Mini-Map for SCI.EE.5.PS.Matter-1

Subject: Science
Physical Science (PS)
Grade band: 3–5

Grade-Level Expectation

DLM Essential Element	DLM Disciplinary Core Idea Family[1]	Framework Disciplinary Core Ideas
SCI.EE.5.PS.Matter-1 Make observations and measurements to describe changes in the physical properties of substances when heated, cooled, or mixed.	Physical Science – Matter and Chemical Reactions	PS1.A: Structure and Properties of Matter PS1.B: Chemical Reactions

[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]
Determine whether objects are similar or different based on their physical characteristics.	Use observations to determine the different physical characteristics of liquids and solids.	Compare observations of physical properties of objects and substances, including substances in their different states (i.e., liquid and solid) and at different temperatures, to identify or classify them.	Use qualitative observations or quantitative measurements to describe changes in the physical properties of a substance when heat is added to or removed from the substance or when it is mixed with another substance.

[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	**Planning and Carrying Out Investigations:** Planning and carrying out investigations to answer questions or test solutions to problems in grades 3–5 builds on K–2 experiences and progresses to using tools and observations in investigations to record data and support claims • Collect and record data using tools to determine and support an explanation of a phenomenon. • Use observations and measurements to determine and describe relationships. **Analyzing and Interpreting Data:** Analyzing data in grades 3–5 builds on K–2 experiences and progresses to using and interpreting data to support claims and relationships. • Represent and interpret data in tables or graphs to determine and identify patterns that indicate relationships. • Use data as evidence for constructing and supporting claims about relationships.
Disciplinary Core Ideas	**Matter and Chemical Reactions** • Observations and measurements of a variety of properties can be used to describe physical changes in matter. o Measurements could include mass (weight), size (length, width, height), temperature, or volume. o Observations could include color, texture, or state of matter. • A phase change is a physical process in which a substance goes from one phase, or state, to another. o Usually, the change occurs when adding or removing heat. The nature of the phase change depends on the direction of the heat transfer. o Heat going into a substance changes it from a solid to a liquid or a liquid to a gas. o Removing heat from a substance changes a gas to a liquid or a liquid to a solid.

Crosscutting Concepts	**Energy and Matter: Flows, Cycles, and Conservation**: Tracking energy and matter flows, into, out of, and within systems helps one understand their system's behavior. • Matter is made of particles. • Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and within systems. • Energy can be transferred in various ways and between objects. **Stability and Change**: For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand. • Change is measured in terms of differences over time and may occur at different rates. • Some systems appear stable, but over long periods of time will eventually change.
How three dimensions support instruction for this Essential Element	Students can investigate two concepts related to energy and matter: (1) how matter can be tracked through mass before and after processes occur, and (2) that energy (in the form of heat) can transfer between objects and substances. Students can observe and measure physical properties of matter, which allows them to compare which properties change (through processes like heating, cooling, or mixing) and where energy (or heat) has transferred. This introduces the concepts of stability and change through familiar examples of change at this grade level (e.g., water as ice or liquid) to build towards more general understanding. Students can use their senses to observe, measure, and compare physical properties of individual substances and mixtures to identify changes. Heating, cooling, and mixing are processes that lead to changes in physical properties of matter (e.g., color, size, texture). Initial notions of stability come through the idea that, although familiar substances may change state (e.g., water may be liquid or solid), they do not change into a different type of matter.

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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