Mini-Map for SCI.EE.8.PS.Energy-2

Subject: Science
Physical Science (PS)
Grade band: 6–8

Grade-Level Expectation

DLM Essential Element	DLM Disciplinary Core Idea Family[1]	Framework Disciplinary Core Ideas
SCI.EE.8.PS.Energy-2 Provide evidence that kinetic energy is transferred between two objects when they collide with each other.	Physical Science – Energy	PS3.A: Definitions of Energy PS3.B: Conservation of Energy and Energy Transfer PS3.C: Relationship Between Energy and Forces PS4.A: Wave Properties

[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]
Recognize the probable result or outcome of an action during a familiar routine, game, activity, or experience.	Use observations of the effects of energy (i.e., a change in an object's position, an object that does not move, or an object in motion) to identify that energy is needed for objects to move.	Make and use observations to describe how a change in an object's energy, due to a collision or other event, results in a change in the object's motion (i.e., speed or direction).	Make and use observations about objects' change in motion (i.e., start moving, stop moving, speeding up, or slowing down) as evidence of kinetic energy transfer between two colliding objects.

[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	**Asking Questions and Defining Problems:** Asking questions and defining problems in grades 6–8 builds on K–5 experiences and progresses to developing and using questions to clarify information and define problems. • Classify and compare information that answers questions about how the natural world works. • Develop questions that can be answered by an investigation. • Ask questions that help to define a simple design problem. **Planning and Carrying Out Investigations:** Planning and carrying out investigations in grades 6–8 builds on K–5 experiences and progresses to collecting data during investigations to examine and support claims • Gather and use data to determine answers to scientific questions. • Use observations and measurements to determine and support relationships between variables. **Engaging in Argument from Evidence:** Engaging in argument from evidence in grades 6–8 builds on K–5 experiences and progresses to use information to make and evaluate claims about the natural world. • Use observations, information, data, or a model to evaluate a claim. • Gather and use information as evidence to support a claim. • Use information to make claims.

Disciplinary Core Ideas	**Energy** • Energy cannot be created or destroyed. • When objects collide, kinetic energy can flow (i.e., transfer) from one object to another. o When two objects are in contact, each one exerts a force on the other that can cause kinetic energy to be transferred from one object to another (see SCI.EE.8.PS.Forces-2). o When kinetic energy is transferred from one object to another, the motion of those objects can change. o Examples could include the changes in motion that occur when a moving marble collides with a stationary marble or when two moving marbles collide.
Crosscutting Concepts	**Cause and Effect: Mechanism and Explanation**: Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering. • Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. • Cause and effect relationships may be used to predict phenomena in natural or designed systems. • Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. **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 conserved because atoms are conserved in physical and chemical processes. • Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. • Energy may take different forms (e.g., energy in fields, thermal energy, energy of motion). • The transfer of energy can be tracked as energy flows through a designed or natural system.

How three dimensions support instruction for this Essential Element	Students can investigate and ask questions about cause-and-effect relationships by observing objects that are stationary, in motion, and in collisions. Students can understand that the energy is applied to a stationary object, so the cause (moving object) and the effect (change in speed or direction) of a collision are identified. They can use data to explain the specific effects on energy (gained or lost kinetic energy) of a moving or stationary object. The concepts of energy and matter are part of students' understanding that kinetic energy transfers between objects upon collision and doesn't disappear. They can investigate energy in the form of energy in motion.

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.PS.Energy-2 Provide evidence that kinetic energy is transferred between two objects when they collide with each other.