

# Scope and Sequence in the Garden: Science

Opportunities for integrating curriculum and school gardening highlighted, with suggested lesson plans and activities.

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\*: PE that incorporates engineering

▲: PE is partially addressed in the unit of study (and appears in another unit in the same grade level or band)

## PRE-KINDERGARTEN

UNIT	Unit 1: Welcome to Pre-K	Unit 2: My Five Senses	Unit 3: All About Us	Unit 4: Where We Live	Unit 5: Transportation
<b>Relevant PERFORMANCE EXPECTATION</b>	<b>P-PS1-1.</b> Ask questions and use observations to test the claim that different kinds of matter exist as either solid or liquid. ▲	<b>P-PS4-1.</b> Plan and conduct investigations to provide evidence that sound is produced by vibrating materials	<b>P-LS1-1.</b> Observe familiar plants and animals (including humans) and describe what they need to survive. <b>P-LS1-2.</b> Plan and conduct an investigation to determine how familiar plants and/or animals use their external parts to help them survive in the environment.	<b>P-ESS1-1.</b> Observe and describe the apparent motions of the Sun, moon, and stars to recognize predictable patterns. ▲ <b>P-ESS2-1.</b> Ask questions, make observations, and collect and record data using simple instruments to recognize patterns about how local weather conditions change daily and seasonally. ▲	<b>P-PS2-1.</b> Use tools and materials to design and build a device that causes an object to move faster with a push or a pull. *
<b>GARDEN LESSON PLAN or IDEA</b>			<ul style="list-style-type: none"> <li>• <a href="#">People and Plants Need Nutrients (Ag in the Class)</a></li> <li>• <a href="#">Honeybee Lesson (Ag in the Class)</a></li> <li>• <a href="#">Texture in the Garden (Ag in the Class)</a></li> <li>• <a href="#">Lesson on Needs of Plants (Ag in the Class)</a></li> <li>• <a href="#">Lesson on a Garden Plot (Ag in the Class)</a></li> </ul>		

			<ul style="list-style-type: none"> <li>• <a href="#">Lesson on Plant Stems (Ag in the Class)</a></li> <li>• <a href="#">Lesson on Roots (Ag in the Class)</a></li> <li>• <a href="#">Lesson on Plant Parts (Ag in the Class)</a></li> <li>• <a href="#">Lesson on Plant Tops and Bottoms (Ag in the Class)</a></li> <li>• <a href="#">Lesson on Seeds to Flowers (Ag in the Class)</a></li> <li>• <a href="#">Fruit and Veggie Bingo (Ag in the Class)</a></li> <li>• <a href="#">The Soil We Grow In (Ag in the Class)</a></li> <li>• Observational garden journal</li> <li>• Investigate thorns, flowers, roots of plants</li> </ul>		
<b>UNIT</b>	<b>Unit 6: Light</b>	<b>Unit 7: Water</b>	<b>Unit 8: Plants</b>	<b>Unit 9: Babies</b>	<b>Unit 10: Transformation</b>
<b>PERFORMANCE EXPECTATION</b>	<b>P-PS3-1.</b> Plan and conduct an investigation to determine the effect of sunlight on Earth's surface.	<p><b>P-PS1-1.</b> Ask questions and use observations to test the claim that different kinds of matter exist as either solid or liquid. ▲</p> <p><b>P-ESS2-1.</b> Ask questions, make observations, and collect and record data using simple instruments to recognize patterns about how local weather conditions change daily and seasonally.</p>	<p><b>P-LS1-2.</b> Plan and conduct an investigation to determine how familiar plants and/or animals use their external parts to help them survive in the environment.</p> <p>P-LS3-1. Develop a model to describe that some young plants and animals are similar to, but not exactly like, their parents. ▲</p>	<b>P-LS3-1.</b> Develop a model to describe that some young plants and animals are similar to, but not exactly like, their parents.	<p>P-ESS1-1. Observe and describe the apparent motions of the Sun, moon, and stars to recognize predictable patterns. ▲</p> <p><b>P-ESS2-1.</b> Ask questions, make observations, and collect and record data using simple instruments to recognize patterns about how local weather conditions change daily.</p>
<b>GARDEN LESSON PLAN or IDEA</b>	<ul style="list-style-type: none"> <li>• Plants in a window that turn toward the sun</li> <li>• Sunflower experiment</li> </ul>	<ul style="list-style-type: none"> <li>• Record rainwater collection</li> <li>• Analyze what plants can grow in which seasons</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Lesson on Roots (Ag in the Class)</a></li> <li>• <a href="#">Lesson on Plant Parts (Ag in the Class)</a></li> <li>• <a href="#">Lesson on Plant Tops and Bottoms (Ag in the Class)</a></li> <li>• Investigate thorns, flowers, roots of plants</li> </ul>		<ul style="list-style-type: none"> <li>• Record rainwater collection</li> </ul>

## KINDERGARTEN

UNIT	Unit 1: SOLIDS AND LIQUIDS (9 WEEKS)	Unit 2: PUSH ME, PULL ME (9 WEEKS)	Unit 3: OUR ENVIRONMENT (9 WEEKS)	Unit 4: OUR WEATHER (9 WEEKS)
<b>Relevant PERFORMANCE EXPECTATION</b>	<p><b>K-PS1-1.</b> Plan and conduct an investigation to test the claim that different kinds of matter exist as either solid or liquid, depending on temperature.</p>	<p><b>K-PS2-1.</b> Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.</p> <p><b>K-PS2-2.</b> Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.</p>	<p><b>K-LS1-1.</b> Use observations to describe patterns of what plants and animals (including humans) need to survive.</p> <p><b>K-ESS2-2.</b> Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.</p> <p><b>K-ESS3-1.</b> Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.</p> <p><b>K-ESS3-3.</b> Communicate solutions that will reduce the impact of humans on living organisms and nonliving things in the local environment. *</p> <p><b>K-ESS2-1.</b> Use and share observations of local weather conditions to describe patterns over time.</p>	<p><b>K-ESS2-1.</b> Use and share observations of local weather conditions to describe patterns over time. ▲</p> <p><b>K-ESS3-2.</b> Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. *</p> <p><b>K-PS3-2.</b> Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.</p>
<b>GARDEN LESSON PLAN or IDEA</b>			<ul style="list-style-type: none"> <li>• <a href="#">Farming in a Glove: sun + water germination (Ag in the Class)</a></li> <li>• <a href="#">Lesson on Needs of Plants (Ag in the Class)</a></li> <li>• <a href="#">Honeybee Lesson (Ag in the Class)</a></li> <li>• <a href="#">People and Plants Need Nutrients (Ag in the Class)</a></li> <li>• <a href="#">Fruit and Veggie Bingo (Ag in the Class)</a></li> <li>• <a href="#">The Soil We Grow In (Ag in the Class)</a></li> <li>• Bug scavenger hunt</li> <li>• Beneficial insect</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Building a school green roof</a></li> <li>• Build an overhead trellis covering blacktop</li> </ul>

1<sup>st</sup> Grade

UNIT	Unit 1: EXPLORING LIGHT AND SOLAR PATTERNS (12 WEEKS)	Unit 2: LIGHT, SOUND, AND WAVES (12 WEEKS)	Unit 3: STRUCTURES AND BEHAVIORS IN LIVING THINGS (12 WEEKS)
<b>Relevant PERFORMANCE EXPECTATION</b>	<p><b>1-PS4-2.</b> Make observations (firsthand or from media) to construct an evidence-based account that objects can be seen only when illuminated. ▲</p> <p><b>1-PS4-3.</b> Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.</p> <p><b>1-ESS1-2.</b> Make observations at different times of year to relate the amount of daylight to the time of year.</p>	<p><b>1-PS4-1.</b> Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.</p> <p><b>1-PS4-2.</b> Make observations (firsthand or from media) to construct an evidence-based account that objects can be seen only when illuminated. ▲</p> <p><b>1-PS4-4.</b> Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.*</p> <p><b>1-ESS1-1.</b> Use observations of the Sun, moon, and stars to describe patterns that can be predicted.</p> <p><b>1-ESS1-2.</b> Make observations at different times of year to relate the amount of daylight to the time of year. ▲</p>	<p><b>1-LS1-1.</b> Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. *</p> <p><b>1-LS1-2.</b> Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.</p> <p><b>1-LS3-1.</b> Make observations to construct an evidence based account that young plants and animals are like, but not exactly like, their parents.</p> <p><b>1-ESS1-2.</b> Make observations at different times of year to relate the amount of daylight to the time of year. ▲</p>
<b>GARDEN LESSON PLAN or IDEA</b>			<ul style="list-style-type: none"> <li>• <a href="#">Lesson on Flowers and Bees (Ag in the Class)</a></li> <li>• How seeds disperse themselves</li> <li>• Stabilize structures by mimicking plant root growth: equal foundation to what we see above-ground</li> <li>• Protective barriers such as thorns</li> <li>• Leaves on baby plants are same shape but smaller in size than adult plants, and other characteristics</li> </ul>

2<sup>nd</sup> Grade

UNIT	Unit 1: PROPERTIES AND PATTERNS OF WATER (12 WEEKS)	Unit 2: THE CHANGES TO LAND OVER TIME (12 WEEKS)	Unit 3: PLANT AND ANIMAL INTERACTIONS (12 WEEKS)
<b>Relevant PERFORMANCE EXPECTATION</b>	<p><b>2-PS1-1.</b> Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.</p> <p><b>2-PS1-4.</b> Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.</p> <p><b>2-LS4-1.</b> Make observations of plants and animals to compare the diversity of life in different habitats.</p> <p><b>2-ESS2-2.</b> Develop a model to represent the shapes and kinds of land and bodies of water in an area. ▲</p> <p><b>2-ESS2-3.</b> Obtain information to identify where water is found on Earth and that it can be solid or liquid.</p>	<p><b>2-PS1-2.</b> Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. *</p> <p><b>2-PS1-3.</b> Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.</p> <p><b>2-ESS1-1.</b> Use information from several sources to provide evidence that Earth events can occur quickly or slowly.</p> <p><b>2-ESS2-1.</b> Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. *</p> <p><b>2-ESS2-2.</b> Develop a model to represent the shapes and kinds of land and bodies of water in an area. ▲</p>	<p><b>2-LS2-1.</b> Plan and conduct an investigation to determine if plants need sunlight and water to grow.</p> <p><b>2-LS2-2.</b> Develop a simple model that illustrates how plants and animals depend on each other for survival. *</p>
<b>GARDEN LESSON PLAN or IDEA</b>	<ul style="list-style-type: none"> <li>• Rain garden, shade garden</li> <li>• <a href="#">Desktop Greenhouses (Ag in the Class)</a></li> <li>• <a href="#">Regional Agriculture lesson (Ag in the Class)</a></li> </ul>		<ul style="list-style-type: none"> <li>• <a href="#">Farming in a Glove: sun + water germination (Ag in the Class)</a></li> <li>• <a href="#">Lesson on Aquaponics (Ag in the Class)</a></li> <li>• <a href="#">Lesson on Flowers and Bees (Ag in the Class)</a></li> <li>• Farm in a Glove</li> <li>• Pollinators, pollinator garden</li> <li>• Fruits and veggies that require animal-assisted pollination</li> </ul>

3<sup>rd</sup> Grade

UNIT	Unit 1: INHERITANCE AND VARIATION (9 WEEKS)	Unit 2: INTERDEPENDENCE (9 WEEKS)	Unit 3: CHANGE OVER TIME (9 WEEKS)	Unit 4: INTERACTING FORCES (9 WEEKS)
Relevant PERFORMANCE EXPECTATION	<p><b>3-LS1-1.</b> Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.</p> <p><b>3-LS2-1.</b> Construct an argument that some animals form groups that help members survive. ▲</p> <p><b>3-LS3-1.</b> Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.</p> <p><b>3-LS3-2.</b> Use evidence to support the explanation that traits can be influenced by the environment.</p> <p><b>3-ESS2-1.</b> Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. ▲</p>	<p><b>3-LS2-1.</b> Construct an argument that some animals form groups that help members survive. ▲</p> <p><b>3-LS4-2.</b> Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.</p> <p><b>3-LS4-3.</b> Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.</p> <p><b>3-ESS2-1.</b> Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. ▲</p> <p><b>3-ESS3-1.</b> Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. *</p>	<p><b>3-LS4-1.</b> Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.</p> <p><b>3-LS4-4.</b> Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. *</p> <p><b>3-ESS2-1.</b> Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. ▲</p> <p><b>3-ESS2-2.</b> Obtain and combine information to describe climates in different regions of the world.</p> <p><b>3-ESS2-3.</b> Plan and conduct an investigation to determine the connections between weather and water processes in Earth systems.</p>	<p><b>3-PS2-1.</b> Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.</p> <p><b>3-PS2-2.</b> Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.</p> <p><b>3-PS2-3.</b> Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.</p> <p><b>3-PS2-4.</b> Define a simple design problem that can be solved by applying scientific ideas about magnets. *</p>
GARDEN LESSON PLAN or IDEA	<ul style="list-style-type: none"> <li>• <a href="#">Hereditary traits in Apples and Onions (Ag in the Class)</a></li> <li>• <a href="#">Exploring Aquaponics / Life cycle of fish and plants (Ag in the Class)</a></li> <li>• <a href="#">Life Cycle of a Bee (Ag in the Class)</a></li> <li>• <a href="#">Peas in a Pod Inherited Traits (Ag in the Class)</a></li> <li>• <a href="#">Inherited Traits in Native Corn vs. Popcorn (Ag in the Class)</a></li> <li>• Life cycles in the garden: insects and plants</li> <li>• Plant seeds, starters, and mature plants of the same variety so students can see all stages at once</li> <li>• Different varieties of mint (all have square stems). Other plant families.</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Regional Agriculture lesson (Ag in the Class)</a></li> <li>• <a href="#">Watershed Activity (Ag in the Class)</a></li> <li>• What plants can and cannot survive in a garden habitat in this region</li> <li>• Native plants lesson</li> <li>• Plant 2 avocado pits (or other tropical plants). Keep one inside on windowsill and one outside and compare growth</li> <li>• Green roof, plants to reduce flooding, plants/trees to act as wind barriers</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Invasive Species on the Move (Ag in the Class)</a></li> <li>• Native vs. invasive species</li> </ul>	

4<sup>th</sup> Grade

UNIT	Unit 1: INTERACTING FORCES (9 WEEKS)	Unit 2: TRANSFER OF ENERGY AND INFORMATION (8 WEEKS)	Unit 3: ENERGY, MOTION, AND COLLISIONS (7 WEEKS)	Unit 4: CHANGES ON EARTH'S SURFACE (6 WEEKS)	Unit 5: IMPACTS OF NATURAL PROCESSES (8 WEEKS)
<b>Relevant PERFORMANCE EXPECTATION</b>	<p><b>4-PS4-2.</b> Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.</p> <p><b>4-LS1-1.</b> Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</p> <p><b>4-LS1-2.</b> Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.</p>	<p><b>4-PS3-2.</b> Make observations to provide evidence that energy is conserved as it is transferred and/or converted from one form to another.</p> <p><b>4-PS3-4.</b> Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. *</p> <p><b>4-PS4-3.</b> Generate and compare multiple solutions that use patterns to transfer information. *</p>	<p><b>4-PS3-1.</b> Use evidence to construct an explanation relating the speed of an object to the energy of that object.</p> <p><b>4-PS3-3.</b> Ask questions and predict outcomes about the changes in energy that occur when objects collide.</p>	<p><b>4-PS4-1.</b> Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. ▲</p> <p><b>4-ESS1-1.</b> Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.</p> <p><b>4-ESS2-1.</b> Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p>	<p><b>4-PS4-1.</b> Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. ▲</p> <p><b>4-ESS2-2.</b> Analyze and interpret data from maps to describe patterns of Earth's features.</p> <p><b>4-ESS3-1.</b> Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.</p> <p><b>4-ESS3-2.</b> Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. *</p>
<b>GARDEN LESSON PLAN or IDEA</b>	<ul style="list-style-type: none"> <li>• <a href="#">Lesson on Plant Roots and Soil (Ag in the Class)</a></li> <li>• <a href="#">Parts of the Wheat Plant Lesson (Ag in the Class)</a></li> <li>• Roots, thorns, stems, colored petals serve different purposes</li> </ul>				<ul style="list-style-type: none"> <li>• <a href="#">Soil Erosion Lesson (Ag in the Class)</a></li> <li>• <a href="#">Watershed Activity (Ag in the Class)</a></li> <li>• Green infrastructure, flood gardens (to control stormwater flooding, etc.)</li> </ul>

5<sup>th</sup> Grade

UNIT	Unit 1: PHYSICAL AND CHEMICAL CHANGES (9 WEEKS)	Unit 2: MATTER AND ENERGY IN ECOSYSTEMS (9 WEEKS)	Unit 3: EARTH SYSTEMS SCIENCE (9 WEEKS)	Unit 4: STARS AND THE SOLAR SYSTEM (9 WEEKS)
<p><b>Relevant PERFORMANCE EXPECTATION</b></p>	<p><b>5-PS1-1.</b> Develop a model to describe that matter is made of particles too small to be seen. ▲  <b>5-PS1-2.</b> Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances the total amount of matter is conserved.  <b>5-PS1-3.</b> Make observations and measurements to identify materials based on their properties.  <b>5-PS1-4.</b> Conduct an investigation to determine whether the mixing of two or more substances results in new substances.</p>	<p><b>5-PS1-1.</b> Develop a model to describe that matter is made of particles too small to be seen. ▲  <b>5-PS3-1.</b> Use models to describe that energy in animals’ food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the Sun.  <b>5-LS1-1.</b> Support an argument that plants get the materials they need for growth chiefly from air and water.  <b>5-LS2-1.</b> Develop a model to describe the movement of matter among plants (producers), animals (consumers), decomposers, and the environment.</p>	<p><b>5-PS1-1.</b> Develop a model to describe that matter is made of particles too small to be seen. ▲  <b>5-PS2-1.</b> Support an argument that the gravitational force exerted by Earth on objects is directed down.  <b>5-ESS2-1.</b> Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.  <b>5-ESS2-2.</b> Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.  <b>5-ESS3-1.</b> Obtain and combine information about ways individual communities use science ideas to protect Earth’s resources and environment.</p>	<p><b>5-ESS1-1.</b> Support an argument that differences in the apparent brightness of the Sun compared to other stars is due to their relative distances from Earth.  <b>5-ESS1-2.</b> Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.</p>
<p><b>GARDEN LESSON PLAN or IDEA</b></p>		<ul style="list-style-type: none"> <li>• <a href="#">Desktop Greenhouses (Ag in the Class)</a></li> <li>• <a href="#">Exploring Aquaponics / Life cycle of fish and plants (Ag in the Class)</a></li> <li>• <a href="#">Test Tube Hydroponics (Ag in the Class)</a></li> <li>• <a href="#">Aeroponic Garden-Growing with only air and water, no light or soil (Ag in the Class)</a></li> <li>• <a href="#">The Rotten Truth Compost activity (Ag in the Class)</a></li> <li>• <a href="#">Working Worms Compost activity (Ag in the Class)</a></li> <li>• Photosynthesis in plants</li> <li>• Garden tasting: eat “sun energy” (eat plants from garden)</li> <li>• Compost cycle</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Corn Bioplastic Activity (Ag in the Class)</a></li> <li>• <a href="#">Watershed Activity (Ag in the Class)</a></li> </ul>	

6<sup>th</sup> Grade

UNIT	Unit 1: ELECTRICITY AND MAGNETISM (6 WEEKS)	Unit 2: ENGINEERING AND ENERGY TRANSFORMATIONS (8 WEEKS)	Unit 3: ECOSYSTEMS (9 WEEKS)	Unit 4: INVESTIGATING WEATHER AND CLIMATE (8 WEEKS)	Unit 5: HUMAN IMPACT ON EARTH'S CLIMATE (5 WEEKS)
<p><b>Relevant PERFORMANCE EXPECTATION</b></p>	<p><b>MS-PS2-3:</b> Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.</p> <p><b>MS-PS2-5:</b> Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.</p> <p><b>MS-PS3-6:</b> Make observations to provide evidence that energy can be transferred by electric currents.</p>	<p><b>MS-PS1-6.</b> Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy during a chemical and/or physical process. *</p> <p><b>MS-PS3-3.</b> Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. *</p> <p><b>MS-PS3-4.</b> Plan and conduct an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the temperature of the sample of matter.</p>	<p><b>MS-LS2-1:</b> Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.</p> <p><b>MS-LS2-2:</b> Construct an explanation that predicts patterns of interactions among organisms in a variety of ecosystems.</p> <p><b>MS-LS2-3:</b> Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.</p> <p><b>MS-LS2-4:</b> Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.</p> <p><b>MS-LS2-5:</b> Evaluate competing design solutions for maintaining biodiversity and protecting ecosystem stability. *</p>	<p><b>MS-PS1-7.</b> Use evidence to illustrate that density is a property that can be used to identify samples of matter.</p> <p><b>MS-ESS2-4.</b> Develop a model to describe the cycling of water through Earth's systems driven by energy from the Sun and the force of gravity.</p> <p><b>MS-ESS2-5.</b> Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.</p> <p><b>MS-ESS2-6.</b> Develop and use a model to describe how unequal heating and rotation of Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.</p>	<p><b>MS-ESS3-2.</b> Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. ▲</p> <p><b>MS-ESS3-3.</b> Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. ▲ *</p> <p><b>MS-ESS3-5.</b> Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century</p>
<p><b>GARDEN LESSON PLAN or IDEA</b></p>		<ul style="list-style-type: none"> <li>• <a href="#">Greenhouse Lab (Edible Schoolyard)</a></li> <li>• <a href="#">Desktop Greenhouses (Ag in the Class)</a></li> <li>• Construct a cold frame, low tunnel, high tunnel, greenhouse, hoop house</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Compost Lab (Edible Schoolyard)</a></li> <li>• <a href="#">Flowers and Pollination Lesson (Ag in the Class)</a></li> <li>• <a href="#">Microorganisms and Decomposition Lesson (Ag in the Class)</a></li> <li>• <a href="#">Invasive Species on the Move (Ag in the Class)</a></li> <li>• <a href="#">Earthworms' Dirty Job Activity (Ag in the Class)</a></li> <li>• Interactions in garden: pests, parasites, beneficial/harmful relationships, weeds</li> <li>• Compost cycle</li> <li>• Aquaponics</li> </ul>		<ul style="list-style-type: none"> <li>• <a href="#">Waste Deep lesson series (Zero Waste Schools and DOE Office of Sustainability)</a></li> <li>• <a href="#">Cafeteria recycling audit activities (Recycling Champions)</a></li> <li>• <a href="#">Corn Bioplastic Activity (Ag in the Class)</a></li> <li>• <a href="#">An Apple a Day Lesson (Ag in the Class)</a> / Organic vs. conventional farming effects</li> <li>• <a href="#">Natural vs. Managed Ecosystems and Farming (Ag in the Class)</a></li> <li>• <a href="#">Watershed Activity (Ag in the Class)</a></li> <li>• Green infrastructure</li> <li>• Agriculture industry carbon footprint</li> </ul>

7<sup>th</sup> Grade

UNIT	Unit 1: STRUCTURE AND PROPERTIES OF MATTER (8 WEEKS)	Unit 2: CHANGING PROPERTIES OF MATTER (10 WEEKS)	Unit 3: STRUCTURES OF LIFE (6 WEEKS)	Unit 4: GEOLOGY (7 WEEKS)	Unit 5: MINIMIZING HUMAN IMPACT THROUGH ENGINEERING DESIGN (5 WEEKS)
<b>Relevant PERFORMANCE EXPECTATION</b>	<p><b>MS-PS1-1.</b> Develop models to describe the atomic composition of simple molecules and extended structures.</p> <p><b>MS-PS1-4.</b> Develop a model that predicts and describes changes in particle motion, temperature, and phase (state) of a substance when thermal energy is added or removed.</p> <p><b>MS-PS1-7.</b> Use evidence to illustrate that density is a property that can be used to identify samples of matter.</p> <p><b>MS-PS1-8.</b> Plan and conduct an investigation to demonstrate that mixtures are combinations of substances.</p>	<p><b>MS-PS1-2.</b> Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.</p> <p><b>MS-PS1-3.</b> Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.</p> <p><b>MS-PS1-5.</b> Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.</p> <p><b>MS-LS1-6.</b> Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.</p> <p><b>MS-LS1-7.</b> Develop a model to describe how food is rearranged through chemical reactions to release energy during cellular respiration and/or forming new molecules that support growth and/or release energy as this matter moves through an organism.</p>	<p><b>MS-LS1-1.</b> Plan and conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.</p> <p><b>MS-LS1-2.</b> Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.</p> <p><b>MS-LS1-3.</b> Construct an explanation supported by evidence for how the body is composed of interacting systems consisting of cells, tissues, and organs working together to maintain homeostasis.</p> <p><b>MS-LS1-8.</b> Gather and synthesize information that sensory receptors respond to stimuli, resulting in immediate behavior and/or storage as memories.</p>	<p><b>MS-ESS1-4.</b> Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.</p> <p><b>MS-ESS2-1.</b> Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.</p> <p><b>MS-ESS2-2.</b> Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying temporal and spatial scales.</p> <p><b>MS-ESS2-3.</b> Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.</p>	<p><b>MS-ESS3-1.</b> Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geologic processes.</p> <p><b>MS-ESS3-2.</b> Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. ▲</p> <p><b>MS-ESS3-3.</b> Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. * ▲</p> <p><b>MS-ESS3-4.</b> Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.</p>
<b>GARDEN LESSON PLAN or IDEA</b>		<ul style="list-style-type: none"> <li>• <a href="#">Vegetables and pH lab (Ag in the Class)</a></li> <li>• <a href="#">Make a Plant Fertilizer using Solvents and Solutes (Ag in the Class)</a></li> <li>• Cheese, whipped cream, herb butter cooking (chemical vs. physical processes)</li> <li>• Photosynthesis</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Root geotropism experiment / Response to gravity (Ag in the Class)</a></li> <li>• <a href="#">Tropism experiment / Leaves turn toward light (Ag in the Class)</a></li> </ul>		<ul style="list-style-type: none"> <li>• <a href="#">Cafeteria recycling audit activities (Recycling Champions)</a></li> <li>• <a href="#">Waste Deep lesson series (Zero Waste Schools and DOE Office of Sustainability)</a></li> <li>• Green infrastructure</li> <li>• Models of agriculture systems</li> </ul>

8<sup>th</sup> Grade

UNIT	Unit 1: ENERGY, FORCES, AND MOTION (8 WEEKS)	Unit 2: EARTH’S PLACE IN THE UNIVERSE (6 WEEKS)	Unit 3: GROWTH, DEVELOPMENT, AND REPRODUCTION OF ORGANISMS (6 WEEKS)	Unit 4: EVOLUTION, NATURAL SELECTION, AND ADAPTATIONS (8 WEEKS)	Unit 5: EVOLUTION OF TECHNOLOGY IN SCIENCE (8 WEEKS)
<b>Relevant PERFORMANCE EXPECTATION</b>	<p><b>MS-PS2-1:</b> Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.</p> <p><b>MS-PS2-2:</b> Plan and conduct an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.</p> <p><b>MS-PS2-4:</b> Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects and the distance between them. ▲</p> <p><b>MS-PS3-1:</b> Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.</p> <p><b>MS-PS3-2:</b> Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.</p> <p><b>MS-PS3-5:</b> Construct, use, and present an argument to support the claim that when work is done on or by a system, the energy of the system changes as energy is transferred to or from the system.</p>	<p><b>MS-PS2-4.</b> Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects and the distance between them. ▲</p> <p><b>MS-ESS1-1.</b> Develop and use a model of the Earth-Sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the Sun and moon, and seasons.</p> <p><b>MS-ESS1-2.</b> Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.</p> <p><b>MS-ESS1-3.</b> Analyze and interpret data to determine scale properties of objects in the solar system.</p>	<p><b>MS-LS1-4.</b> Use arguments based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively.</p> <p><b>MS-LS1-5.</b> Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</p> <p><b>MS-LS3-1.</b> Develop and use a model to explain structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.</p> <p><b>MS-LS3-2.</b> Develop and use a model to describe how asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.</p>	<p><b>MMS-LS4-1.</b> Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and changes of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.</p> <p><b>MS-LS4-2.</b> Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between model and fossil organisms to infer evolutionary relationships.</p> <p><b>MS-LS4-3.</b> Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.</p> <p><b>MS-LS4-4.</b> Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals’ probability of surviving and reproducing in a specific environment.</p> <p><b>MS-LS4-6.</b> Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.</p>	<p><b>MS-PS4-1.</b> Develop a model and use mathematical representations to describe waves that includes frequency, wavelength, and how the amplitude of a wave is related to the energy in a wave.</p> <p><b>MS-PS4-2.</b> Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.</p> <p><b>MS-PS4-3.</b> Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.</p> <p><b>MS-LS4-5.</b> Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.</p>
<b>GARDEN LESSON PLAN or IDEA</b>			<ul style="list-style-type: none"> <li>• <a href="#">Plant Propagation: Sexual vs. Asexual (Ag in the Class)</a></li> <li>• <a href="#">Soil pH as an environmental factor (Edible Schoolyard)</a></li> <li>• Structures for plant reproduction: bright flowers, flower nectar, and odors attract insects that transfer pollen, acorns have hard shells that squirrels bury</li> <li>• Effects of drought, fertilizer (environmental factors) vs. different plant varieties growing at different rates (genetic factors)</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Weeds and Ecosystem Stability (Ag in the Class)</a></li> <li>• Natural selection in the garden</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Hybrids and Hereditary Traits experiment (Ag in the Class)</a></li> <li>• <a href="#">Extracting DNA from Strawberries experiment (Ag in the Class)</a></li> <li>• <a href="#">Food, Farming, and Heredity (Ag in the Class)</a></li> <li>• GMO plants vs. selective breeding—what kind are in the garden?</li> </ul>