Mini-Map for SCI.EE.8.ESS.Earth-2

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.Earth-2 Use information to evaluate a claim about how the hydrosphere affects the shape of land (i.e., the geosphere) over time.	Earth and Space Science – Earth Systems	ESS2.A: Earth Materials and Systems ESS2.C: The Roles of Water in Earth's Surface Processes ESS3.C: Human Impacts on Earth Systems

[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]
Compare the characteristics of objects in multiple sets to identify the shared property that organizes the objects into each set (i.e., the characteristic shared by each set's members).	Use observations to support the idea that Earth's surface is made of both land and water and that water can be standing or moving.	Use evidence to support the idea that water, in its different and changing states, changes the shape of land over time.	Evaluate gathered evidence to determine if it supports claims about how the hydrosphere (i.e., water falling onto and moving across Earth's surface) affects the shape of land over time.

[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	**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. **Obtaining, Evaluating, and Communicating Information:** Obtaining, evaluating, and communicating information in grades 6–8 builds on K–5 experiences and progresses to combining information to describe and support scientific claims and ideas. • Decide which observations, images, texts, data, and other media are useful for defining problems and determining how the natural world works. • Combine information (e.g., observations, texts, tables, images, graphs, maps) to answer scientific questions and evaluate scientific ideas.

Disciplinary Core Ideas	**Earth Systems**
	• The geosphere refers to Earth features and components such as rocks, minerals, and landforms.
	• The hydrosphere refers to all water on Earth's surface. This includes water that is part of the general water cycle (e.g., clouds, rain) (see SCI.EE.8.ESS-Earth-1).
	• Gravity directs the flow of water (including glaciers) downhill.
	  o Moving water carries soil and rocks from one place to another.
	  o Over time, this affects the shape of land.
	• The force of precipitation (i.e., rain, sleet, hail) can also affect the shape of land over time (see SCI.EE.8.ESS-Earth-1 and SCI.EE.5.PS-Forces-2).

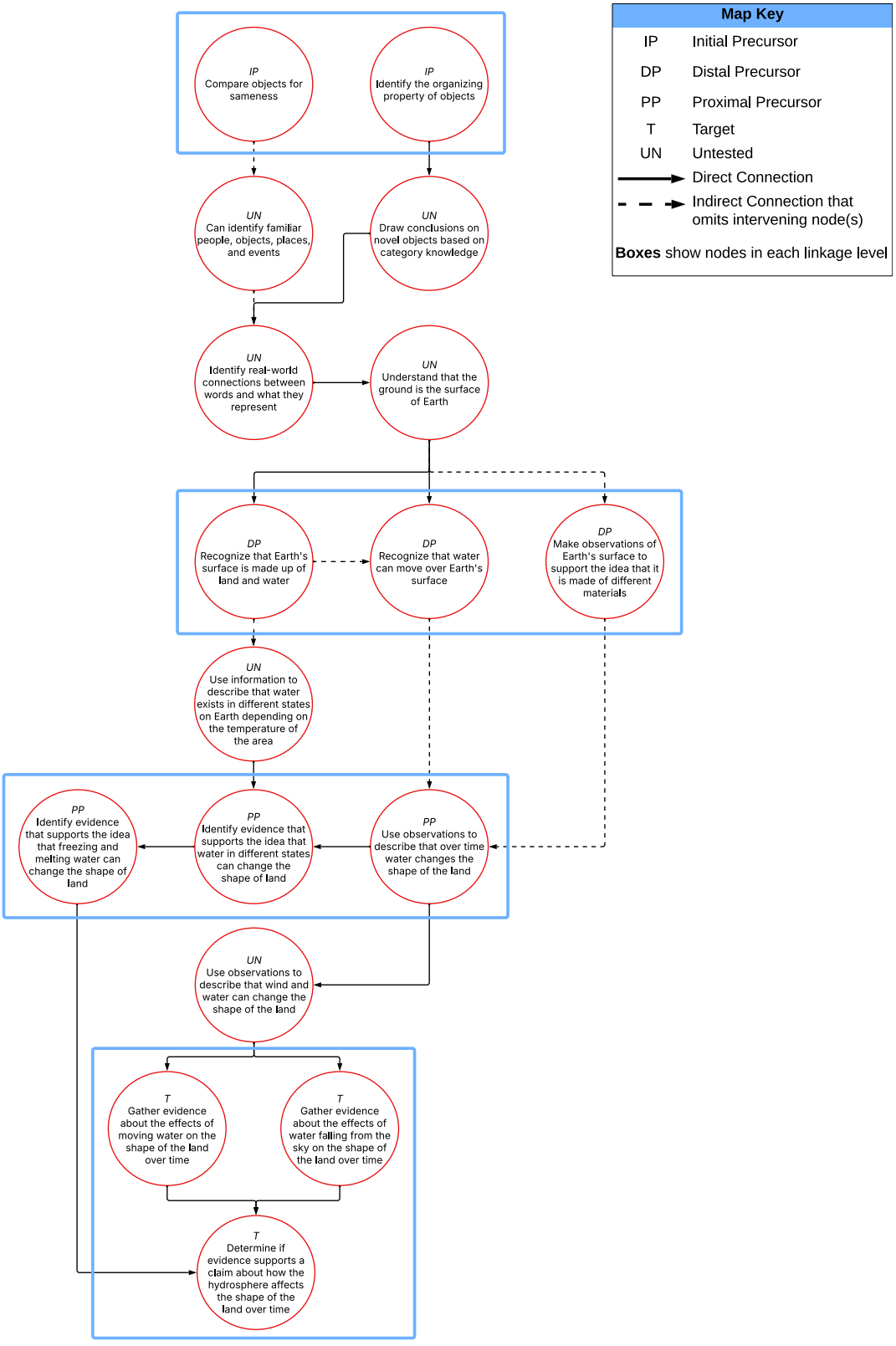
Crosscutting Concepts	**Cause and Effect: Mechanism and Explanation**: Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering. • Relationships can be classified as causal 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. **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. • Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales, including the atomic scale. • Small changes in one part of a system might cause large changes in another part. • Stability might be disturbed either by sudden events or gradual changes that accumulate over time. • Systems in dynamic equilibrium are stable due to a balance of feedback mechanisms.
How three dimensions support instruction for this Essential Element	Students can learn about stability and change by evaluating evidence about cause-and-effect relationships where movement of water through the hydrosphere affects the stability of landscapes over time. For example, students can understand how gravity affects the flow of water and gather evidence about the effects of falling or moving water, in liquid and solid forms, on the shape of land over time.

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.Earth-2 Use information to evaluate a claim about how the hydrosphere affects the shape of land (i.e., the geosphere) over time.



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
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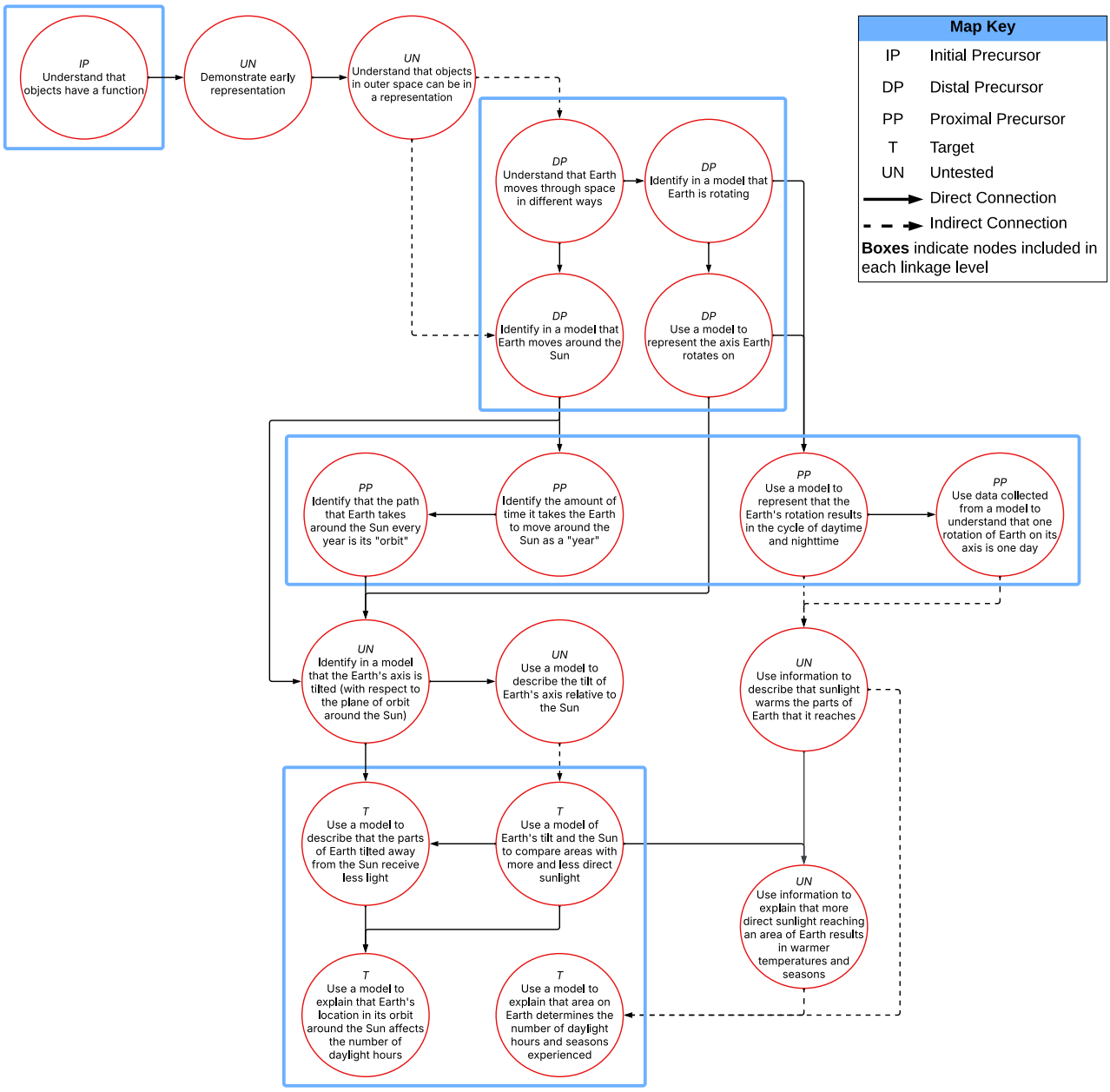
Link to Text-Only Map

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.



Mini-Map for SCI.EE.8.ESS.Weath-2

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.Weath-2 Use information to describe the relationships between regional climates, location on Earth, geographic features, and weather.	Earth and Space Science – Weather and Climate	ESS2.D: Weather and Climate ESS3.D: Global Climate Change

[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]
Match a visual, tactile, or symbolic representation with the real object.	Use information to describe that daily weather conditions, which are composed of different kinds of atmospheric conditions for a specific time and place, differ by location.	Use weather and climate information to determine that climate (i.e., the pattern of weather conditions in an area over many years) differs across regions of Earth.	Use information to describe how a region's location on Earth and its geographic features affect its climate.

[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

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Science and Engineering Practices	**Analyzing and Interpreting Data:** Analyzing data in grades 6–8 builds on K–5 experiences and progresses to representing and evaluating data to support explanations about relationships and solutions to problems in the natural world. • Gather and represent data to determine and describe patterns. • Evaluate data to construct and support explanations. • Analyze data to evaluate solutions to problems. **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. **Obtaining, Evaluating, and Communicating Information:** Obtaining, evaluating, and communicating information in grades 6–8 builds on K–5 experiences and progresses to combining information to describe and support scientific claims and ideas • Decide which observations, images, texts, data, and other media are useful for defining problems and determining how the natural world works. • Combine information (e.g., observations, texts, tables, images, graphs, maps) to answer scientific questions and evaluate scientific ideas.

Disciplinary Core Ideas	**Weather and Climate** • Weather and climate are influenced by interactions involving sunlight, ice, bodies of water, and landforms. These interactions vary with latitude, altitude, and local and regional geography. • Weather is a specific event, such as a rainstorm or hot day that happens over a few hours, days, or weeks. Weather can change from hour to hour or even year to year. • Climate is the long-term pattern of weather in a particular area. The region's average weather patterns, usually tracked for at least 30 years, are considered its climate. • Different parts of the world have different climates. o Tropical wet climates occur in parts of the world near the equator that are hot and rainy nearly every day. o Polar climates occur in parts of the world near the poles that are cold and snow-covered most of the year. o Between the icy poles and the steamy tropics are many other climates that contribute to Earth's biodiversity. • The climate of an area in which air masses originate eventually affects the weather in other areas. • It has been observed that Earth's global climate is getting warmer.

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. **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. **Scale, Proportion, and Quantity**: In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change. • Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. • The observed function of natural and designed systems may change with scale. • Proportional relationships (e.g., speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes. • Scientific relationships can be represented through the use of algebraic expressions and equations. • Phenomena that can be observed at one scale may not be observable at another scale.
How three dimensions support instruction for this Essential Element	Using data and information, students can identify patterns in weather and climate across different regions of Earth. These patterns can also help students explain cause-and-effect relationships, such as how bodies of water or elevation impact climate in the surrounding area. Students can also learn concepts related to scale, proportion, and quantity through comparison of weather data from one region's climate patterns to other regions in vastly different locations on Earth.

Instructional Resources

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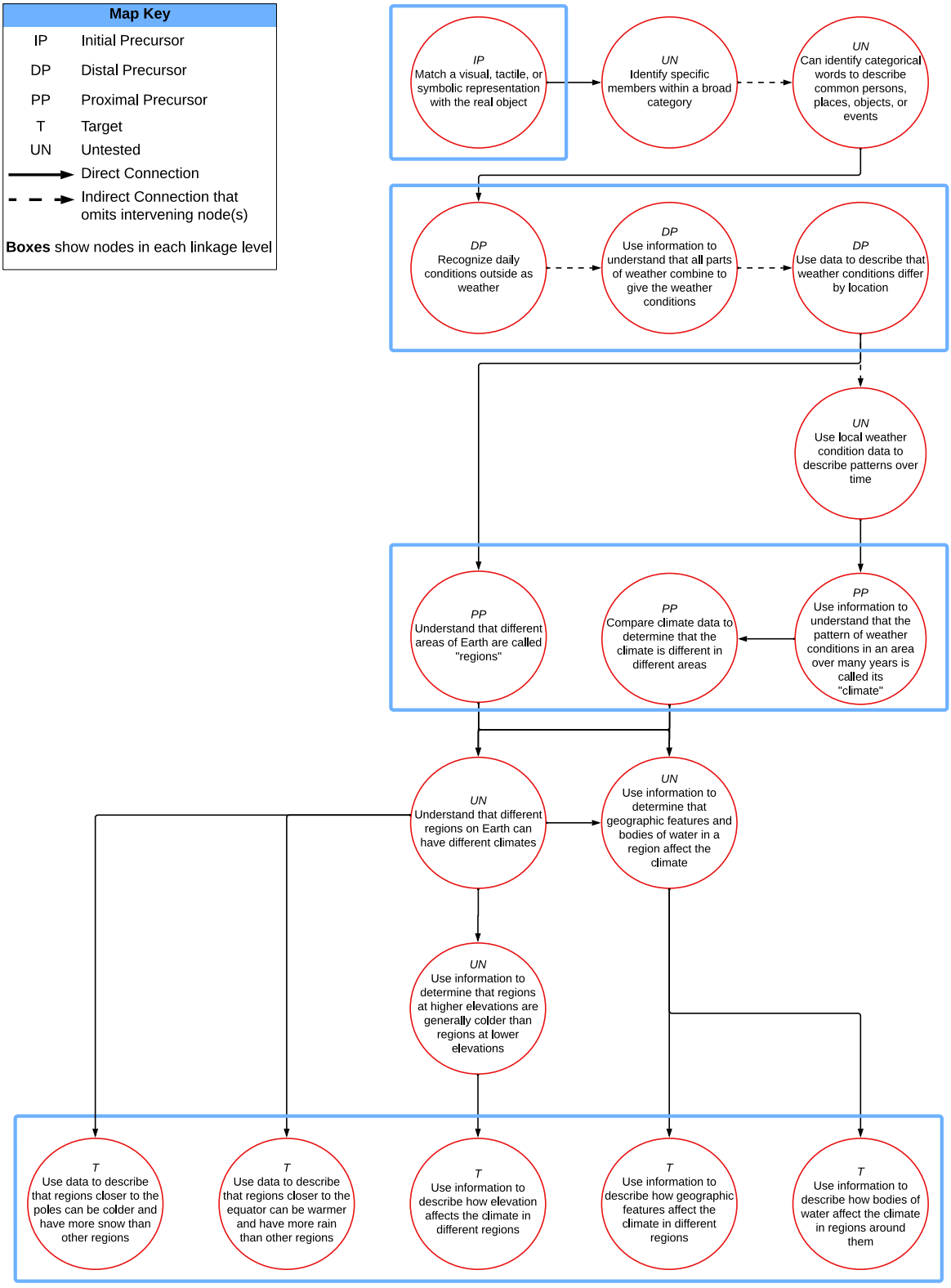
Link to Text-Only Map

SCI.EE.8.ESS.Weath-2 Use information to describe the relationships between regional climates, location on Earth, geographic features, and weather.



Mini-Map for SCI.EE.8.LS.EcoHlth-1

Subject: Science
Life Science (LS)
Grade band: 6–8

Grade-Level Expectation

DLM Essential Element	DLM Disciplinary Core Idea Family[1]	Framework Disciplinary Core Ideas
SCI.EE.8.LS.EcoHlth-1 Use data to explain the relationship between organisms' survival and growth and their interactions with both living and nonliving factors in their ecosystem.	Life Science – Ecosystem Health	LS2.A: Interdependent Relationships in Ecosystems LS2.C: Ecosystem Dynamics, Functioning, and Resilience LS4.D: Biodiversity and Humans ESS2.A: Earth Materials and Systems ESS2.D: Weather and Climate ESS2.E: Biogeology ESS3.A: Natural Resources

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Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target[2]
Identify the steps or events that follow the completion of previous steps within the sequence of a familiar routine.	Use information to describe what living things (i.e., plants, animals, and people) get within their habitat (i.e., water, air, light, food, and a place to live) to stay alive.	Use information to describe the availability of living and nonliving resources (i.e., air, water, sunlight, food, and shelter) in different habitats.	Use data to explain how the living and nonliving elements of an ecosystem affect availability of resources and organisms' growth and survival.

[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

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Science and Engineering Practices	**Analyzing and Interpreting Data:** Analyzing data in grades 6–8 builds on K–5 experiences and progresses to representing and evaluating data to support explanations about relationships and solutions to problems in the natural world. • Gather and represent data to determine and describe patterns. • Evaluate data to construct and support explanations. • Analyze data to evaluate solutions to problems. **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	**Ecosystem Health** • Organisms, including humans, depend on their habitat (biosphere, hydrosphere, atmosphere, and geosphere) for many living and nonliving resources. These resources are not evenly distributed. • The survival of organisms is dependent upon their interactions with both other living things (biosphere) and nonliving factors (geosphere, hydrosphere, and atmosphere). o Interactions could include predation, competition, disease, immigration of species, migration of species, cooperation or symbiosis, drought, flood, food availability, and nesting and sheltering. • Limiting factors slow or stop population growth. Examples include predation, competition, disease, immigration of species, weather, food, and water availability. o Limiting factors affect populations' access to living and nonliving resources. • Ecosystems can change over time. • Living organisms (biosphere) have impacted Earth's spheres (hydrosphere, geosphere, and atmosphere). o Human activity can disrupt or improve ecosystems. o Focus is on the interactions or impacts and not on identifying or naming spheres.
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. **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.

	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. • Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales, including the atomic scale. • Small changes in one part of a system might cause large changes in another part. • Stability might be disturbed either by sudden events or gradual changes that accumulate over time. • Systems in dynamic equilibrium are stable due to a balance of feedback mechanisms.
How three dimensions support instruction for this Essential Element	Students can use data to describe relationships among features of ecosystems and habitats as they change over time. They can understand that these changes can have causal effects on other aspects of the ecosystem. These changes can be small or gradual (e.g., a slow increase in annual rainfall or the slow decrease in the size of a population) or large or sudden (e.g., a large flood or the release of a new predator into a habitat). Students can learn about relationships within systems by evaluating how living and nonliving features of an ecosystem interact. Students can explain the cause-and-effect relationship between factors like resource availability and other parts of the ecosystem, like population size. Students can observe habitats that contain different amounts and kinds of resources and explain how the factors within an ecosystem affect and are affected by resource availability. Students can understand concepts of stability and change through their explanations of how changes to some parts of the ecosystem over time have important effects on other parts of the system. For example, in a drought, the types and numbers of plants and animals living in an ecosystem can change over time. Human activities, such as building structures within a habitat, can also result in a change in plant and animal populations.

Instructional Resources

Resources
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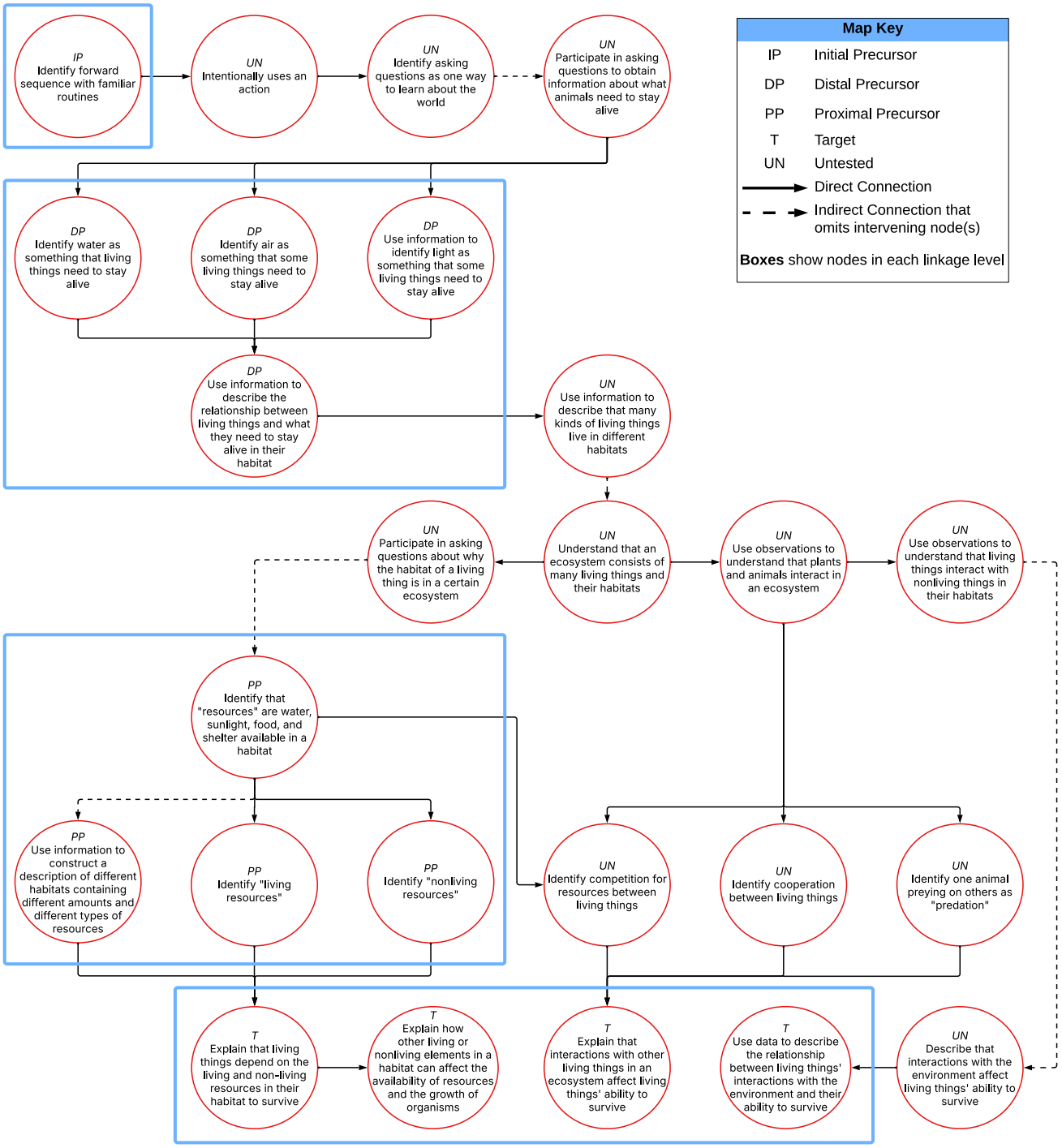
Link to Text-Only Map

SCI.EE.8.LS.EcoHlth-1 Use data to explain the relationship between organisms' survival and growth and their interactions with both living and nonliving factors in their ecosystem.



Mini-Map for SCI.EE.8.LS.Ecosys-1

Subject: Science
Life Science (LS)
Grade band: 6–8

Grade-Level Expectation

DLM Essential Element	DLM Disciplinary Core Idea Family[1]	Framework Disciplinary Core Ideas
SCI.EE.8.LS.Ecosys-1 Use a model to describe the transfer of food (i.e., matter and energy) between plants, animals, and decomposers.	Life Science – Ecosystem: Cycling of Matter and Flow of Energy	LS1.C: Organization for Matter and Energy Flow in Organisms LS2.A: Interdependent Relationships in Ecosystems LS2.B: Cycles of Matter and Energy Transfer in Ecosystems PS3.D: Energy in Chemical Processes and Everyday Life

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Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target[2]
Identify familiar places, events, people, and objects, including the functions of those familiar objects.	Use a food chain to identify either plants or other animals as a food source animals need to live.	Use a food chain/web to support the idea that animals eat different types of living things (i.e., only plants, only other animals, or both plants and other animals) to grow.	Use a model to describe the movement of different types of matter (i.e., different types of food sources) and energy between plants (i.e., producers), animals (i.e., consumers), and decomposers.

[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

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Science and Engineering Practices	**Developing and Using Models:** 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.
Disciplinary Core Ideas	**Ecosystem: Cycling of Matter and Flow of Energy** • Energy (i.e., sunlight) is required for plants to produce food (i.e., plant matter). Therefore, the energy released from food was once energy from the Sun that was captured by plants in the process that forms plant matter (from air and water) (see SCI.EE.8.LS.Plant-1). • The food produced by plants is used for growth, used for energy, or stored for later use. • Some animals eat plants; some animals eat both plants and animals; some animals eat only animals. • Organisms are interconnected in food webs. Food webs model how matter and energy are transferred among producers, consumers, and decomposers. • Decomposers break down dead plants and animals, recycling nutrients to the soil.

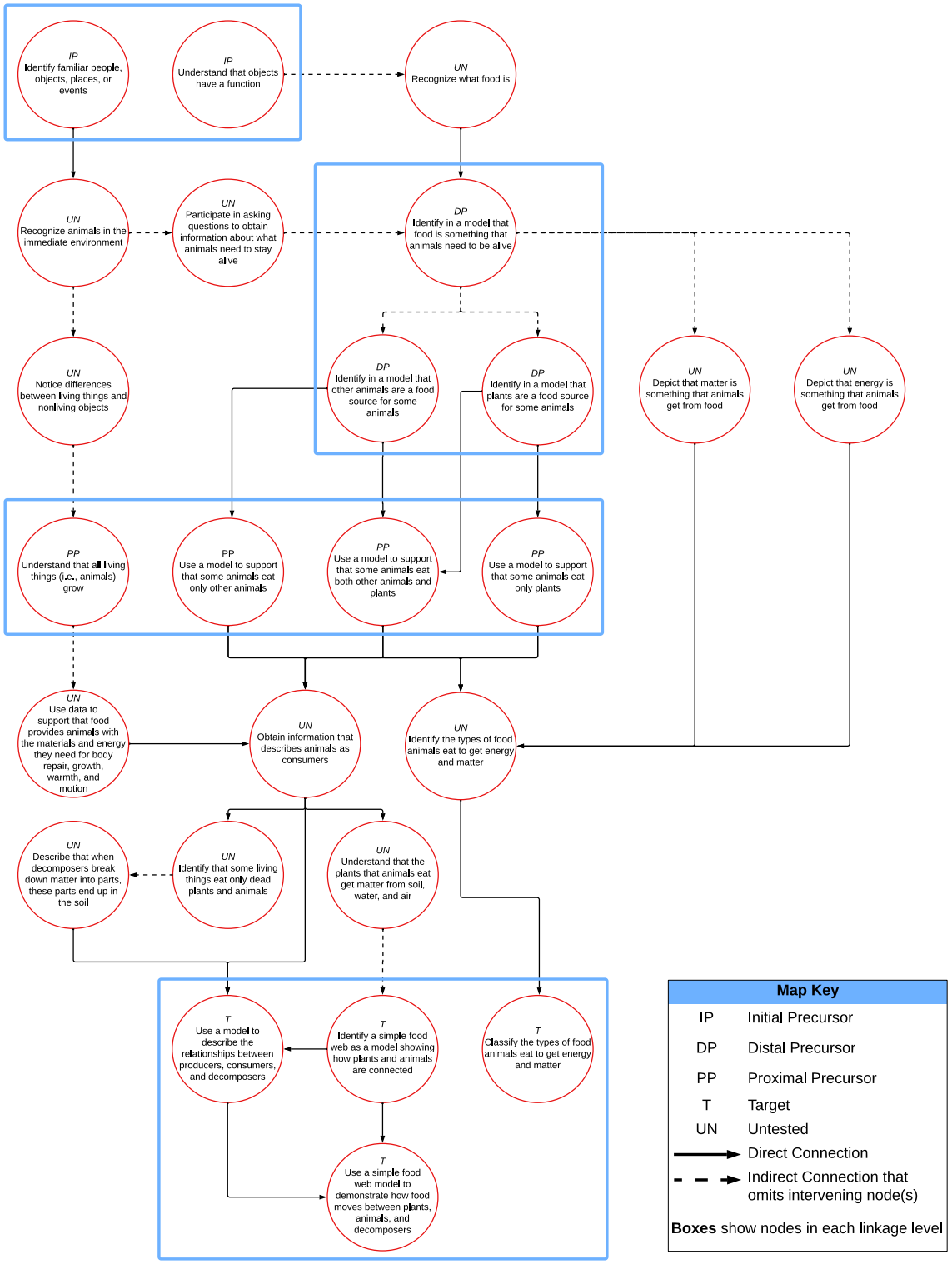
Crosscutting Concepts	**Systems and System Models:** A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems. • Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. • 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. **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 use system models to learn about ecosystems and the transfer of energy and matter within the system. Students can use models to identify the components of an ecosystem (Sun, plants, animals, and decomposers). Within this system some animals eat plants, some animals eat animals, and some animals eat both. Students can notice how energy and matter flow within this system; for example, by recognizing that decomposers recycle nutrients back to the soil. Students can also track energy from the Sun to plants, plant energy to animals, and plant and animal energy eventually to decomposers. They can make the connection of energy transfer within the ecosystem when they use a model of a food web.

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.LS.Ecosys-1 Use a model to describe the transfer of food (i.e., matter and energy) between plants, animals, and decomposers.



Mini-Map for SCI.EE.8.LS.Plant-1

Subject: Science
Life Science (LS)
Grade band: 6–8

Grade-Level Expectation

DLM Essential Element	DLM Disciplinary Core Idea Family[1]	Framework Disciplinary Core Ideas
SCI.EE.8.LS.Plant-1 Use data to explain that plants use energy (i.e., sunlight) and matter (i.e., air and water) to produce food (i.e., plant matter) for growth.	Life Science – Plants: Cycling of Matter and Flow of Energy	LS1.C: Organization for Matter and Energy Flow in Organisms LS2.B: Cycles of Matter and Energy Transfer in Ecosystems PS3.D: Energy in Chemical Processes and Everyday Life

[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]
Notice differences between objects and in the natural world to determine changes that occur over time.	Use observations of plant parts across multiple time points to identify that plants need light, water, and air to grow.	Use data to determine that plants must take in light, air, and water from their environment to grow.	Use data as evidence to explain that plants make and use their own food (i.e., plant matter) for growth by taking in and utilizing matter (i.e., air and water) and energy (i.e., sunlight) from their environment.

[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	**Analyzing and Interpreting Data:** Analyzing data in grades 6–8 builds on K–5 experiences and progresses to representing and evaluating data to support explanations about relationships and solutions to problems in the natural world. • Gather and represent data to determine and describe patterns. • Evaluate data to construct and support explanations. • Analyze data to evaluate solutions to problems. **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	**Plants: Cycling of Matter and Flow of Energy** • Plants use light energy (i.e., sunlight) and matter (i.e., air and water) from the environment to produce food. • The food produced by plants is used for growth, used for energy, or stored for later use. • The apparent increase in plant matter or material (e.g., increase in mass, height of stalk, number of leaves) is evidence of the transfer of matter from the environment to the plant.

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 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. **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 use data (e.g., observations or measurements of plant growth in different conditions) to explain that energy and matter from the environment flow through plants. For example, they can use data to describe that plants make their own food from matter and light in the environment and explain that matter from the environment becomes part of the plant. Students can understand how plants make their own food from energy (i.e., light) and matter (i.e., air and water) as an entry point to understanding these components as being part of an ecosystem.

Instructional Resources

Resources
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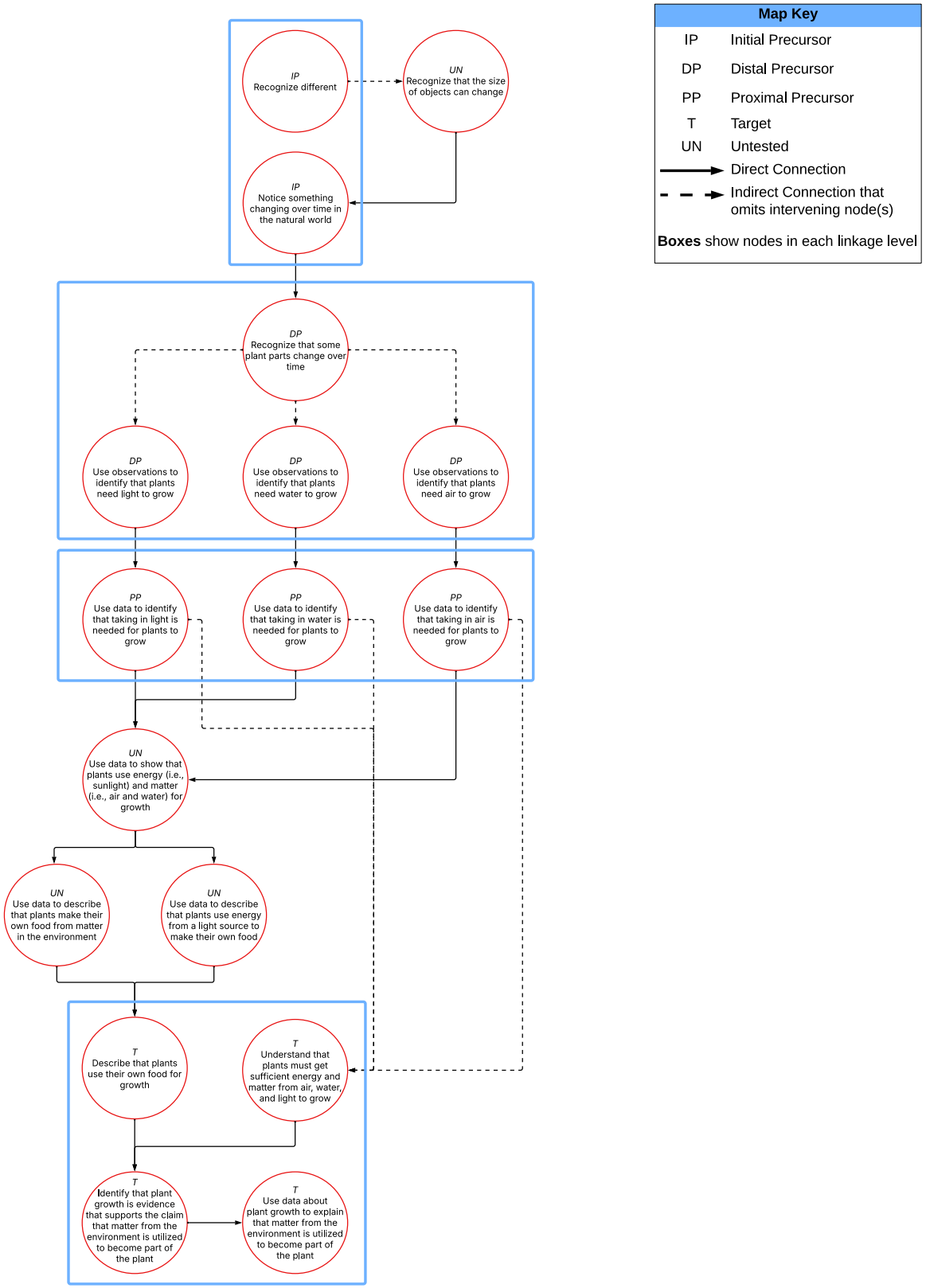
Link to Text-Only Map

SCI.EE.8.LS.Plant-1 Use data to explain that plants use energy (i.e., sunlight) and matter (i.e., air and water) to produce food (i.e., plant matter) for growth.



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
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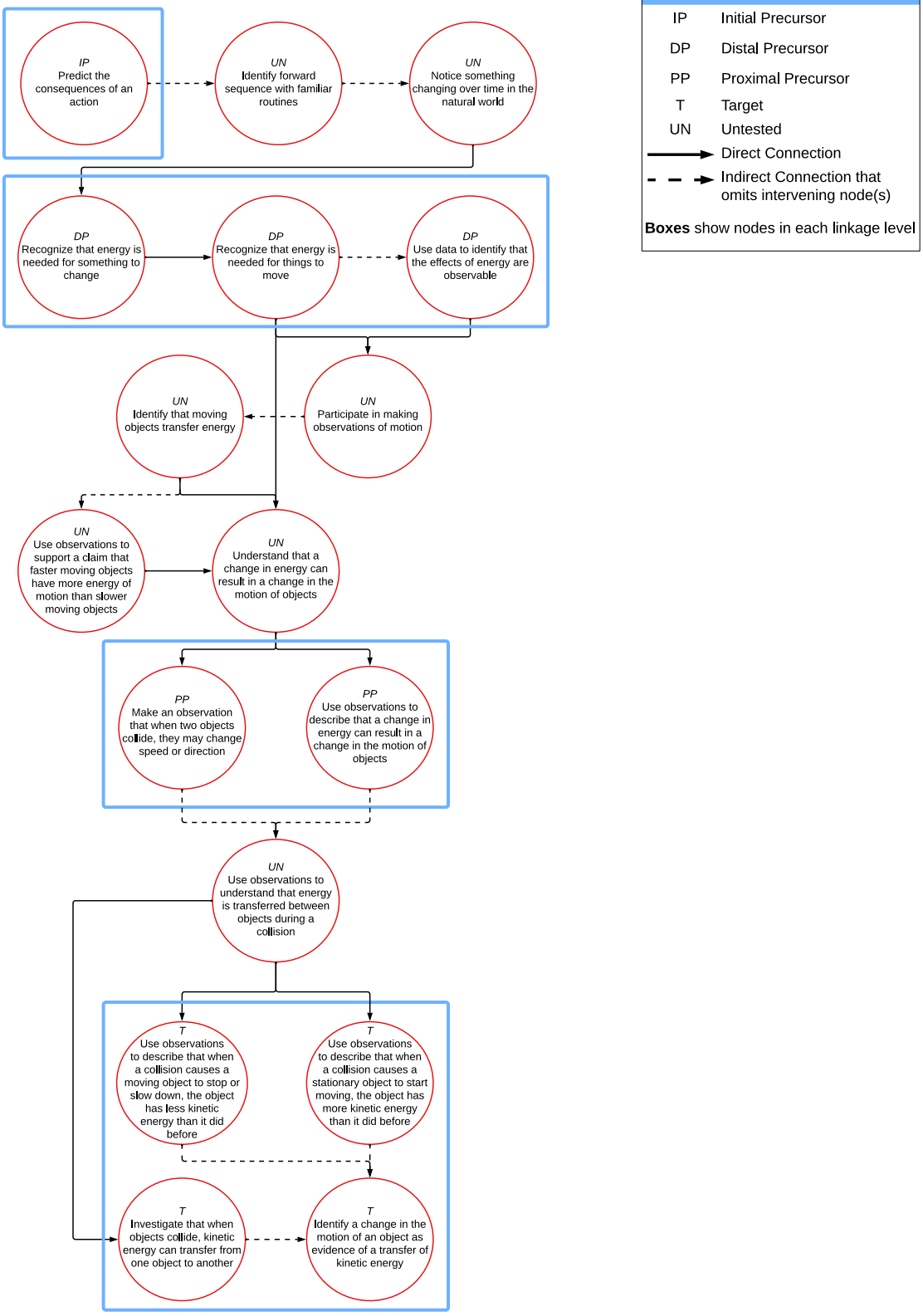
Link to Text-Only Map

SCI.EE.8.PS.Energy-2 Provide evidence that kinetic energy is transferred between two objects when they collide with each other.



Mini-Map for SCI.EE.8.PS.Forces-1

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.Forces-1 Use observations and measurements to determine how an object's mass affects the force needed to change its motion.	Physical Science – Interacting Forces	PS2.A: Forces and Motion PS2.B: Types of Interactions PS2.C: Stability and Instability in Physical Systems PS3.C: Relationship Between Energy and Forces

[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 when specific attribute values of objects' physical characteristics are similar to or different from each other.	Observe the values of two attributes (i.e., motion of an object and force applied to the object) to identify that a force (i.e., push/pull) can cause a stationary object to move and the direction of the motion is related to the direction of the force.	Compare observations of two variables (i.e., motion of an object and force applied to the object) to determine how differing directions and magnitudes (i.e., strengths) of forces (i.e., pushes and pulls) applied to an object changes its motion (i.e., direction of motion, distance traveled, and speed of motion).	Use relative measurements from tests to determine the relationships between objects' masses, the strength of forces applied to them, and their resulting motion (i.e., speed of motion, direction of motion, and distance traveled).

[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	**Analyzing and Interpreting Data:** Analyzing data in grades 6–8 builds on K–5 experiences and progresses to representing and evaluating data to support explanations about relationships and solutions to problems in the natural world. • Gather and represent data to determine and describe patterns. • Evaluate data to construct and support explanations. • Analyze data to evaluate solutions to problems. **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. o Use observations and measurements to determine and support relationships between variables. **Using Mathematics and Computational Thinking:** Mathematical and computational thinking in grades 6–8 builds on K–5 experiences and progresses to using and applying data and mathematical concepts to understand relationships in the natural and designed world. • Apply mathematical concepts and processes to determine and describe relationships between variables. • Use mathematical representations and reasoning to compare characteristics of components of a system.

Disciplinary Core Ideas	**Interacting Forces** • The motion of an object depends on the total forces acting on that object (see SCI.EE.5.PS.Forces-1). • Newton's third law of motion: For any pair of interacting objects, the forces exerted by each object on the other are equal and opposite. In other words, the force exerted by the first object on the second object is equal to the force that the second object exerts on the first but in the opposite direction.
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. **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.
How three dimensions support instruction for this Essential Element	Students can identify patterns in relationships between an object's mass and the force needed to change motion by using measurement and observations. They learn the general principle that an object's mass affects the force needed to change its motion in systematic ways. Through investigations, students can record the relationships between forces with different directions and magnitudes acting on an object (causes) and the resulting speed, direction, and distance the object travels (effects). This can help students understand that the total force acting on an object, not just individual forces, is the key factor in determining its motion.

Instructional Resources

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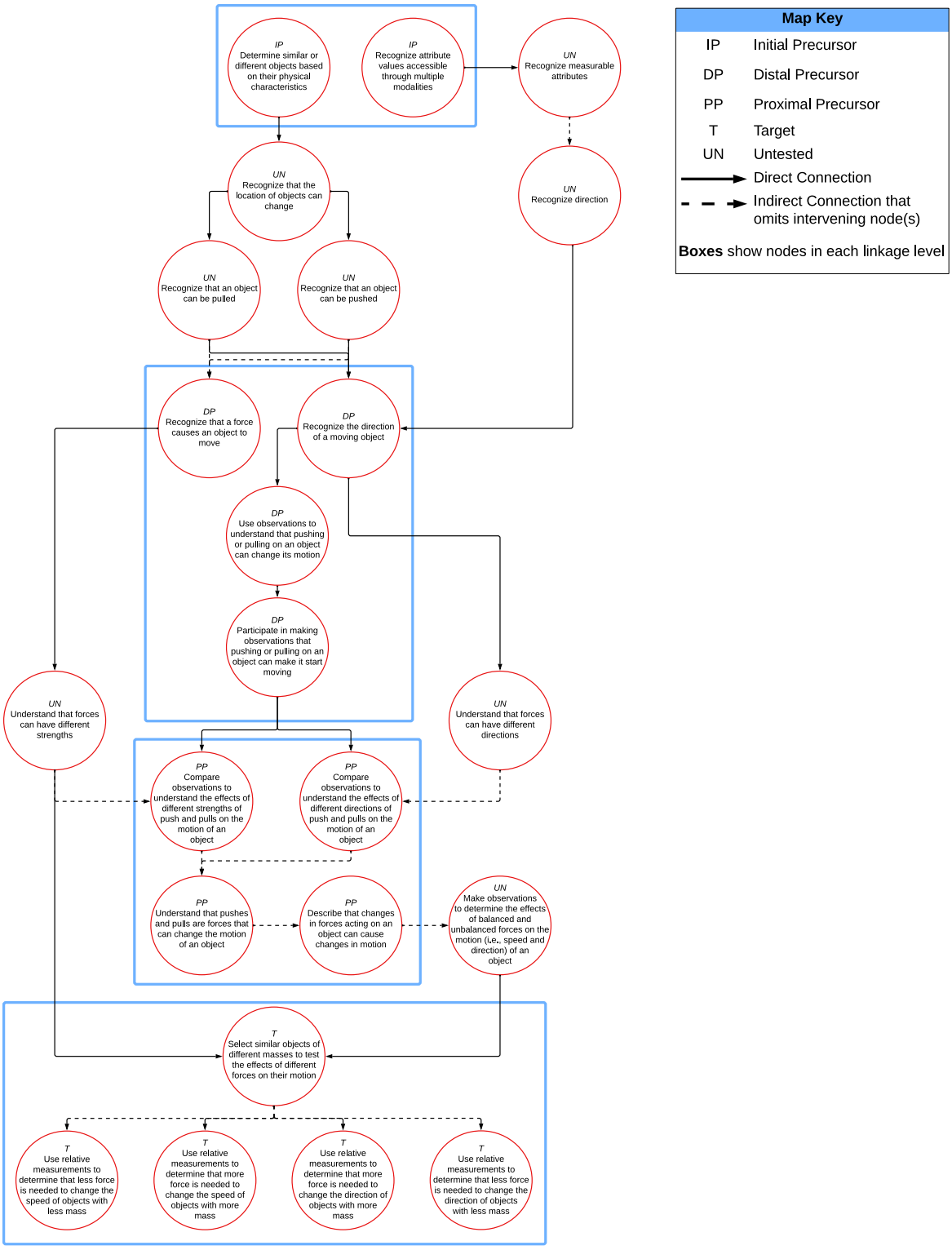
Link to Text-Only Map

SCI.EE.8.PS.Forces-1 Use observations and measurements to determine how an object's mass affects the force needed to change its motion.



Mini-Map for SCI.EE.8.PS.Matter-1

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.Matter-1 Use a particle model of matter to describe the relationships between the states of matter, their characteristics and properties, and temperature.	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]
Identify and use categorical words to describe common persons, places, objects, or events.	Use representations to classify common kinds and forms of materials according to their physical characteristics.	Use representations to describe the different forms (i.e., states) in which substances (i.e., matter) can exist.	Use a particle model of matter to describe the relationships between temperature, states of matter, and their characteristics and properties.

[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

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Science and Engineering Practices	**Developing and Using Models:** 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	**Matter and Chemical Reactions** • Matter (i.e., substance) is made of different types of particles. • Matter can exist as solids, liquids, or gases depending on temperature. The changes of state that occur with variations in temperature can be described and predicted using particle models of matter. • In a solid, particles are closely spaced and vibrate in position but do not change relative locations. • Gases and liquids are made of particles that are moving about relative to each other. In a liquid, the particles are constantly in contact with each other; in a gas, they are widely spaced except when they happen to collide. Gases are made of particles that are moving freely around in space. • The changes of state that occur with variations in temperature can be described and predicted using these particle models of matter (see SCI.EE.8.PS.Energy-1 and SCI.EE.8.PS.Energy-2).

	Usually, the change occurs when adding or removing heat. The nature of the phase change depends on the direction of the heat transfer. Heat going into a substance changes it from a solid to a liquid or a liquid to a gas. Particles of matter generally move more or faster when heated. Removing heat from a substance changes a gas to a liquid or a liquid to a solid. Particles of matter generally move less or slower when cooled • Bulk properties of states of matter that can be observed or measured can include the ability to move or flow, the ability to take the shape of a container, and the ability to hold its shape or volume.
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. **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. **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 learn about systems and system models through a particle model of matter. Models can be used to represent and describe particles, the distance between particles, particle movement under different conditions, and the interactions between particles in the system. Understanding of cause-and-effect relationships can help students explain changes in states of matter. Students can make observations of effects when temperature changes, when the position or motion of particles in a model changes, and when states of matter change. Energy and matter concepts build on prior understanding about matter, states of matter, and how heat impacts matter. The concept of energy relates to matter through investigating relationships between the movement of particles, states of matter, and temperature or heat.

Instructional Resources

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Link to Text-Only Map

SCI.EE.8.PS.Matter-1 Use a particle model of matter to describe the relationships between the states of matter, their characteristics and properties, and temperature.