary Core Idea Family[1]	Framework Disciplinary Core Ideas
SCI.EE.12.LS.Org-1 Use a model to construct an explanation of how systems of specialized cells within organisms work together to perform essential functions of life.	Life Science — Organisms: Structure and Function, Growth and Development	LS1.A: Structure and Function LS1.B: Growth and Development of Organisms

[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]
Identify parts of a sequence, process, or scientific phenomenon.	Use representations to identify the different levels that comprise an organism's body system (i.e., the body is a system made of subsystems which are made of external and internal body parts).	Use representations to describe a body system as made up of internal and external organs with specific functions that interact with each other.	Use a model to explain how systems of specialized cells have different functions and work together (i.e., specialized cells that form tissues, tissues that form organs, and organs that make up organ systems) to keep organisms alive.

[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 Models:** Modeling in grades 9–12 builds on K–8 experiences and progresses to developing, using, and evaluating models (e.g., maps, diagram, drawing, physical replica, diorama, graphs, dramatization, storyboard) that represent relationships, events, and systems in the natural world. • Develop, use, and evaluate models to describe relationships between variables and components of a system. • Use models to construct and evaluate explanations in the natural world. **Constructing Explanations and Designing Solutions:** Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to constructing and evaluating explanations about processes or relationships in the natural or designed world. • Gather and use information to construct descriptions and explanations of processes and relationships in the natural world.
Disciplinary Core Ideas	**Organisms: Structure and Function, Growth and Development** • Living things are made up of a system of specialized cells. • Groups of cells work together to form systems of cells (examples of tissue could include muscle or nerve). • Systems of cells form organs (e.g., heart, lung, ear) and organ systems (e.g., circulatory system, respiratory system). • Organs and organ systems perform specific body functions. • Organs and organ systems interact to perform life functions of an organism.

Crosscutting Concepts	**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 can be designed to do specific tasks. • When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models. • Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. • Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models. **Structure and Function:** The way an object is shaped or structured determines many of its properties and functions. • Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. • The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.
How three dimensions support instruction for this Essential Element	Students can use system models to investigate the body as a kind of system. Using a model, students can represent the functions of common organs, such as the heart or stomach. Students can explain how organs work as a system to keep organisms alive. Students can observe through models that organ systems are made up of organs, organs are made of tissues, tissues made of cells, and that each component has different specialized functions. From here, students can understand the structure of external and internal organs and how the organs' structures relate to their functions.

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

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