Mini-Map for SCI.EE.5.ESS.Earth-2

Subject: Science
Earth and Space Science (ESS)
Grade band: 3–5

Grade-Level Expectation

DLM Essential Element	DLM Disciplinary Core Idea Family[1]	Framework Disciplinary Core Ideas
SCI.EE.5.ESS.Earth-2 Use information to describe that water is found in different forms almost everywhere on Earth.	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]
Identify familiar people, objects, places, or events and whether objects are similar or different, based on their physical characteristics.	Use information to identify Earth's surface as both land (i.e., the ground that people stand on) and different forms of water (i.e., liquid water and solid ice).	Use information to compare different bodies of water in different locations on Earth's surface.	Use information to describe that different forms of water (i.e., solid, liquid, and gas) are found almost everywhere on Earth (i.e., on its surface and in its atmosphere).

[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	**Obtaining, Evaluating, and Communicating Information:** Obtaining, evaluating, and communicating information in grades 3–5 builds on K–2 experiences and progresses to describing scientific ideas. • Use observations, images, simple texts, and other media to understand problems and determine how the natural world works. • Use information (e.g., observations, images, graphs, maps) to answer questions and support scientific ideas.
Disciplinary Core Ideas	**Earth Systems** • Depending on temperature, water exists in different states: solid, liquid, or gas. • Water is found almost everywhere on Earth. o It is found as water vapor (gas) in the air. o It is found in the clouds as tiny water droplets (liquid). o It is found in the sky and as rain (liquid), ice (solid), or snow (solid) falling from clouds. o It is found as ice, snow, and standing water on Earth's surface. o It is found in bodies of water on Earth's surface (e.g., lakes, streams, oceans). o It is found as running water on land.

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.
How three dimensions support instruction for this Essential Element	Students can use information to recognize that water (in various states of matter) can be found in many locations on Earth. Students can also learn how the same water is transported from place to place on Earth over time (for example, that water flows from clouds in the atmosphere to the surface of Earth).

Instructional Resources

Resources
Learning modules and additional science instructional resources can be found at https://www.dlmpd.com/science/
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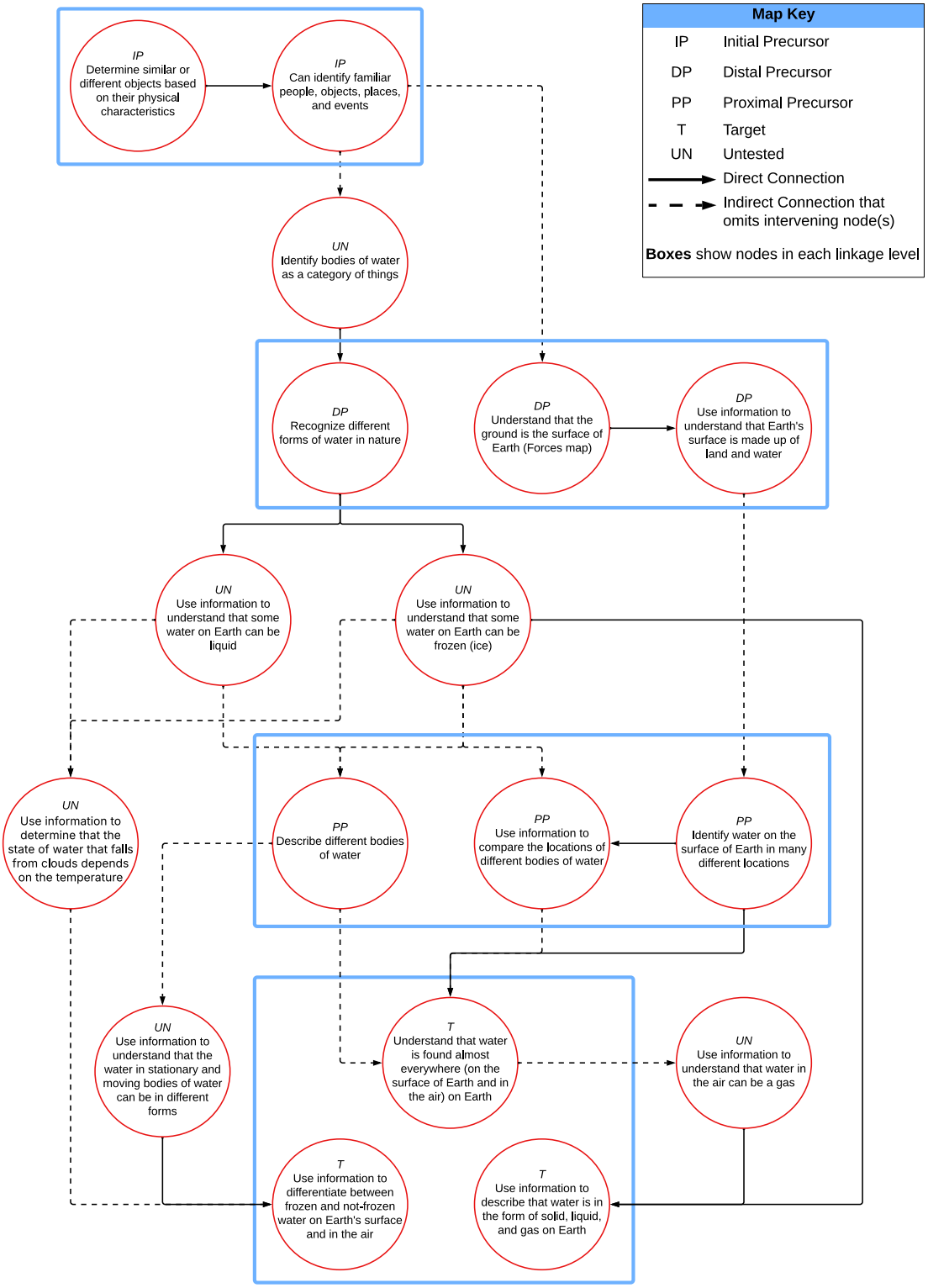
Link to Text-Only Map

SCI.EE.5.ESS.Earth-2 Use information to describe that water is found in different forms almost everywhere on Earth.



Mini-Map for SCI.EE.5.ESS.SolSys-3

Subject: Science
Earth and Space Science (ESS)
Grade band: 3–5

Grade-Level Expectation

DLM Essential Element	DLM Disciplinary Core Idea Family[1]	Framework Disciplinary Core Ideas
SCI.EE.5.ESS.SolSys-3 Use data from different times of the year to determine 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]
Recognize the order in which actions and/or events occur (i.e., what action or event comes before another and what comes after another).	Identify the alternating pattern of daytime (i.e., daylight) and nighttime (i.e., darkness) in a daily sequence.	Count the number of daylight hours (i.e., the number of hours between sunrise and sunset) represented in tables and graphs as part of one day (i.e., 24 hours).	Quantify and qualify annual, seasonal patterns in data (i.e., in data tables and graphs) about daylight hours across the months of a year.

[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 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. **Using Mathematics and Computational Thinking**: Mathematical and computational thinking in grades 3–5 builds on K–2 experiences and progresses to using data and mathematical concepts to describe the natural and designed world. • Use simple data tables and graphs to determine and describe relationships in the natural world. • Use measurements and simple mathematical representations to describe characteristics of the natural world.
Disciplinary Core Ideas	**Earth in the Solar System** • Earth completes one full rotation upon its axis every 24 hours (see SCI.EE.5.ESS.SolSys-2). The part of Earth facing the Sun experiences daytime, or sunlight, while the part of Earth facing away from the Sun experiences nighttime, or darkness. • The number of daylight hours can vary throughout the year. This variation may result in seasonal patterns. Examples of patterns in the Northern Hemisphere could include that the number of hours of daylight in summer months is generally greater than in winter months, and the number of hours of daylight generally decreases from summer months to winter months.

Crosscutting Concepts	**Patterns:** Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them. • Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena and designed products. • Patterns of change can be used to make predictions. • Patterns can be used as evidence to support explanation.
How three dimensions support instruction for this Essential Element	Patterns help students understand the movement of objects in the solar system and seasonal changes on Earth. Students analyze changes in seasonal data to reveal patterns in the number of daylight hours in each of Earth's seasons. They also use patterns to understand that the Earth rotates once per day and revolves around the Sun once per year.

Instructional Resources

Resources
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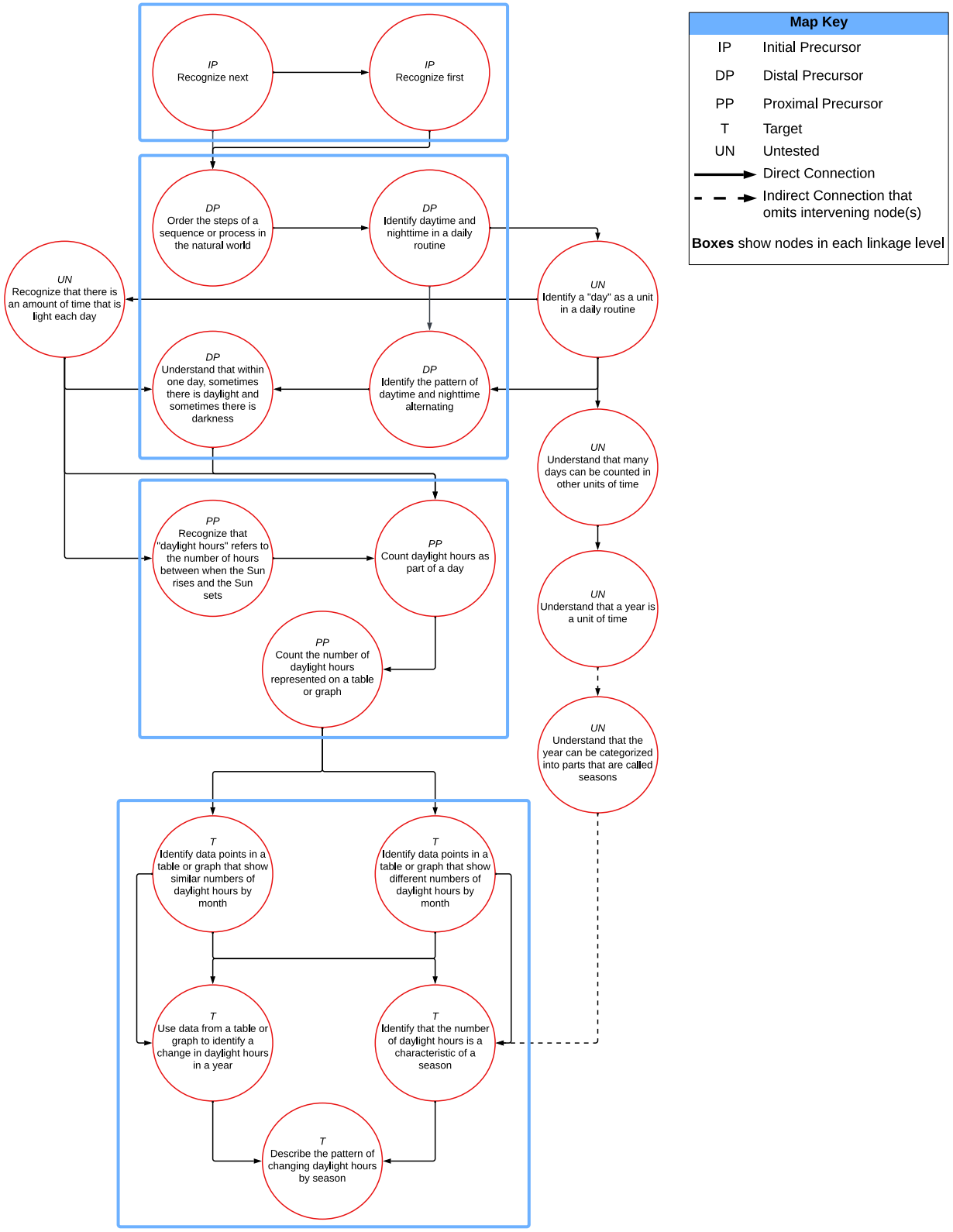
Link to Text-Only Map

SCI.EE.5.ESS.SolSys-3 Use data from different times of the year to determine seasonal patterns in the number of daylight hours.



Mini-Map for SCI.EE.5.ESS.SolSys-4

Subject: Science
Earth and Space Science (ESS)
Grade band: 3–5

Grade-Level Expectation

DLM Essential Element	DLM Disciplinary Core Idea Family[1]	Framework Disciplinary Core Ideas
SCI.EE.5.ESS.SolSys-4 Make observations to support that Earth's gravity exerts a downward force on all objects on its surface.	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]
Intentionally use an action to achieve a goal.	Participate in making observations to identify objects in motion and when they are being pushed and/or pulled.	Make and use observations to identify that objects fall downward toward the ground (i.e., the surface of the Earth) when they are dropped.	Make and use observations of falling objects to support the identification of Earth's gravity as a force that pulls objects downward to Earth's surface.

[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	**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. **Engaging in Argument from Evidence:** Engaging in argument from evidence in grades 3–5 builds on K–2 experiences and progresses to identifying information that can support claims about the natural world. • Identify relevant evidence to support a claim. • Use observations, information, data, or a model to support claims.
Disciplinary Core Ideas	**Earth in the Solar System** • Some forces act through contact, while other forces act even when the objects are not in contact (see SCI.EE.5.PS.Forces-2). • Gravity is the force that pulls all objects on Earth's surface downward (i.e., toward the center of Earth). • Gravity pulls both heavy and light objects downward.
Crosscutting Concepts	**Patterns**: Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them. • Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena and designed products. • Patterns of change can be used to make predictions. • Patterns can be used as evidence to support explanation.

	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. • Cause and effect relationships are routinely identified, tested, and used to explain change. • Events that occur together with regularity might or might not be a cause and effect relationship.
How three dimensions support instruction for this Essential Element	Through investigations, students can recognize the pattern that, when objects are dropped, they fall to the ground. This pattern can be used as evidence for the cause and effect relationship that gravity makes objects fall downward. Understanding the pull of Earth (gravity) can build from student investigations of how changes in motion are caused by variations in the strength and direction of pushes and pulls.

Instructional Resources

Resources
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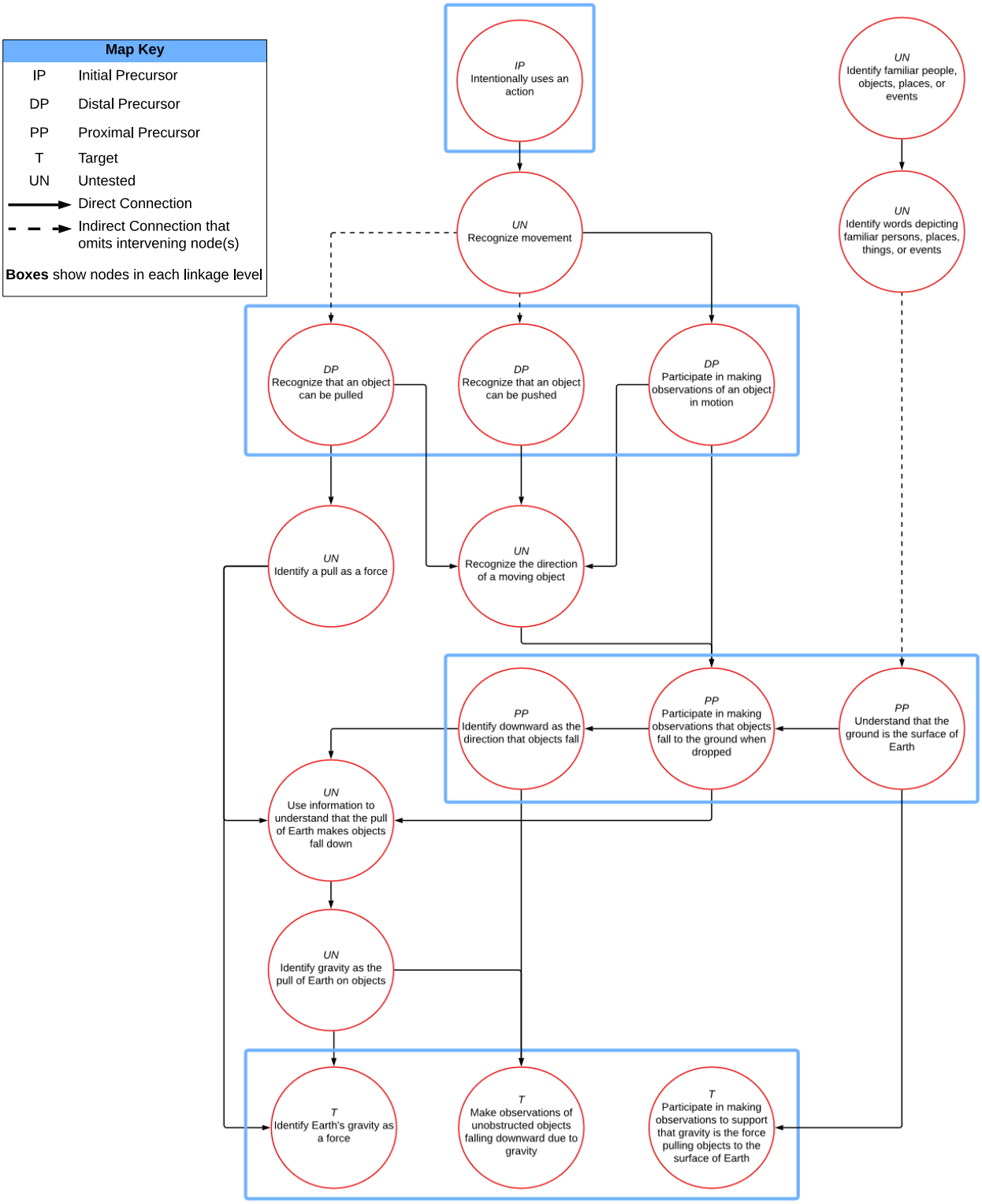
Link to Text-Only Map

SCI.EE.5.ESS.SolSys-4 Make observations to support that Earth's gravity exerts a downward force on all objects on its surface.



Mini-Map for SCI.EE.5.LS.EcoHlth-2

Subject: Science
Life Science (LS)
Grade band: 3–5

Grade-Level Expectation

DLM Essential Element	DLM Disciplinary Core Idea Family[1]	Framework Disciplinary Core Ideas
SCI.EE.5.LS.EcoHlth-2 Ask questions to determine how living things (both plants and animals) impact the habitat in which they live.	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]
Anticipate the resulting action or event following the completion of the current action or event within the sequence of a familiar routine, game, or activity.	Identify and respond to simple questions to determine the differences between living (i.e., animals) and nonliving (i.e., neither plants nor animals) things to identify whether a thing is living or nonliving.	Use questions to elicit information that describes different living things and the different places in which they live (i.e., habitats).	Use questions to obtain an understanding of how the life activities of plants and animals impact the habitat in which they live.

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Essential Element Three Dimensions

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Science and Engineering Practices	**Asking Questions and Defining Problems:** Asking questions and defining problems in grades 3–5 builds on K–2 experiences and progresses to identifying questions to gain information through investigation. • Develop questions that can help determine relationships. **Obtaining, Evaluating, and Communicating Information:** Obtaining, evaluating, and communicating information in grades 3–5 builds on K–2 experiences and progresses to describing scientific ideas. • Use observations, images, simple texts, and other media to understand problems and determine how the natural world works. • Use information (e.g., observations, images, graphs, maps) to answer questions and support scientific ideas.

Disciplinary Core Ideas	**Ecosystem Health**
	• Healthy ecosystems have a diversity of plants and animals in a fairly stable environment.
	• Organisms live where they can find enough food, water, space, and place to raise their young.
	• Living things can impact the physical characteristics of where they live.
	  o Animals aid in plant pollination and seed dispersal.
	  o Impacts can be positive or negative.
	• Populations live in a variety of habitats, and change in those habitats affects the organisms living there.

Crosscutting Concepts	**Cause and Effect**: 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. • Cause and effect relationships are routinely identified, tested, and used to explain change. • Events that occur together with regularity might or might not be a cause and effect relationship.

	System 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. • A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. • A system can be described in terms of its components and their interactions. **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 use questions and information to understand and predict how the actions of living things relate to and impact the habitats they live in. The concepts of system and system models are part of identifying an ecosystem as a type of system and understanding interactions among various components, including plants, animals, and their environment. For example, students can learn about how the population of one species can affect other aspects of their habitat (e.g., a higher wolf population leads to a lower elk population, which then allows plants to flourish and protect riverbanks). Students can also understand different ways in which these components of an ecosystem interact, such as an animal moving parts of plants around the environment, raising young, and consuming food and water. As students learn that features of an ecosystem can change or can stay the same over time, they come to understand how stability and change are part of ecosystems. Students can determine that change in habitats affects the organisms that live there, that stable ecosystems have fewer changes than unstable ones, and that healthy ecosystems tend to be fairly stable.

Instructional Resources

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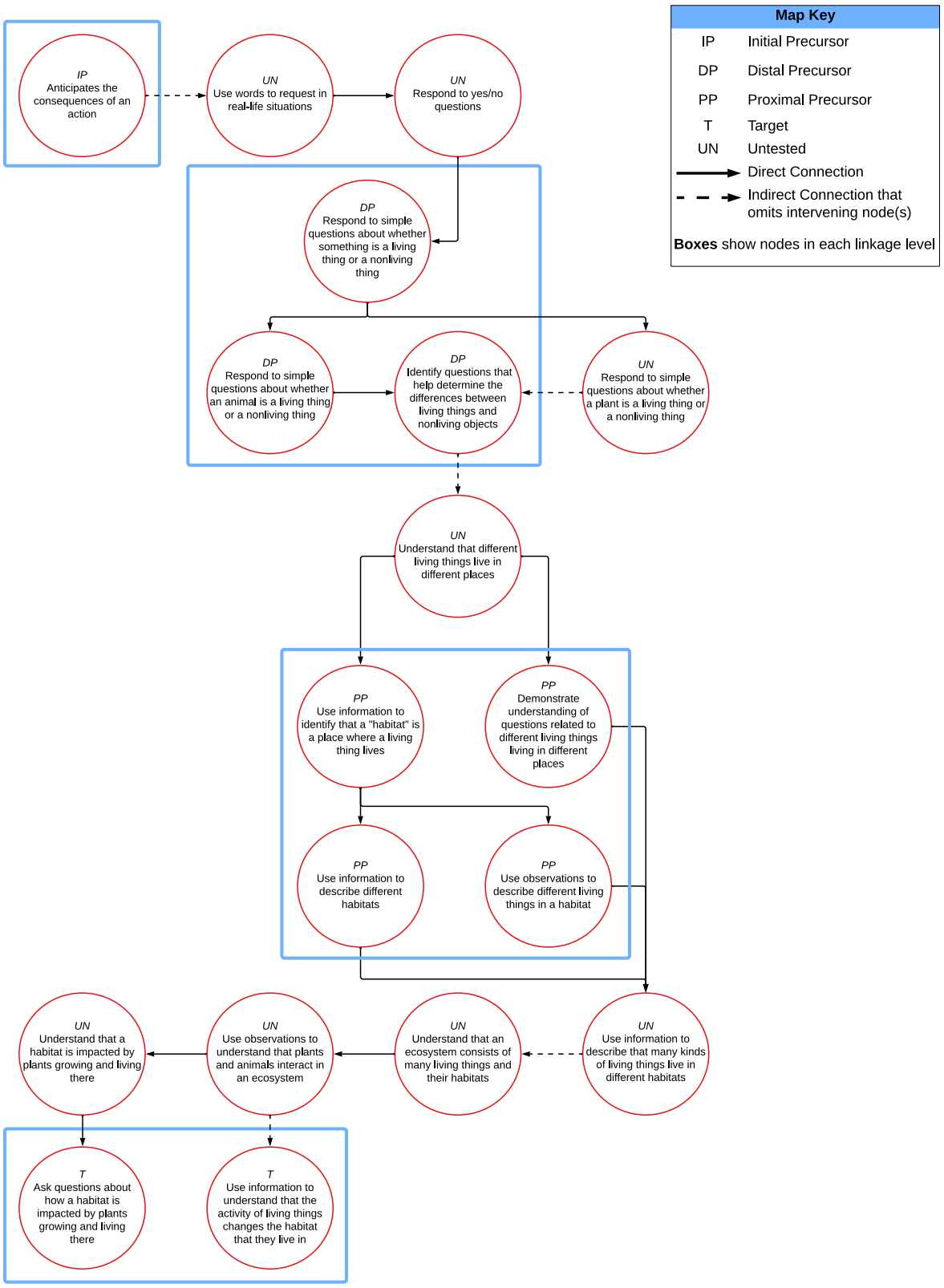
Link to Text-Only Map

SCI.EE.5.LS.EcoHlth-2 Ask questions to determine how living things (both plants and animals) impact the habitat in which they live.



Mini-Map for SCI.EE.5.LS.Ecosys-1

Subject: Science
Life Science (LS)
Grade band: 3–5

Grade-Level Expectation

DLM Essential Element	DLM Disciplinary Core Idea Family[1]	Framework Disciplinary Core Ideas
SCI.EE.5.LS.Ecosys-1 Use data to support that food provides animals with the materials and energy they need for body repair, growth, warmth, and motion.	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

[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 objects that have similar and different physical characteristics.	Based on what is and is not food, classify animals that eat food as living things and inanimate objects (i.e., objects other than plants, animals, and humans) that do not eat food as non-living things.	Use data from multiple timepoints to support that animals need to consume food to grow.	Use data as evidence to make and support claims about the relationships between available energy and matter from food sources and animals' abilities to sustain their bodily processes (i.e., sustain warmth, movement, growth, and body repair).

[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 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. **Engaging in Argument from Evidence:** Engaging in argument from evidence in grades 3–5 builds on K–2 experiences and progresses to identifying information that can support claims about the natural world. • Identify relevant evidence to support a claim. • Use observations, information, data, or a model to support claims.
Disciplinary Core Ideas	**Ecosystem: Cycling of Matter and Flow of Energy** • Animals acquire matter and energy from their environment. • Organisms live where they can find enough food. • Some animals eat plants for food, and other animals eat the animals that eat plants. • Food provides animals with the materials they need for body repair, growth, warmth, and motion. • Energy stored in food can be used for body repair, growth, warmth, and motion.

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. • Cause and effect relationships are routinely identified, tested, and used to explain change. • Events that occur together with regularity might or might not be a cause and effect relationship. **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.
How three dimensions support instruction for this Essential Element	Students can use data to identify relationships between animals getting the type and amount of food they need (causes) and being able to grow, move, stay warm, and repair their bodies (effects). Students can also use data as evidence that energy and matter are transferred through the food animals eat. They can identify that food stores energy and is made up of matter and argue that both are transferred to the animal that eats it. For example, when using data provided to them, students can observe that the amount of food that is available for animals to eat relates to whether they have energy for movement and growth.

Instructional Resources

Resources
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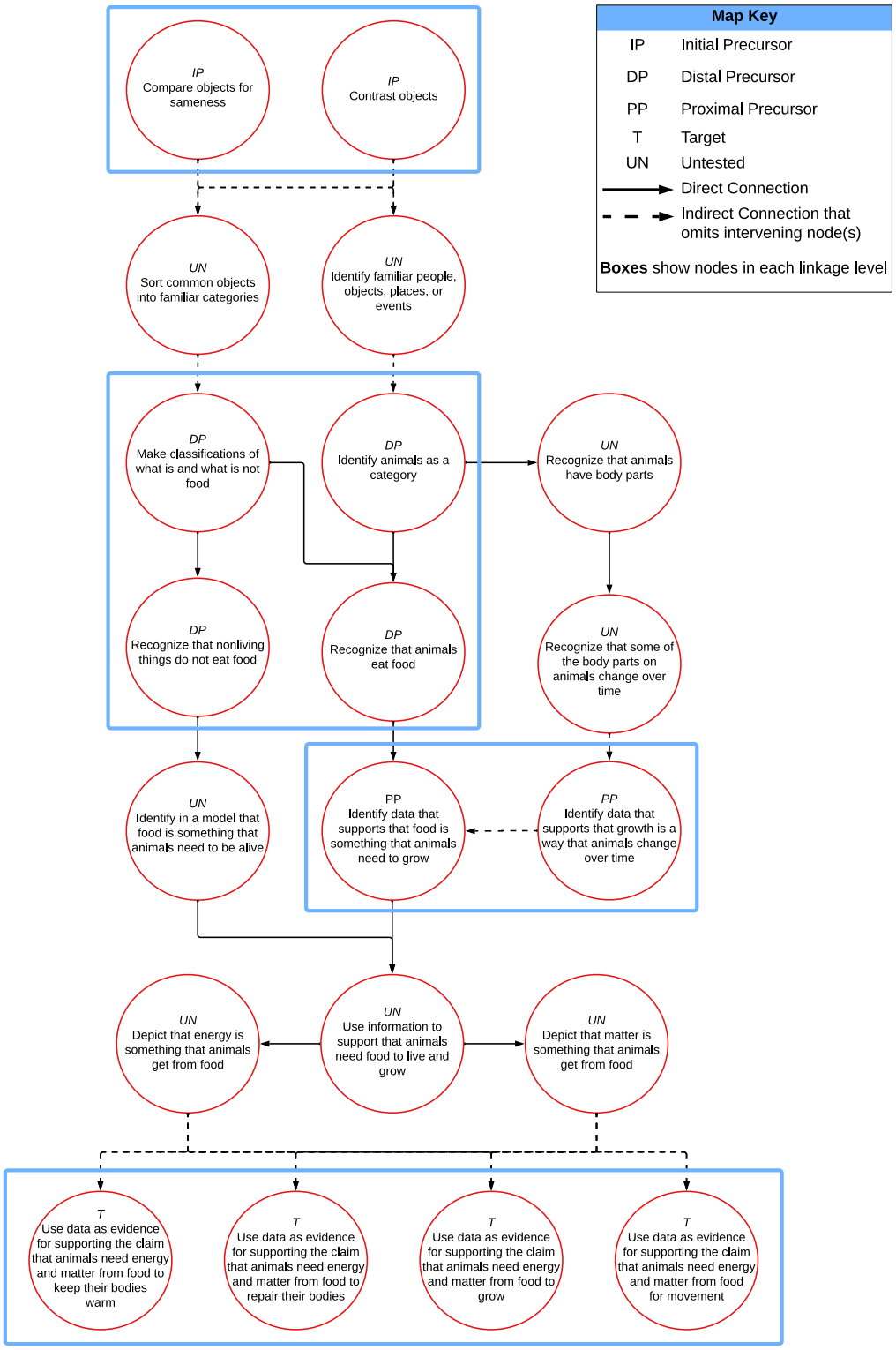
Link to Text-Only Map

SCI.EE.5.LS.EcoSys-1 Use data to support that food provides animals with the materials and energy they need for body repair, growth, warmth, and motion.



Mini-Map for SCI.EE.5.LS.Plant-1

Subject: Science
Life Science (LS)
Grade band: 3–5

Grade-Level Expectation

DLM Essential Element	DLM Disciplinary Core Idea Family[1]	Framework Disciplinary Core Ideas
SCI.EE.5.LS.Plant-1 Use data to show that plants use energy (i.e., sunlight) and matter (i.e., air and water) 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

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Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target[2]
Compare objects to determine whether they are the same or different.	Compare observations across multiple time points of the characteristics of objects, plants in the immediate environment, and the larger natural world to identify change over time.	Identify patterns within observations collected over multiple time points to relate the occurrence or lack of plant growth to what plants need to grow (i.e., water and light).	Use relationships in data between plant growth and available energy and matter in the environment to show that plants take in energy from light (i.e., sunlight) and matter from air and water to grow.

[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 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. **Engaging in Argument from Evidence:** Engaging in argument from evidence in grades 3–5 builds on K–2 experiences and progresses to identifying information that can support claims about the natural world. • Identify relevant evidence to support a claim. • Use observations, information, data, or a model to support claims.
Disciplinary Core Ideas	**Plants: Cycling of Matter and Flow of Energy** • Plants acquire materials for growth mainly from the air and water and process matter and obtain energy from sunlight, which is used for body repair and growth. • Organisms get gases (air) and water from the environment. • Energy (stored) in plant matter is used for body repair and growth.

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. • Cause and effect relationships are routinely identified, tested, and used to explain change. • Events that occur together with regularity might or might not be a cause and effect relationship. **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.
How three dimensions support instruction for this Essential Element	Students can analyze data related to what causes plants to grow or not, such as the amounts of water, air, and light plants receive. Data to identify effects on growth might include the height, weight, condition, or number and size of leaves of plants in and away from sunlight, water, or air. For example, students could use data on the number of leaves on two identical plants, one exposed to sunlight and one in a dark location. Students can understand the concepts of energy and matter by using data to argue that plants get energy from sunlight and matter from air and water. Both are necessary for plants to grow. For example, students can use evidence of plant growth or lack of growth to note the transfer of energy from light (the Sun) to plants. Students can interpret plant weight (mass) data to note that when matter, in the form of water and air, is transported into the plant, the weight increases.

Instructional Resources

Resources
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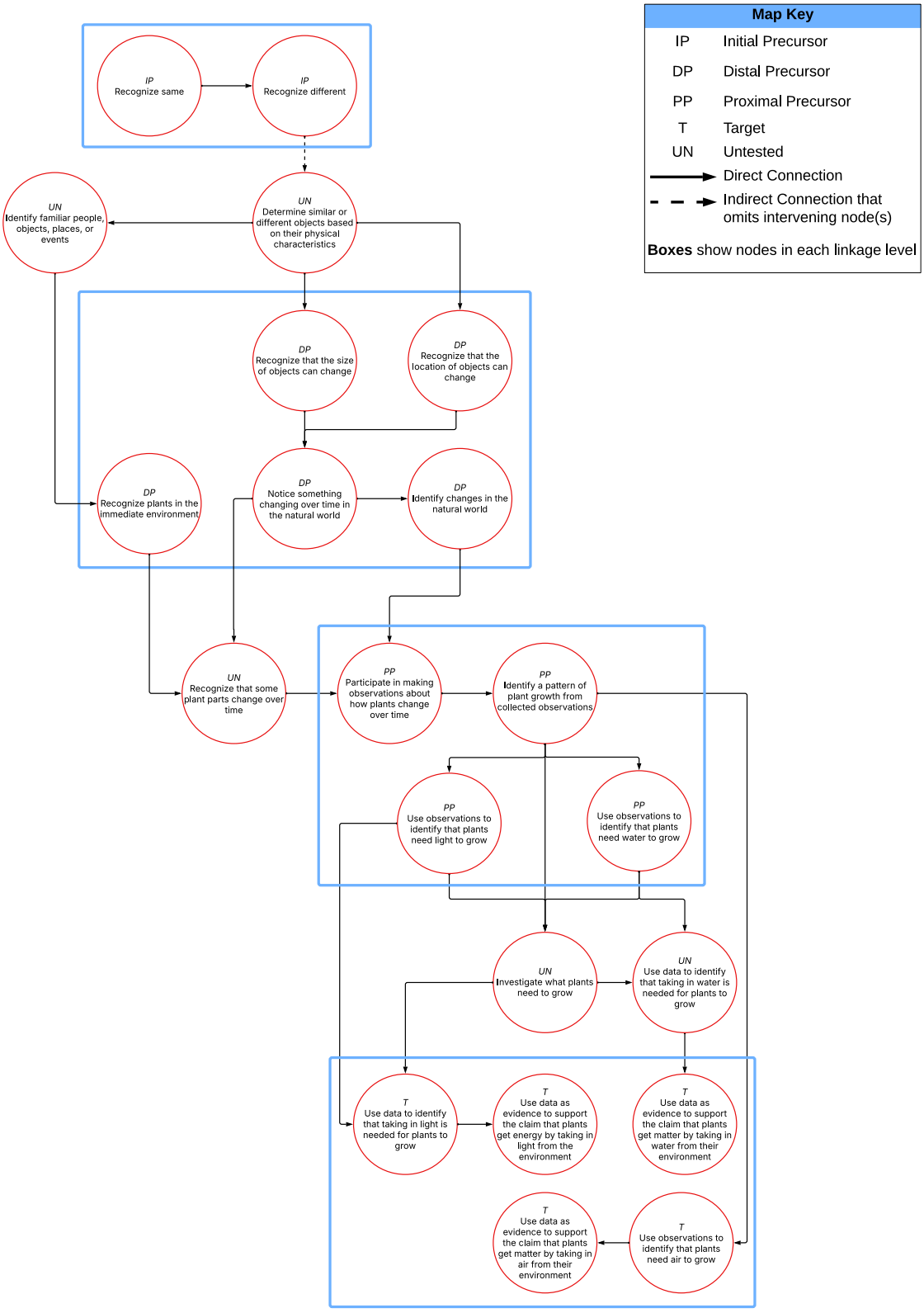
A glossary defining key science terms found in the Essential Elements can be found at DLM Glossary for Science Learning Maps.

Link to Text-Only Map

SCI.EE.5.LS.Plant-1 Use data to show that plants use energy (i.e., sunlight) and matter (i.e., air and water) for growth.



Mini-Map for SCI.EE.5.PS.Forces-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.Forces-1 Make observations to determine the effects of balanced and unbalanced forces on the motion (i.e., speed and direction) of an object.	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]
Anticipate the consequences of actions and intentionally act to achieve a specific goal.	Participate in making observations to recognize the causal relationship between a force (i.e., push or pull) applied to a stationary object and its resulting motion.	Use observations to identify that forces (i.e., pushes or pulls) of different magnitudes (i.e., strengths) acting on a stationary object cause the object to move and travel different distances.	Use observations to describe the relationships between balanced and unbalanced forces (i.e., pushes and/or pulls) acting on an object and any resulting change in the object's motion (i.e., change in speed or direction).

[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. **Using Mathematics and Computational Thinking:** Mathematical and computational thinking in grades 3–5 builds on K–2 experiences and progresses to using data and mathematical concepts to describe the natural and designed world. • Use simple data tables and graphs to determine and describe relationships in the natural world. • Use measurements and simple mathematical representations to describe characteristics of the natural world. **Constructing Explanations and Designing Solutions:** Constructing explanations and designing solutions in grades 3–5 builds on K–2 experiences and progresses to describing and explaining processes or relationships in the natural or designed world. • Identify observations, information, data, or models to describe and explain processes or relationships in the natural world. • Use information to determine and explain relationships in the designed world.
Disciplinary Core Ideas	**Interacting Forces** • Each force acts on one particular object and has both strength and direction. • Objects in contact exert forces on each other. One object applies a force on the other and vice versa (i.e., they push on each other).

	• A change in the forces acting on an object can cause changes in the motion of that object.
	• An object typically has multiple forces acting on it. The motion of an object depends on the total forces acting on that object.
	  o When the multiple forces acting on an object balance each other out (i.e., balanced forces have zero net force on the object), there is no change in that object's motion.
	  o An object at rest has balanced forces acting on it.
	  o An object moving at a constant speed has balanced forces acting on it.
	  o Forces acting on an object that are not balanced (i.e., do not sum to zero) can change the object's motion (i.e., speed it up, slow it down, stop it, and change direction).

Crosscutting Concepts	**Patterns**: Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them. • Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena and designed products. • Patterns of change can be used to make predictions. • Patterns can be used as evidence to support explanation. **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. • Cause and effect relationships are routinely identified, tested, and used to explain change. • Events that occur together with regularity might or might not be a cause and effect relationship. **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. • Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods. • Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.

How three dimensions support instruction for this Essential Element	Through investigations, students can observe patterns in how pushes or pulls on an object result in different speeds and directions of movement. Patterns can be observed in both the strength and direction of forces on an object. Students can identify mathematical relationships to understand the connections between causes of unequal or equal forces on objects and effects on the motion of those objects. For example, students can recognize that applying balanced forces on an object causes no change in the motion of the object, but unbalanced forces result in a change in motion. The concepts of proportion and quantity come through students learning about relationships between the magnitude of forces and their resulting motions. Students learn to quantify forces (i.e., the strength of a push or pull) and motion (i.e., speed and direction of movement).

Instructional Resources

Resources
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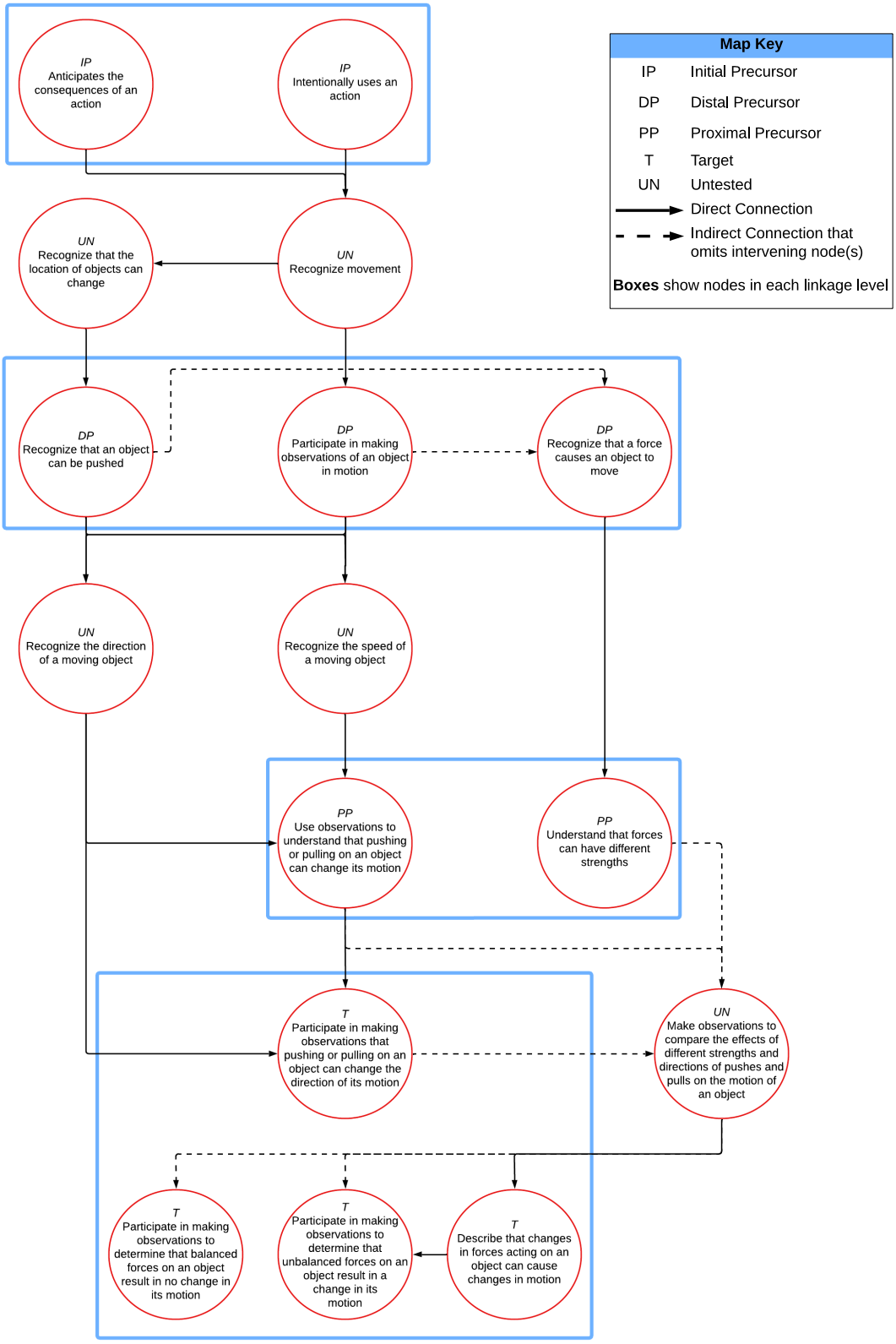
Link to Text-Only Map

SCI.EE.5.PS.Forces-1 Make observations to determine the effects of balanced and unbalanced forces on the motion (i.e., speed and direction) of an object.



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.

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Link to Text-Only Map

SCI.EE.5.PS.Matter-1 Make observations and measurements to describe changes in the physical properties of substances when heated, cooled, or mixed.