

inquisitive

OHIO LEARNING STANDARDS FOR SCIENCE & Inquisitive Crosswalk

Ohio Learning Standards for Science:
100% Inquisitive Alignment & Coverage



inquisitive

What does it mean to be Inquisitive?

Our mission is for teachers to enjoy teaching and for students to learn with purpose and depth. Inquisitive lessons inspire wonder, curiosity and engagement by introducing science and engineering through real world phenomena and relevant focus questions. That's what it means to be Inquisitive.

Open-and-Go Lessons

Inquisitive's open-and-go lessons clearly cover the three dimensions of the NGSS and Ohio Learning Standards for Science so teachers can easily see the lesson objectives and be confident while teaching standards-aligned science. Inquisitive strives to reduce teachers' planning time. Simple, easy to use, and a beautiful experience on any device. With integrated and varied stimulus in each unit, Inquisitive is a comprehensive phenomena-based curriculum, made easy.

Phenomena-Based

Experiencing science through the lens of true observable phenomena offers all students a deep and meaningful learning experience. Each Inquisitive lesson centers around a phenomenon and includes a variety of learning tools to help students make the link from science to the real world.

Inquisitive Ohio Crosswalk

This document maps Inquisitive content to the Ohio Learning Standards for Science. We have included the relevant NGSS Performance Expectations and Inquisitive lesson learning targets, for ease of use and reference to the content statements.

Ohio Standards: 95% Inquisitive coverage

Ohio standards at NGSS PE level: 89% Inquisitive cover

Ohio's Learning Standards					NGSS Code (s)	AAAS 2061 Code (s)	Inquisitive Lessons (Learning Targets)
Grade Level	Domain	Ohio Content Statement	Ohio Content Descriptors	Ohio Content Elaboration			
K	ESS	K.ESS.1 Weather changes are long-term and short-term.	Weather changes occur throughout the day and from day to day. Air is a nonliving substance that surrounds Earth and wind is air that is moving. Wind, temperature and precipitation can be used to document short-term weather changes that are observable. Yearly weather changes (seasons) are observable patterns in the daily weather changes. Note: The focus is on observing the weather patterns of seasons. The reason for changing seasons is not appropriate for this grade level; this is found in grade 5.	Wind, temperature and precipitation are components of the weather that can be observed and measured for Kindergarten. The measurements collected and tools used can be nonstandard and must be age-appropriate. For example, the temperature may be above or below a given point (warmer or colder) or the amount of snow is marked on a dowel rod to check the depth.	K-ESS2-1 Use and share observations of local weather conditions to describe patterns over time.	4B/E5 The weather is always changing and can be described by measurable quantities such as temperature, wind direction and speed, and precipitation. Large masses of air with certain properties move across the surface of the earth. The movement and interaction of these air masses is used to forecast the weather.	K-ESS2-1 What is Weather? - Observe the current local weather. - Describe the weather as a combination of different conditions at a particular time. Watching the Weather - Recognize the symbols used to depict weather. - Understand that the weather changes daily. - Record weather over time and look for patterns.
				Weather measurements must be collected on a regular basis throughout the school year and then compared, explained and discussed each week and each month. At the end of the school year, a comparison can be made and seasons can be identified by the patterns that were measured throughout the year. Consistent review and questioning to deepen understanding are essential.	K-ESS3-2 Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to severe weather.		K-ESS3-2 Weather Warning! - Ask questions about severe weather in their local area. - Describe how people plan and prepare for severe weather.
				Weather measurements must be collected on a regular basis throughout the school year and then compared, explained and discussed each week and each month. At the end of the school year, a comparison can be made and seasons can be identified by the patterns that were measured throughout the year. Consistent review and questioning to deepen understanding are essential.	3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.		3-ESS2-1 Weather Watching - Describe some types of weather data and how they are collected. - Represent weather data as a bar graph. - Use weather data as evidence for decisions or explanations. Weather Patterns and Predictions - Draw tables and graphs to analyze weather data. - Use weather data to make a decision about when to hold an outdoor event. - Use weather data from previous years to make a prediction about future weather.
				Use technology to compare classroom data to local data, study weather events, communicate and share data with other classrooms, and record classroom data.	3-ESS3-1 Make a claim about the merit of a design solution that reduces the impact of a weather-related hazard.		3-ESS3-1 Weatherproof! - Give some examples of extreme weather and the problems they cause. - Make a claim about the effectiveness of a solution for a particular weather hazard and use evidence to support the claim.

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K	ESS	K.ESS.2 The moon, sun and stars can be observed at different times of the day or night.	The moon, sun and stars are in different positions at different times of the day or night. Sometimes the moon is visible during the night, sometimes the moon is visible during the day and at other times, the moon is not visible at all. The observable shape of the moon changes in size very slowly throughout each day of every month. The sun is visible only during the day. The sun's position in the sky changes in a single day and from season to season. Stars are visible at night, some are visible in the evening or morning and some are brighter than others.	Changes in the position of the sun in the sky can be measured and recorded at different times during the school day. Observations also can be made virtually. This data can be compared from month to month to monitor changes. Stars, groups of stars and different phases of the moon can be observed through books or virtually and documented throughout the month. The names of the stars, constellations or moon phases are not appropriate for Kindergarten; only the changes in appearances and what can actually be observed are included. The moon also can be observed in the daylight, at times. Drawings, photographs or other graphics can be used to document student observations. Demonstrating (either 3-D or virtual) and testing/experimenting (through kits or models) must be used to explain the changing positions (in the sky) of the sun, stars and moon. Review, question and discuss the demonstrations and observations to deepen understanding.	1-ESS1-1 Use observations of the sun, moon and stars to describe patterns that can be predicted.	4A/P1 There are more stars in the sky than anyone can easily count, but they are not scattered evenly, and they are not all the same in brightness or color. 4A/P2 The sun can be seen only in the daytime, but the moon can be seen sometimes at night and sometimes during the day. The sun, moon, and stars all appear to move slowly across the sky.	1-ESS1-1 The Sun Is Out - Identify that when the sun appears in the sky, it is daylight. - Observe, describe, and predict the pattern of motion of the sun as it appears in the sky. Bright Moon - Identify that the moon appears brighter when it is nighttime. - Identify that the moon can appear at different times during the day and night. - Observe and describe that the moon's position in the sky appears to move. Starry, Starry Night - Understand that the appearance of stars in the sky can be observed and predicted. - Identify that stars (other than our own sun) are visible at night but not during the day.
					1-ESS1-2 Make observations at different times of the year to relate the amount of daylight to the time of year.	4A/P3 The moon looks a little different every day but looks the same again about every four weeks. 4A/E1 The patterns of stars in the sky stay the same, although they appear to move across the sky nightly, and different stars can be seen in different seasons. 4B/E2a* The earth is approximately spherical in shape. Like the earth, the sun and planets are spheres. 3 - 5)	1-ESS1-2 Daylight and Nighttime - Identify that there is more daylight in summer. - Identify that there is more nighttime in winter.

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K	LS	K.LS.1 Living things are different from nonliving things.	Living things include anything that is alive or has ever been alive. Living things have specific characteristics and traits. Living things grow and reproduce. Living things are found almost everywhere in the world. There are somewhat different kinds in different places.	The emphasis of this content statement is to build a grade-appropriate understanding of what it means to be living, not to distinguish living and nonliving. There are different kinds of living things. The focus is on familiar organisms (e.g., grass, trees, flowers, cats, dogs, horses). Some grade-appropriate characteristics include that living things respond to stimuli, grow and require energy. Living things respond to stimuli. The responses described must be easy to observe (e.g., fish in an aquarium respond to a stimulus – food). Living things grow (e.g., plant seeds or seedlings and watch them grow). Observing plants growing toward a light source can lead to experiments and explorations of what happens when the plant is placed in a different place in the classroom (e.g., on the floor, in a closet, on a desk) or rotated 90 degrees. Some observations also can be done virtually. Animals need food; plants make their own food. Read grade-appropriate, non-fiction books to students or by students (e.g., picture books) that accurately describe the characteristics of living things found in Ohio. Technology also can be used to find photographs and stories or take photographs of living things in Ohio. When studying living things, ethical treatment of animals and safety must be employed. Respect for and proper treatment of living things must be modeled. For example, shaking a container, rapping on insect bottles, unclean cages or aquariums, leaving living things in the hot sun or exposure to extreme temperatures (hot or cold) must be avoided. The National Science Teachers Association (NSTA) has a position paper to provide guidance in the ethical use and treatment of animals in the classroom at http://www.nsta.org/about/positions/animals.aspx .	K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.	This content is not explicitly addressed in AAAS Project 2061 Benchmarks for Science Literacy.	K-LS1-1 Staying Alive ● Identify living things and nonliving things. ● State that animals need food and water to survive. ● Describe the foods that different animals eat. What do Plants Need? ● Identify the needs of plants to live and grow.

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K	LS	K.LS.2 Living things have physical traits and behaviors, which influence their survival.	Living things are made up of a variety of structures. Some of these structures and behaviors influence their survival.	At this grade level, providing exposure through personal observation and stories to a large variety of living things is required. The focus is not on naming the parts of living things, but associating through interaction and observation that living things are made of parts, and because of those parts, living things can do specific things. The scientific explanations of how those parts function will come later. Identify and discuss examples such as birds have wings for flying and beaks for eating. Dogs have eyes for seeing, teeth for chewing and legs for moving. Trees have leaves and trunks. Concrete experiences are necessary to deepen knowledge of the traits and behaviors of living things. Technology can be used to compare data on the number of honeybees observed in the schoolyard with other schools. Additional inquiry investigations include conducting observations of pond water (e.g., using a hand lens, focusing on macroscopic organisms), raising a classroom pet, planting seeds and watching them grow, and noting differences between different types of plants or bird watching.	1-LS1-1 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.	5A/P1 Some animals and plants are alike in the way they look and in the things they do, and others are very different from one another.	1-LS1-1 How Useful! - Identify that animals use their body parts in different ways. - Identify that animals use their body parts to survive and grow. Plant Parts - Identify that plants have different external structures (parts). - Identify that plants use these external structures to survive and grow. Scaredy-Cat! - Identify that animals have body parts that capture and convey different kinds of information needed for growth and survival. - Identify that animals respond to these stimuli with behaviors that help them survive. - Identify that plants also respond to some external stimuli. Mimic Nature - Identify that plants and animals use their body parts to survive and grow. - Use materials to design a solution to a human problem that mimics how plants or animals use their external parts. - Recognize that the shape and stability of structures of natural and designed objects are related to their function.
				Note: To ensure the health of students, check for allergies prior to raising a classroom pet.	1-LS1-2 Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.		1-LS1-2 Offspring - Identify behaviors of parents and offspring that help the offspring survive. - Read grade-appropriate texts and use media to obtain scientific information. - Determine patterns in the natural world.

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K	PS	K.PS.1 Objects and materials can be sorted and described by their properties.	Objects can be sorted and described by the properties of the materials from which they are made. Some of the properties can include color, size and texture.	In Kindergarten, the concept that objects are made of specific materials (e.g., clay, cloth, paper, metal, glass) is reinforced. Objects have certain properties (e.g., color, shape, size, temperature, odor, texture, flexibility) that can be described, compared and sorted. Temperature observations must be limited to descriptors such as hot, warm and cold. Observations of weight must be limited to describing objects as heavy or light. Comparisons must be used to sort and describe objects (e.g., is the wooden block heavier or lighter than the plastic block?). Standard and nonstandard measuring tools can give additional information about the environment and can be used to make comparisons of objects and events. Magnifiers can be used to see detail that cannot be seen with the unaided eye. Familiar objects from home, the classroom or the natural environment must be explored and investigated.	2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.	4C/P1 Chunks of rocks come in many sizes and shapes, from boulders to grains of sand and even smaller. 4D/P1 Objects can be described in terms of their properties. Some properties, such as hardness and flexibility, depend upon what material	2-PS1-1 What IS This Stuff? ● Understand that matter is all of the substances we can see and feel. ● Investigate the differences between solids and liquids. ● Understand that solids keep their shape while liquids take the shape of their container. Sorting Our Stuff ● Explain that matter has properties. ● Classify matter by its properties. ● Observe that the properties of matter can change when heated or cooled.
				2-PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. Note: Using the sense of taste should be prohibited in the classroom. Discussions of taste can be limited to experiences outside the classroom. Comparisons of objects are a precursor to measurement.		the object is made of, and some properties, such as size and shape, do not. 4D/E6 All materials have certain physical properties, such as strength, hardness, flexibility, durability, resistance to water and fire, and ease of conducting heat. (3-5) 5C/P1 Magnifiers help people see things they could not see without them.	2-PS1-2 The Best Materials for the Job ● Explain how different materials have properties that make them suited for different purposes.

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K	PS	K.PS.2 Some objects and materials can be made to vibrate to produce sounds.	Sound is produced by touching, blowing or tapping objects. The sounds that are produced vary depending on the properties of objects. Sound is produced when objects vibrate.	Sound can be made in many ways. Objects like cymbals, the tabletop or drums can be tapped to produce sound. Objects like a rubber band or a guitar string can be plucked to produce sound. Objects like a bottle or a trumpet can be blown into to produce sound. A wide variety of sounds can be made with the same object (e.g., a plastic bottle could be tapped or blown into). The connection between sound energy and the vibration of an object must be made. Vibrations can be made visible when water splashes from a cymbal or triangle placed in water or rice vibrates on the top of a banging drum. The concepts of pitch (low vs. high notes) and loudness are introduced. The pitch of sound can be changed by changing how fast an object vibrates. Objects that vibrate slowly produce low pitches; objects that vibrate quickly produce high pitches. Sound must be experienced, investigated and explored through observations and experimentation. Standard, virtual and student-constructed instruments must be used to explore sound.	1-PS4-1 Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.	4F/P3 Things that make sound vibrate.	1-PS4-1 Good Vibrations - Identify what happens when materials vibrate. - Investigate materials and their relationship with sound. - Determine that vibrating materials make sound. Move to the Sound - Identify what happens to materials when sound is played. - Investigate sound and its relationship to materials. - Determine that sound can make materials vibrate.
				Note: Wave descriptions of sound and the propagation of sound energy are not appropriate at this grade.	1-PS4-4 Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.		1-PS4-4 Sounds Signals - Identify that devices allow us to communicate. - Design and build a device that uses sound to communicate. - Determine communication means to send and receive information. Light Signals - Identify what devices allow us to communicate using light. - Design and build a device that uses light to communicate. - Determine communication means to send and receive information using light.

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1	ESS	1.ESS.1 The sun is the principal source of energy.	Sunlight warms Earth's land, air and water. The amount of exposure to sunlight affects the amount of warming or cooling of air, water and land.	Quantitative measurements must be used to observe and document the warming and cooling of air, water or soil. The length of time an object or material (including water) is exposed to sunlight and its resulting temperature must be observed, as should the amount of time for the object or material to cool down after it is taken out of the sunlight.	K-PS3-1 Make observations to determine the effect of sunlight on Earth's surface.	4E/P1 The sun warms the land, air, and water.	K-PS3-1 Sunlight Warms Earth ● Describe the warming effect of the sun on Earth's surface.
				Appropriate tools and technology must be used to collect, compare and document data. Investigation and experimentation must be combined with explanation, questioning and discussion of the results and findings.	K-PS3-2 Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.		K-PS3-2 Shelter from the Sun ● Explain negative effects from too much sunlight and heat. ● Plan, design, and build a structure to provide shade and protection from the sun's light and heat.

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1	ESS	1.ESS.2 The physical properties of water can change.	These changes occur due to changing energy. Water can change from a liquid to a solid and from a solid to a liquid. Weather observations can be used to examine the property changes of water. Note: Water as a vapor is not introduced until grade 2; only solid and liquid water should be discussed at this level. A broader coverage of states of matter is found in grade 4. This concept builds on the PS Kindergarten strand pertaining to properties (liquids and solids).	Water can be observed in lakes, ponds, streams, wetlands, the ocean and through weather events. Freezing and melting of water are investigated through measurements and observations using technology, in the classroom or in a natural setting. Examining maps (virtual or 2-D) of Ohio, world maps or globes can illustrate the amount of Earth's surface that is covered in water and why it is important to learn about water. Water can change the shape of the land (e.g. moving soil or sand along the banks of a river or at the beach). Water also can be observed in the air as clouds, steam or fog, but this comment should be limited to observation only at this grade level (see Note). Investigations (inside or outside) and experimentation must be used to demonstrate the changing properties of water. Use appropriate tools to test and measure water's weight, texture, temperature or size (e.g., compare measurements of water before and after freezing, examine the texture of snow or ice crystals using a hand lens) to document the physical properties.	2-ESS2-3 Obtain information to identify where water is found on Earth and that it can be a solid or liquid.	4B/P2 Water can be a liquid or a solid and can go back and forth from one form to the other. If water is turned into ice and then the ice is allowed to melt, the amount of water is the same as it was before freezing.	2-ESS2-3 Water, Water Everywhere! - Identify where water is found on Earth. - Understand that water can be found in liquid or solid (ice) form.
					2-PS1-4 Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.		2-PS1-4 Changes from Heating and Cooling - Explain that heating and cooling can change matter. - Compare and contrast changes that can be undone and cannot be undone.

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1	LS	1.LS.1 Living things have basic needs, which are met by obtaining materials from the physical environment.	Living things require energy, water and a particular range of temperatures in their environments. Plants get energy from sunlight. Animals get energy from plants and other animals. Living things acquire resources from the living and nonliving components of the environment.	Earth has many different environmental conditions that support living things. The emphasis of this content statement is that living things meet their basic needs for survival by obtaining necessary materials from the environment. This includes, but is not limited to, temperature range, amount of water, amount of sunlight and available food sources. The environment includes both living (plants and animals) and nonliving (e.g., water, air, sunlight, nutrients) things.	K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.	5C/P2 Most living things need water, food, and air. 5D/P1 Animals eat plants or other animals for food and may also use plants (or even other animals) for shelter and nesting. 5E/P1 Plants and animals both need to take in water, and animals need to take in food. In addition, plants need light. 5E/E2 Some source of "fuel" is needed for all organisms to stay alive and grow. (3-5)	K-LS1-1 Staying Alive - Identify living things and nonliving things. - State that animals need food and water to survive. - Describe the foods that different animals eat. What do Plants Need? - Identify the needs of plants to live and grow. K-ESS2-2 Change, Change, Change! - Give an example of a living thing changing its environment and explain how and why it is doing so. - Use evidence (in images) to decide whether or an animal or plant is changing its environment. 1-LS1-1 How Usefull - Identify that animals use their body parts in different ways. - Identify that animals use their body parts to survive and grow. Plant Parts - Identify that plants have different external structures (parts). - Identify that plants use these external structures to survive and grow. Scaredy-Cat! - Identify that animals have body parts that capture and convey different kinds of information needed for growth and survival. - Identify that animals respond to these stimuli with behaviors that help them survive.
				Living things get the energy they require to respond, grow and reproduce from the environment. Observing energy being used in everyday situations can help promote understanding that living things get resources from the physical environment. A detailed discussion of energy is not appropriate at this grade level (see section heading E). Energy is not scientifically explained until grade 3.	K-ESS2-2 Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.		
				When studying living things, ethical treatment of animals and safety must be employed. Respect for and proper treatment of living things must be modeled. For example, shaking a container, rapping on insect bottles, unclean cages or aquariums, leaving living things in the hot sun or exposure to extreme temperatures (hot or cold) must be avoided. The National Science	1-LS1-1 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.		

				Teachers Association (NSTA) has a position paper to provide guidance in the ethical use and treatment of animals in the classroom at http://www.nsta.org/about/positions/animals.aspx . Investigations about the types of living things that live in specific environments can be done virtually or in nature.			● Identify that plants also respond to some external stimuli. Mimic Nature ● Identify that plants and animals use their body parts to survive and grow. ● Use materials to design a solution to a human problem that mimics how plants or animals use their external parts. ● Recognize that the shape and stability of structures of natural and designed objects are related to their function.
					2-LS2-1 Plan and conduct an investigation to determine if plants need sunlight and water to grow.		2-LS2-1 Growing Plants ● Plan and conduct an investigation. ● Collect and interpret data about plant growth. ● Understand that plants need water and sunlight to grow.

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1	LS	1.LS.2 Living things survive only in environments that meet their needs.	Resources are necessary to meet the needs of an individual and populations of individuals. Living things interact with their physical environments as they meet those needs. Effects of seasonal changes within the local environment directly impact the availability of resources.	Plants and animals require resources from the environment. The focus at this grade level is on macroscopic interactions and needs of common living things (plants and animals).	K-ESS2-2 Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.	5D/E1 For any particular environment, some kinds of plants and animals thrive, some do not live as well, and some do not survive at all. (3-5) 5D/P2 Living things are found almost everywhere in the world. There are somewhat different kinds in different places. 5F/P1 Different plants and animals have external features that help them thrive in different kinds of places.	K-ESS2-2 Change, Change, Change! - Give an example of a living thing changing its environment and explain how and why it is doing so. - Use evidence (in images) to decide whether or an animal or plant is changing its environment.
				Animals require basic habitat components, including food, water, cover and space. The amount and distribution of the basic components will influence the types of animals that can survive in an area. Food sources might include insects, plants, seeds or other animals. Water sources may be as small as drops of dew found on grass or as large as a lake or river.	K-ESS3-1 Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.		
				Animals need cover for many life functions, including nesting, escaping from predators, seeking shelter from the elements on a cold winter day and resting. Animals also need space in which to perform necessary activities such as feeding or raising young.	K-ESS3-3 Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.		
				Seasonal changes affect the resources available to living things (e.g., grasses are not as available in winter as they are in summer).	1-LS1-1 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.		
				The needs of plants include room to grow, temperature range, light, water, air, nutrients and time (growing season). The amount and distribution of these will influence the types of			K-ESS3-1 This Is Home - Describe the relationships among living things, the resources they need to survive, and where those things live. - Use a model to describe how the needs of living things are met by the places in which they live and the resources found in those places.
							K-ESS3-3 Helping Earth - Describe how people affect the land, water, air, and other living things in the local environment in positive and negative ways. - Communicate solutions that will reduce the impact of humans on the land, water, air, and other living things in the local community.
							1-LS1-1 How Useful! - Identify that animals use their body parts in different ways. - Identify that animals use their body parts to survive and grow. Plant Parts - Identify that plants have different external structures (parts). - Identify that plants use these external structures to survive and grow. Scaredy-Cat!

				plants that can survive in an area. Observations of seasonal changes in temperature, liquid water availability, wind and light must be applied to the effect of seasonal changes on local plants.			● Identify that animals have body parts that capture and convey different kinds of information needed for growth and survival. ● Identify that animals respond to these stimuli with behaviors that help them survive. ● Identify that plants also respond to some external stimuli. <u>Mimic Nature</u> ● Identify that plants and animals use their body parts to survive and grow. ● Use materials to design a solution to a human problem that mimics how plants or animals use their external parts. ● Recognize that the shape and stability of structures of natural and designed objects are related to their function.
					<u>2-LS4-1</u> Make observations of plants and animals to compare the diversity of life in different habitats.		<u>2-LS4-1</u> <u>Whose Habitat Is This?</u> ● Identify and describe different habitats. ● Describe living things in a certain habitat. ● Compare the different plants and animals that live in a certain habitat.
					<u>3-LS4-3</u> 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.		<u>3-LS4-3</u> <u>Happy in My Habitat</u> ● Describe what a habitat is and give some examples of different habitats. ● Describe the features an animal has that enable it to survive in its habitat. ● Explain why an animal could not live in a different habitat

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1	PS	1.PS.1 Properties of objects and materials can change.	Objects and materials change when exposed to various conditions, such as heating or freezing. Not all materials change in the same way. Note 1: Changes in temperature are a result of changes in energy. Note 2: Water changing from liquid to solid and from solid to liquid is found in ESS grade 1.	Materials can be exposed to conditions that change some of their properties, but not all materials respond the same way. The properties of a material can change as it interacts with other materials. Heating and cooling changes some, but not all, properties of materials. Some materials can be a liquid or solid at room temperature and may change from one form to the other with a change in the temperature. A liquid may turn into a solid when frozen. A solid may turn into a liquid when heated. The amount of the material in the solid or liquid remains the same. Investigations and experiments (may include virtual investigations) must be conducted to explore property changes of objects and materials. Parts of objects have specific properties that allow them to work with other parts to carry out a particular function. Something may not work well or at all if a part of it is missing, broken, worn out, mismatched or misconnected. Toys that can be assembled from several parts can be investigated when one or more of the parts are missing. Note: Emphasis is placed on observations. Concepts of thermal energy, atoms and heat transfer are inappropriate at this grade.	2-PS1-3 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.	4C/P2 Change is something that happens to many things. 4D/P2 Things can be done to materials to change some of their properties, but not all materials respond the same way to what is done to them.	2-PS1-3 Building New Things from Parts - Identify that objects are made from parts. - Explain that an object can be disassembled into parts, and these parts can be reassembled to make something new.
					2-PS1-4 Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.		2-PS1-4 Changes from Heating and Cooling - Explain that heating and cooling can change matter. - Compare and contrast changes that can be undone and cannot be undone.

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1	PS	1.PS.2 Objects can be moved in a variety of ways, such as straight, zigzag, circular and back and forth.	The position of an object can be described by locating it relative to another object or to the object's surroundings. An object is in motion when its position is changing. The motion of an object can be affected by pushing or pulling. A push or pull is a force that can make an object move faster, slower or go in a different direction. Note: Changes in motion are a result of changes in energy.	The position of an object is described by comparing its location relative to another object (e.g., in front, behind, above, below). Objects can be moved and their positions are changed. Objects can move in a straight line (like a dropped coin falling to the ground) or a circle (like a pinwheel) or back and forth (like a swing) or even in a zigzag pattern. Objects near Earth fall to the ground unless something holds them up. Object motion can be faster, slower or change direction by pushing or pulling the object. Experimentation, testing and investigations of different ways to change the motion of different objects (such as a ball, a pinwheel or a kite) must be used to demonstrate movement. Note 1: Scientific definitions and calculations of speed are inappropriate at this grade. Note 2: Force is a push or pull between two objects and energy is the property of an object that can cause change. A force acting on an object can sometimes result in a change in energy. The differences between force and energy will be developed over time and are not appropriate for this grade.	K-PS2-1 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.	4F/P1 Things move in many different ways, such as straight, zigzag, round and round, back and forth, and fast and slow. 4F/P2 The way to change how something is moving is to give it a push or a pull.	K-PS2-1 Push and Pull - Understand that pushes and pulls are used to start and stop the motion of objects. - Identify and classify pushes and pulls. Speed It Up! Slow It Down! - Demonstrate how pushes and pulls of different strengths can cause the speed of objects to change. Which Way? - Demonstrate how pushes and pulls can cause the direction of objects to change. - Explain that when objects collide, objects will move in different directions. K-PS2-2 Does It Work? - Understand that there are several ways to solve a problem. - Analyze data from a design solution and draw a conclusion. - Explain how changing the force acting on an object changes the speed of its motion. 3-PS2-2 Patterns in Motion - Identify patterns in motion and use these patterns to predict future motion. - Make observations and measurements to produce data that serves as the basis for evidence for an explanation of an observed phenomenon.
					K-PS2-2 Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or pull.		
					3-PS2-2 Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to produce future motion.		

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2	ESS	2.ESS.1 The atmosphere is made up of air.	Air has properties that can be observed and measured. The transfer of energy in the atmosphere causes air movement, which is felt as wind. Wind speed and direction can be measured. Note: Air is introduced in ESS Kindergarten and can be linked to PS and LS.	In the earlier grades, wind is measured but not with a numerical value or directional data (e.g. wind may be moving faster/slower than yesterday is coming from a different direction). Wind can change the shape of the land (e.g. sand dunes, rock formations). In grade 2, wind can be measured with numeric value and direction (e.g. wind speed is 6 mph, wind direction is west to east). Air takes up space (has volume) and has mass. Heating and cooling of air (transfer of energy) results in movement of air (wind). The direction and speed of wind and air temperature can be measured using a variety of instruments, such as windsocks, weather vanes, thermometers or simple anemometers. Weather events that are related to wind (e.g. tornadoes, hurricanes) are included in this content. Monitoring weather changes using technology (e.g. posting/sharing classroom data with other classes at the school or at other schools) can lead to review and questioning of data and evaluation of wind patterns that may be documented. Experiments models (including digital/virtual) and investigations must be conducted to demonstrate the properties of air, wind and wind-related weather events. Questions, comparisons and discussions related to actual data and the analysis of the data is an important way to deepen the content knowledge.	Understanding these concepts are important to understanding more advanced NGSS standards (MS-ESS2-5), but are not addressed independently in a lower level NGSS standard.	4B/E4 Air is a material that surrounds us and takes up space and whose movement we feel as wind. (3 - 5)	MS-ESS2-5 <i>Inquisitive does not currently have NGSS Middle School content.</i>

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2	ESS	2.ESS.2 Long- and short-term weather changes occur due to changes in energy.	Changes in energy affect all aspects of weather, including temperature, precipitation amount and wind. Note: Discussion of energy at this grade level should be limited to observable changes.	Weather is a result of energy change. Heating and cooling of water, air and land (from sunlight) are directly related to wind, evaporation, condensation, freezing, thawing and precipitation. Weather patterns (long-term) and fronts (short-term) can be documented through consistent measuring of temperature, air pressure, wind speed and direction, and precipitation. Some forms of severe weather can occur in specific regions/areas, scientists forecast severe weather events.	3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.	4B/P1 The temperature and amount of rain (or snow) tend to be high, low, or medium in the same months every year. 4B/E5 The weather is always changing and can be described by measurable quantities such as temperature, wind direction and speed, and precipitation. Large masses of air with certain properties move across the surface of the earth. The movement and interaction of these air masses is used to forecast the weather. (3 - 5) 4E/P1 The sun warms the land, air, and water.	3-ESS2-1 Weather Watching - Describe some types of weather data and how they are collected. - Represent weather data as a bar graph. - Use weather data as evidence for decisions or explanations. Weather Patterns and Predictions - Draw tables and graphs to analyze weather data. - Use weather data to make a decision about when to hold an outdoor event. - Use weather data from previous years to make a prediction about future weather.
				Weather data must be measured, collected and documented over a period of time and then connected to observable forms of energy (e.g. wind causes a sailboat to move, the sun can heat the sidewalk). Experiments and investigations (both inside and outside of the classroom) must be used to demonstrate the connection between weather and energy.	3-ESS2-2 Obtain and combine information to describe climates in different regions of the world.		3-ESS2-2 What's Your Climate? - Differentiate between the terms "weather" and "climate." - Describe some of the climates found around the world.
				Note: Density and convection should not be introduced at this grade level.	3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.		3-ESS3-1 Weatherproof! - Give some examples of extreme weather and the problems they cause. - Make a claim about the effectiveness of a solution for a particular weather hazard and use evidence to support the claim.

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2	LS	2.LS.1 Living things cause changes on Earth.	Living things function and interact with their physical environments. Living things cause changes in the environments where they live; the changes can be very noticeable or slightly noticeable, fast or slow. Note: At this grade level, discussion is limited to changes that can be easily observed.	The environment is a combination of the interactions between living and non-living components. Living things can cause changes in their environment, which can be observed. These interactions can cause changes in groups of living things and the physical environment (soil, rocks, water). Conducting investigations (in nature or virtually) to document specific changes and the results of the changes must be used to demonstrate this concept (e.g. moles tunneling in a lawn, beavers or muskrats building dams, plants growing in cracks of rocks). Maps or charts (digital or 2-D) can be used to document the location of specific types of living things found in the local area. The impact and actions of living things must be investigated and explored. The focus is not limited to human interaction with the environment (such as resource use of recycling). Observe earthworm compost bins, ant farms and weeds growing on vacant lots.	4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind or vegetation.	4C/P3 Animals and plants sometimes cause changes in their surroundings.	4-ESS2-1 Weathering - Describe a process by which rocks become weathered. - Use observations from an investigation as evidence for an explanation of how weathering occurs. Erosion - Give an example of an erosion process and explain how it moves weathered rock. - Use practical observations as evidence for an explanation of how the slope of the land can affect the rate of erosion.

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2	LS	2.LS.2 Some kinds of individuals that once lived on Earth have completely disappeared, although they were something like others that are alive today.	Living things that once lived on Earth no longer exist; their basic needs were no longer met.	Fossils are physical traces of living things that are preserved in rock. By examining fossils, it can be determined that some fossils look similar to plants and animals that are alive today, while others are very different from anything alive today. Extinction refers to the disappearance of the last member of a living thing's kind. Sometimes extinction is described as the dying out of all members of the living thing's kind. Extinction generally occurs as a result of changed conditions to which the living thing's kind is not suited. Some kinds of living things that once lived on Earth have completely disappeared (e.g. the Sabertooth Cat, Smilodon). Some kinds of living things that once lived on Earth are something like others that are alive today (e.g. horses). Explore and compare a vast array of organisms, both extinct (e.g. Rugosa Coral, Sphenopsids) and extant (e.g. Brain Coral, Equisetum). Research and exposure should focus on the organism and its environment for both extinct and extant organisms. Photographs, video, websites, books, local parks and museums can be used to visualize past environments and the organisms that lived in them.	3-LS4-1 Analyze and interpret data from fossils to provide evidence of the organisms and environments in which they lived long ago.	5F/P2 Some kinds of organisms that once lived on Earth have completely disappeared, although they were something like others that are alive today.	3-LS4-1 Fossil Stories - Describe what a fossil is and name an example of one. - Give a simple explanation of how fossils are formed. - Give an example of the type of information we can obtain from a fossil. - Explain how the locations of fossils can tell us about changes to the environment over time.

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2	PS	2.PS.1 Forces change the motion of an object.	Motion can increase, change direction or stop depending on the force applied. The change in motion of an object is related to the size of the force. Some forces act without touching, such as using a magnet to move an object or objects falling to the ground. Note: At this grade level, gravitational and magnetic forces should be introduced through observation and experimentation only. The definitions of these forces should not be the focus of the content statements.	Forces are needed to change the movement (speed up, slow down, change direction or stop) of an object. Some forces may act when an object is in contact with another object (e.g. pushing or pulling). Other forces may act when objects are not in contact with each other (e.g. magnetic or gravitational). Earth's gravity pulls any object toward it, without touching the object. Static electricity also can pull or push objects without touching the object. Magnets can pull some objects to them (attraction) or push objects away from them (repulsion). Gravity, static electricity and magnets must be explored through experimentation, testing and investigation at this grade level.	K-PS2-1 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.	4B/E1 Things on or near the earth are pulled toward it by the earth's gravity. (3-5) 4F/E1a Changes in speed or direction of motion are caused by forces. (3-5) 4F/P2 The way to change how something is moving is to give it a push or a pull. 4G/E1 The earth's gravity pulls any object on or near the earth toward it without touching it. (3-5) 4G/P2 Magnets can be used to make some things move without being touched 4G/E2 Without touching them, a magnet pulls on all things made of iron and either pushes or pulls on other magnets. (3-5) 4G/E3 Without touching them, an object that has been electrically charged	K-PS2-1 Push and Pull - Understand that pushes and pulls are used to start and stop the motion of objects. - Identify and classify pushes and pulls. Speed It Up! Slow It Down! - Demonstrate how pushes and pulls of different strengths can cause the speed of objects to change. Which Way? - Demonstrate how pushes and pulls can cause the direction of objects to change. - Explain that when objects collide, objects will move in different directions. K-PS2-2 Does It Work? - Understand that there are several ways to solve a problem. - Analyze data from a design solution and draw a conclusion. - Explain how changing the force acting on an object changes the speed of its motion. 3-PS2-3 Hair Raising! - Identify electrostatic force as a non-contact force. - Describe the interaction between two charged objects in terms of a cause and effect relationship. It's Magnetic! - Identify when a magnetic force is at work and what types of materials are magnetic. - Describe the interaction between two magnetic objects in terms of a cause and effect relationship.
				For a particular object, larger forces can cause larger changes in motion. A strong kick to a rock is able to cause more change in motion than a weak kick to the same rock. Real-world experiences and investigations must be used for this concept. Note 1: Introducing fields, protons, electrons or mathematical manipulations of positive and negative to explain observed phenomena are not appropriate at this grade level. Note 2: There often is confusion between the concepts of force and energy. Force can be thought of as a push or pull between two objects	K-PS2-2 Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or pull.		
					3-PS2-3 Ask questions to determine cause and effect relationships of electrical or magnetic interactions between two objects not in contact with each other.		
					3-PS2-4		3-PS2-4

				and energy as the property of an object that can cause change. A force acting on an object can sometimes result in a change in energy. The differences between force and energy will be developed over time and is not appropriate at this grade level. Note 3: Charges and poles are often confused. It is important to emphasize they are different.	Define a simple design problem that can be solved by applying scientific ideas about magnets.	pulls on all other uncharged objects and may either push or pull other charged objects. (3-5) 4G/M5 A charged object can be charged in one of two ways, which we call either positively charged or negatively charged. Two objects that are charged in the same manner exert a force of repulsion on each other, while oppositely charged objects exert a force of attraction on each other. (6-8)	What's the Problem? ● Identify and define a problem that can be solved using magnets. ● Use their knowledge of magnets and magnetic force to design a solution to the problem.
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3	ESS	3.ESS.1 Earth's nonliving resources have specific properties.	Soil is composed of pieces of rock, organic material, water and air and has characteristics that can be measured and observed. Rocks have unique characteristics that allow them to be sorted and classified. Rocks form in different ways. Air and water are nonliving resources. Note 1: Rock classification is not the focus for this grade level; this is found in grade 6. At this grade, the actual characteristics of rocks can be used to sort or compare, rather than formal classification.	The properties of air and water are introduced in the early elementary grades, so the focus at the third- grade level is on soil and rocks. Air and water are present within rocks and soil. Air and water also play an important role in the formation of rocks and soil. All are considered nonliving resources. The characteristics of rocks and soil must be studied through sampling, observation and testing. This testing includes the ability of water to pass through samples of rock or soil and the determination of color, texture, composition and moisture level of soil. Measurable and observable characteristics of rocks include size and shape of the particles or grains (if present) within the rock, texture and color. Age- appropriate tools must be used to test and measure the properties. The characteristics of the rock can help determine the environment in which it formed. Technology can be used to analyze and compare test results, connect to other classrooms to compare data or share samples, and document the findings. Note: It is important to use the term "soil," not "dirt." Dirt and soil are not synonymous.	Understanding these concepts are important to understanding more advanced NGSS standards (MS-LS2-3, MS-ESS2-1), but are not addressed independently in a lower level NGSS standard.	4C/E2 Rock is composed of different combinations of minerals. Smaller rocks come from the breakage and weathering of bedrock and larger rocks. Soil is made partly from weathered rock, partly from plant remains—and also contains many living organisms.	MS-LS2-3 , MS-ESS2-1 <i>Inquisitive does not currently have NGSS Middle School content.</i>

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3	ESS	3.ESS.2 Earth's resources can be used for energy.	Many of Earth's resources can be used for the energy they contain. Renewable energy is an energy resource, such as wind, water or solar energy, that is replenished within a short amount of time by natural processes. Nonrenewable energy is an energy resource, such as coal or oil, that is a finite energy source that cannot be replenished in a short amount of time.	Distinguishing between renewable and nonrenewable resources through observation and investigation is the emphasis for this content statement. This can be connected to learning about the different forms of energy (PS grade 3). Electrical circuit or solar panel models can be used to demonstrate different forms of energy and the source of the energy. The conservation of energy is explored within the content statement. Some of Earth's resources are limited. Specific energy sources in Ohio are introduced, such as fossil fuels found in Ohio, new energy technologies, and the development of renewable energy sources within Ohio. Ohio must be compared to other states regarding energy sources.	4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.	4B/H8 The earth has many natural resources of great importance to human life. Some are readily renewable, some are renewable only at great cost, and some are not renewable at all. (9-12) 5E/H1 At times, environmental conditions are such that land and marine organisms reproduce and grow faster than they die and decompose to simple carbon containing molecules that are returned to the environment. Over time, layers of energy-rich organic material inside the earth have been chemically changed into great coal beds and oil pools. (9-12) 8C/P2 People burn fuels such as wood, oil, coal, or natural gas, or use electricity, to cook their food and warm their houses. (K-2) 8C/E1 Moving air and water can be used to run machines. 8C/E2 Sunlight is used to run many devices. 8C/H2 When selecting fuels, it is important to consider the relative advantages and disadvantages of each fuel. (9-12) 8C/E4 Some people try to reduce the amount of fuels they use in order to conserve resources, reduce pollution, or save money. 8C/M5 Energy from the sun (and the wind and water energy derived from it) is available indefinitely. Because the transfer of energy from these resources is weak and variable, systems are needed to collect and concentrate the energy. (6-8) 8C/M10 Some resources are not renewable or renew very slowly. Fuels already accumulated in the earth, for instance, will become more difficult to obtain as the most readily available resources run out. How long the resources will last, however, is difficult to predict. The ultimate limit may be the prohibitive cost of obtaining them. (6-8)	4-ESS3-1 Energy Resources - Explain the difference between a renewable and a nonrenewable energy resource. - Describe the effects of a particular energy resource on the environment.

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3	ESS	3.ESS.3 Some of Earth's resources are limited.	Some of Earth's resources become limited due to overuse and/or contamination. Reducing resource use, decreasing waste and/or pollution, recycling and reusing can help conserve these resources.	Within third grade, the focus is on the different types of Earth's resources, how they are used and how they can be conserved. Scientific data should be used to evaluate and compare different methods of conservation (e.g., effectiveness of different kinds of recycling such as paper vs. metal). The concentration must be the science behind the conservation of resources and why certain resources are limited. Reducing or limiting the use and/or waste of resources should be emphasized (rather than concentrating only on recycling of resources).	5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	4B/M10ab Some material resources are very rare and some exist in great quantities. The ability to obtain and process resources depends on where they are located and the form they are in. As resources are depleted, they may become more difficult to obtain. (6-8) 4B/H8 The earth has many natural resources of great importance to human life. Some are readily renewable, some are renewable only at great cost, and some are not renewable at all. (6-8) 4B/M10c Recycling materials and the development of substitutes for those materials can reduce the rate of depletion of resources but may also be costly. Some materials are not easily recycled. (6-8) 4B/M11a The wasteful or unnecessary use of natural resources can limit their availability for other purposes. Restoring depleted soil, forests, or fishing grounds can be difficult and costly. (6-8) 4B/M11bc The benefits of Earth's resources—such as fresh water, air, soil, and trees—can be reduced by deliberately or inadvertently polluting them. The atmosphere, the oceans, and the land have a limited capacity to absorb and recycle waste materials. In addition, some materials take a long time to degrade. Therefore, cleaning up polluted air, water, or soil can be difficult and costly. (6-8) 5E/P2 Many materials can be recycled and used again, sometimes in different forms. (K-2)	5-ESS3-1 Water World - Describe the relative amounts of salt water and freshwater found on Earth as well as the main sources of each. - Represent the actual amounts of Earth's salt water and freshwater in a graphical way. Science to the Rescue! - Describe the harmful effects on the environment of certain human activities. - Give an example of a science-based action that has repaired or protected the environment.

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3	LS	3.LS.2 Individuals of the same kind differ in their traits and sometimes the differences give individuals an advantage in surviving and reproducing.	Plants and animals have physical features that are associated with the environments where they live.	Organisms have different structures and behaviors that serve different functions. Some plants have leaves, stems and roots; each part serves a different function for the plant. Some animals have wings, feathers, beaks; each part serves a different function for the animals. The observation of body parts should be limited to gross morphology and not microscopic or chemical features. Comparison across species is not appropriate at this grade level; only observation of variation within the same species is expected. This content statement can be combined with the observation of the life cycles of organisms and/or the observation of the similarity between offspring and parents.	3-LS4-2 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.	5A/P1 Some animals and plants are alike in the way they look and in the things they do, and others are very different from one another. (K-2) 5A/H1a The variation of organisms within a species increases the likelihood that at least some members of the species will survive under changed environmental conditions. (9-12) 5B/P1 There is variation among individuals of one kind within a population. (K-2) 5F/E1 Individuals of the same kind differ in their characteristics, and sometimes the differences give individuals an advantage in surviving and reproducing. 5F/M2a	3-LS4-2 What's My Advantage? Use evidence to construct an explanation for why a variation in a trait gives certain individuals in a species a survival advantage.
			Plants and animals have certain physical or behavioral characteristics that improve their chances of surviving in particular environments.	There may be variations in the traits that are passed down that increase the ability of organisms to thrive and reproduce. Some variations in traits that are passed down may reduce the ability of organisms to survive and reproduce. Some variations in traits that are passed down may have no appreciable effect on the ability of organisms to survive and reproduce. Variations in physical features among animals and plants can help them survive in different environmental conditions. Variations in color, size, weight, etc., can be observed as the organism develops.	3-LS4-3 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.		3-LS4-3 Happy in My Habitat - Describe what a habitat is and give some examples of different habitats. - Describe the features an animal has that enable it to survive in its habitat. - Explain why an animal could not live in a different habitat
			Individuals of the same kind have different characteristics that they have inherited. Sometimes these different characteristics give individuals an advantage in surviving and reproducing.	Plants and animals that survive and reproduce pass successful features on to future generations. Some	MS-LS1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.		MS-LS1-5 <i>Inquisitive does not currently have Middle School content however please find below a substitute.</i> 3-LS3-2 Can the Environment Affect Traits? Identify and use evidence to support the idea that the environment of a living thing can affect both its physical and behavioral traits.
			Note: The focus is on the individual, not the population. Adaption is not the focus at this grade level.		MS-LS1-4 Use argument based on empirical		MS-LS1-4 <i>Inquisitive does not currently have Middle School content however the lessons above address Ohio Standard 3.LS.2.</i>

				grade-appropriate organisms to study are plants (e.g., radishes, beans) and insects (e.g., butterflies, moths, beetles, brine shrimp). Comparisons can be made in nature or virtually. Venn diagrams can be used to illustrate the similarities and differences between individuals of the same type.	evidence and scientific reasoning to support and explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively.	Individual organisms with certain traits are more likely than others to survive and have offspring. (6-8)	
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3	LS	3.LS.3 Plants and animals have life cycles that are part of their adaptations for survival in their natural environments.	Over the whole earth, organisms are growing, reproducing, dying and decaying. The details of the life cycle are different for different organisms, which affects their ability to survive and reproduce in their natural environments. Note: The names of the stages within the life cycles are not the focus. Note: New organisms are produced by the old ones.	Plants and animals have life cycles that are adapted to survive in distinct environments (e.g., bean plants can be grown inside during winter, but cannot grow outside in the winter). Most life cycles start with birth, then progress to growth, development, adulthood, reproduction and death. The process can be interrupted at any stage. The details of the life cycle are different for different organisms. Observation of the complete life cycle of an organism can be made in the classroom (e.g., butterflies, mealworms, plants) or virtually. Hand lens, magnifying lenses, metric rulers and scales are some of the tools that can be used to question, explore and investigate the physical appearance of living things. When studying living things, ethical treatment of animals and safety must be employed. Respect for and proper treatment of living things must be modeled. For example, shaking a container, rapping on insect bottles, unclean cages or aquariums, leaving living things in the hot sun or exposure to extreme temperatures (hot or cold) must be avoided. The National Science Teachers Association (NSTA) has a position paper to provide guidance in the ethical use and treatment of animals in the classroom at http://www.nsta.org/about/positions/animals.aspx .	3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.	5D/E3b Many plants depend on animals for carrying their pollen to other plants or for dispersing their seeds. 5E/E3 Over the whole earth, organisms are growing, dying, decaying, and new organisms are being produced by the old ones.	3-LS1-1 Plant Life-From Seed to Seed - Produce an informative model that shows the key stages in the life cycle of a plant. Animal Life Cycles - Produce an informative model that shows the key stages in the life cycle of a chosen animal.

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3	PS	3.PS.1 All objects and substances in the natural world are composed of matter.	Matter takes up space and has mass*. *While mass is the scientifically correct term to use in this context, the NAEP 2009 Science Framework (page 27) recommends using the more familiar term "weight" in the elementary grades with the distinction between mass and weight being introduced at the middle school level. In Ohio, students will not be assessed on the differences between mass and weight until Grade 6.	Objects are composed of matter and matter has observable properties. Matter is anything that has mass* and takes up space. All solids, liquids and gases are made of matter. Volume is a measure of the amount of space an object takes up. Volumes of liquids can be measured in metric units with a beaker or graduated cylinder. Weight is a measure of gravity (how strongly Earth's gravity pulls the object toward Earth). Weight is measured using a scale. For any given location, the more matter there is in an object, the greater the weight. Opportunities to investigate and experiment with different methods of measuring weight and liquid volume must be provided. Objects are made of smaller parts, some too small to be seen even with magnification. Matter continues to exist, even when broken into pieces too tiny to be visible. Notes: Atomic and subatomic nature of matter is not appropriate at this grade. Math standards at this grade limit volume measurements to liquids measured to the nearest whole number. This document follows the recommendations of the NAEP 2009 Science Framework (see page 27) for dealing with the concepts of mass and weight. *While mass is the scientifically correct term to use in this context, the NAEP 2009 Science Framework (page 27) recommends using the more familiar term "weight" in the elementary grades with the distinction between mass and weight being introduced at the middle school level. In Ohio, students will not be assessed on the differences between mass and weight until Grade 6.	5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen.	4D/E3 Materials may be composed of parts that are too small to be seen without magnification.	5-PS1-1 Too Small to Be Seen • State that all matter is made of particles too small to see. • Describe differences among the particles in solids, liquids, and gases. • Use the movement of particles to explain observations of matter.

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3	PS	3.PS.2 Matter exists in different states, each of which has different properties.	The most common states of matter are solids, liquids and gases. Shape and compressibility are properties that can distinguish between the states of matter. One way to change matter from one state to another is by heating or cooling.	Gases, liquids and solids are different states of matter that have different properties. Liquids and solids do not compress into a smaller volume as easily as do gases. Liquids and gases flow easily, but solids do not flow easily. Solids retain their shape and volume (unless a force is applied). Liquids assume the shape of the part of the container that it occupies (retaining its volume). Gases assume the shape and volume of its container. Heating may cause a solid to melt to form a liquid, or cause a liquid to boil or evaporate to form a gas. Cooling may change a gas into a liquid or cause a liquid to freeze and form a solid. Conducting experiments or investigations that demonstrate phase changes, such as the melting or freezing of substances other than water (e.g., vinegar, vegetable oil, sugar, butter), must be used to reinforce the concept that materials other than water also go through phase changes. Note 1: Purdue University provides a table that can help in differentiating the properties of solids, gases and liquids. Teaching about the atomic structure as related to the phases is not appropriate for this grade level. Note 2: Only solids, liquids and gases are appropriate at this grade, even though other phases have been identified. The differences between boiling and evaporation are not dealt with at this grade.	5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen.	4B/E3 When liquid water disappears, it turns into a gas (vapor) in the air and can reappear as a liquid when cooled, or as a solid if cooled below the freezing point of water. Clouds and fog are made of tiny droplets or frozen crystals of water. 4D/E1a Heating and cooling can cause changes in the properties of materials, but not all materials respond the same way to being heated and cooled.	5-PS1-1 Too Small to Be Seen • State that all matter is made of particles too small to see. • Describe differences among the particles in solids, liquids, and gases. • Use the movement of particles to explain observations of matter.

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3	PS	3.PS.3 Heat, electrical energy, light, sound and magnetic energy are forms of energy.	There are many different forms of energy. Energy is the ability to cause motion or create change. Note: The different forms of energy that are outlined at this grade level should be limited to familiar forms of energy that a student is able to observe.	Examples of energy causing motion or creating change include a falling rock causing a crater to form on the ground, heating water causing water to change into a gas, light energy from the sun contributing to plant growth, electricity causing the blades of a fan to move, electrically charged objects causing movement in uncharged objects or other electrically charged objects, sound from a drum causing rice sitting on the drum to vibrate, and magnets causing other magnets and some metal objects to move. Investigations (3-D or virtual) must be used to demonstrate the relationship between different forms of energy and motion. Note 1: It is not appropriate at this grade level to explore the different types of energy in depth or use wave terminology when discussing energy. These will be developed at later grades. Note 2: There often is confusion between the concepts of force and energy. Force can be thought of as a push or pull between two objects and energy as the property of an object that can cause change. If forces actually push or pull something over a distance, then there is an exchange of energy between the objects. The differences between force and energy will be developed over time and are not appropriate for this grade level. Note 3: The word "heat" is used loosely in everyday language, yet it has a very specific scientific meaning. Usually what is called heat is actually "thermal or radiant energy." An object has thermal energy due to the random movement of the particles that make up the object. Radiant energy is that which is given off by objects through space (e.g., warmth from a fire, solar energy from the sun). "Heating" is used to describe the transfer of thermal or radiant energy to another object or place. Differentiating between these concepts is inappropriate at this grade. This document uses the same conventions as noted in the NAEP 2009 Science Framework (see page 29) where "heat" is used in lower grades. However, the word "heat" has been used with care so it refers to a transfer of thermal or radiant energy. The concept of thermal energy, as it relates to particle motion, is introduced in grade 6.	4-PS3-1 Use evidence to construct an explanation relating the speed of an object to the energy of that object.	AAAS Project 2061 Benchmarks deal with energy, but make no attempt to characterize or define energy.	4-PS3-1 Fast Energy - State that objects that are moving faster have more energy. - Use practical examples or observations as evidence to support their statement.

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4	ESS	4.ESS.1 Earth's surface has specific characteristics and landforms that can be identified.	About 70 percent of the Earth's surface is covered with water and most of that is the ocean. Only a small portion of the Earth's water is freshwater, which is found in rivers, lakes and groundwater. Earth's surface can change due to erosion and deposition of soil, rock or sediment. Catastrophic events such as flooding, volcanoes and earthquakes can create landforms.	Earth is known as the Blue Planet because about 70 percent of Earth's surface is covered in water. Freshwater is a small percentage of the overall water found on Earth; the majority is oceanic.	2-ESS1-1	4C/M8 There are a variety of different land forms on the earth's surface (such as coastlines, rivers, mountains, deltas, and canyons). (6-8)	2-ESS1-1 Earth Changes S-l-o-w-l-y - Understand that elements and features on Earth (dirt, sand, rocks, hills, mountains, rivers, lakes, and seas) change over time. - Recognize that weathering and erosion are slow changes that transform Earth's surface over a long period of time. Earth Changes Fast! - Understand that elements and features on Earth (soil, sand, rocks, hills, mountains, rivers, lakes, and seas) change over time. - Recognize that volcanic eruptions, earthquakes, and floods are examples of changes that happen quickly, and transform Earth's surface suddenly.
				There are many different processes that continually build up or tear down the surface of Earth. These processes include erosion, deposition, volcanic activity, earthquakes, glacial movement and weathering.	2-ESS2-2		
				Beginning to recognize common landforms or features through field investigations, field trips, topographic maps, remote sensing data, aerial photographs, physical geography maps and/or photographs (through books or virtually) are important ways to understand the formation of landforms and features. Common landforms and features include streams, deltas, floodplains, hills, mountains/mountain ranges, valleys, sinkholes, caves, canyons, glacial features, dunes, springs, volcanoes and islands.	4-ESS1-1		
				Connecting the processes that must occur to the resulting landform, feature or characteristic should be emphasized. This can be demonstrated through experiments, investigation (including virtual experiences) or field observations. Technology can help illustrate specific features that are not found locally or demonstrate change that occurred (e.g. using satellite photos of an erosion event such as flooding).	4-ESS2-2		
							2-ESS2-2 Map It! - Develop a model that identifies natural landforms and bodies of water. - Understand that maps can be used to represent many types of areas.
							4-ESS1-1 Has the Earth Changed? - Describe how Earth's surface changes over time. - Use rock layers and the fossils found in them as evidence of Earth's changes.
							4-ESS2-2 Mapping Patterns Describe the positions of Earth's mountain ranges on the continents and the position of the ocean trenches.

							Describe the locations of volcanoes and earthquake activity and note that they are similar.
					<u>4-ESS3-2</u> Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.		<u>4-ESS3-2</u> <u>Living With Earth's Hazards</u> - Describe some natural hazards that cause problems for humans. - Design and evaluate a potential solution to reduce harm caused by a natural hazard.

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4	ESS	4.ESS.2 The surface of Earth changes due to weathering.	Rocks change shape, size and/or form due to water or ice movement, freeze and thaw, wind, plant growth, gases in the air, pollution and catastrophic events such as earthquakes, mass wasting, flooding and volcanic activity. Note: The ice movement (above) refers to large bodies of ice, such as glaciers that can break large rocks into small ones.	Different types of rock weather at different rates due to specific characteristics of the rock and the exposure to weathering factors (e.g. freezing/thawing, wind, water). Weathering is defined as a group of processes that change rock at or near Earth's surface. Some weathering processes take a long time to occur, while some weathering processes occur quickly. The weathering process must be observed in nature, through classroom experimentation or virtually. Seeing tree roots fracturing bedrock or the effect of years of precipitation on a marble statue can illustrate ways that rocks change shape over time. Investigations can include classroom simulations, laboratory testing and field observations.	2-ESS2-1 Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.	4C/E1 Waves, wind, water, and ice shape and reshape the earth's land surface by eroding rock and soil in some areas and depositing them in other areas, sometimes in seasonal layers. 4C/M2b The earth's surface is shaped in part by the motion of water (including ice) and wind over very long times, which acts to level mountain ranges. Rivers and glacial ice carry off soil and break down rock, eventually depositing the material in sediments or carrying it in solution to the sea. (6-8)	2-ESS2-1 The Power of Wind and Water ● Understand that sudden and slow changes caused by wind and water can change the shape of the land. ● Examine and discuss solutions that engineers and scientists have designed to prevent this damage from happening. ● Compare solutions designed to slow or prevent wind or water from changing the shape of the land. 4-ESS2-1 Weathering ● Describe a process by which rocks become weathered. ● Use observations from an investigation as evidence for an explanation of how weathering occurs. Erosion ● Give an example of an erosion process and explain how it moves weathered rock. ● Use practical observations as evidence for an explanation of how the slope of the land can affect the rate of erosion.
					4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind or vegetation.		

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4	ESS	4.ESS.3 The surface of Earth changes due to erosion and deposition.	Water, wind and ice physically remove and carry (erosion) rock, soil and sediment and deposit the material in a new location. Gravitational force affects movements of water, rock and soil.	Erosion is a process that transports rock, soil or sediment to a different location. Weathering is the breakdown of large rock into smaller pieces of rock. Erosion is what carries the weathered material to a new location. Gravity plays an important role in understanding erosion, especially catastrophic events like mass wasting (e.g. mudslides, avalanches, landslides) or flooding.	2-ESS2-1 Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.	4C/E1 Waves, wind, water, and ice shape and reshape the earth's land surface by eroding rock and soil in some areas and depositing them in other areas, sometimes in seasonal layers.	2-ESS2-1 The Power of Wind and Water - Understand that sudden and slow changes caused by wind and water can change the shape of the land. - Examine and discuss solutions that engineers and scientists have designed to prevent this damage from happening. - Compare solutions designed to slow or prevent wind or water from changing the shape of the land.
				Erosion is a "destructive" process and deposition is a "constructive" process. Erosion and deposition directly contribute to landforms and features formation that are included in grade 4. Topographic maps and aerial photographs can be used to locate erosional and depositional areas in Ohio. Surficial geology maps also can illustrate the patterns of glacial erosion and deposition that have occurred. Field trips and field investigations (may be virtual) are recommended as erosional and depositional features that can be seen locally or within the state can help to connect the concept of erosion and deposition to the real world.	4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind or vegetation.		
						4C/M2b The earth's surface is shaped in part by the motion of water (including ice) and wind over very long times, which acts to level mountain ranges. Rivers and glacial ice carry off soil and break down rock, eventually depositing the material in sediments or carrying it in solution to the sea. (6-8)	4-ESS2-1 Weathering - Describe a process by which rocks become weathered. - Use observations from an investigation as evidence for an explanation of how weathering occurs. Erosion - Give an example of an erosion process and explain how it moves weathered rock. - Use practical observations as evidence for an explanation of how the slope of the land can affect the rate of erosion.

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4	LS	4.LS.1 Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.	Ecosystems can change gradually or dramatically. When the environment changes, some plants and animals survive and reproduce and others die or move to new locations. An animal's patterns of behavior are related to the environment. This includes the kinds and numbers of other organisms present, the availability of food and resources, and the physical attributes of the environment.	Ecosystems are based on interrelationships among and between biotic and abiotic factors. Ohio has experienced various weather patterns. Some parts of Ohio hosted glaciers and other parts of Ohio were submerged with water. Ecosystems can change rapidly (e.g. volcanoes, earthquakes, or fire) or very slowly (e.g. climate change). Major changes over a short period of time can have a significant impact on the ecosystem and the populations of plants and animals living there. The changes that occur in the plant and animal populations can impact access to resources for the remaining organisms, which may result in migration or death. The fossil record provides evidence for changes in populations of species. Researching and investigating specific areas in Ohio (e.g. Cedar Bog, Lake Erie, Hocking Hills, Ceasar Creek, Kellys Island) via field studies, virtual field trips or other references must be used to explore the relationships between previous environments, changes that have occurred in the environments and the species that lived there.	3-LS4-4 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.	5D/E4 Changes in an organism's habitat are sometimes beneficial to it and sometimes harmful. 5F/M2b Changes in environmental conditions can affect the survival of individual organisms and entire species. (6-8)	3-LS4-4 What Happens When Environments Change? - Describe some of the ways that environments can change. - Describe how changes to an environment can affect the organisms that live there. - Evaluate the effectiveness of a solution designed to solve a problem caused by changes to an environment

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4	LS	4.LS.2 <u>Fossils can be compared to one another and to present-day organisms according to their similarities and differences.</u>	The concept of biodiversity is expanded to include different classification schemes based upon shared internal and external characteristics of organisms. Most types of organisms that have lived on Earth no longer exist. Fossils provide a point of comparison between the types of organisms that lived long ago and those existing today.	Fossils provide evidence that many plants and animal species are extinct and that many species have changed over time. The types of fossils that are present provide evidence about the nature of the environment at that time. As the environment changed so did the types of organisms that could survive in that environment. The opportunity to learn about an increasing variety of living organisms, both the familiar and the exotic, should be provided. The observations and descriptions of organisms should become more precise in identifying similarities and differences based upon observed structures. Emphasis can still be on external features; however, finer detail than before should be included. Hand lenses and microscopes should be routinely used. Microscopes are used not to study cell structure but to begin exploring the world of organisms that cannot be seen by the unaided eye. Non-Linnaean classification systems should be developed that focus on gross anatomy, behavior patterns, habitats and other features.	<u>3-LS4-1</u> Analyze and interpret data from fossils to provide evidence of the organisms and environments in which they lived long ago.	<u>5F/E2</u> Fossils can be compared to one another and to living organisms according to their similarities and differences. Some organisms that lived long ago are similar to existing organisms, but some are quite different. <u>5F/M4</u> Most species that have lived on the earth are now extinct. Extinction of species occurs when the environment changes and the individual organisms of that species do not have the traits necessary to survive and reproduce in the changed environment. (6-8)	<u>3-LS4-1</u> <u>Fossil Stories</u> • Describe what a fossil is and name an example of one. • Give a simple explanation of how fossils are formed. • Give an example of the type of information we can obtain from a fossil. • Explain how the locations of fossils can tell us about changes to the environment over time.

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4	PS	4.PS.1 The total amount of matter is conserved when it undergoes a change.	When an object is broken into smaller pieces, when a solid is dissolved in a liquid or when matter changes state (solid, liquid, gas), the total amount of matter remains constant. Note 1: At this grade, the discussion of conservation of matter should be limited to a macroscopic, observable level. Note 2: States of matter are found in PS grade 3. Heating and cooling is one way to change the state of matter.	Some properties of objects may stay the same even when other properties change. For example, water can change from a liquid to a solid, but the mass of the water remains the same. Parts of an object or material may be assembled in different configurations, but the mass remains the same. The sum of all of the parts in an object equals the mass of the object. When a solid is dissolved in a liquid, the mass of the mixture is equal to the sum of the masses of the liquid and solid. At this grade level, the discussion of conservation of matter should be limited to a macroscopic, observable level. Conservation of matter must be developed from experimental evidence collected in the classroom. After the concept has been well established with experimental data and evidence, investigations can include interactions that are more complex where the mass may not appear to stay constant (e.g. fizzing tablets in water). Note: Mass* is an additive property of objects and volume is usually an additive property for the same material at the same conditions. However, volume is not always an additive property, especially if different substances are involved. For example, mixing alcohol with water results in a volume that is significantly less than the sum of the volumes.	5-PS1-2 Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.	4D/E5 Substances may move from place to place, but they never appear out of nowhere and never just disappear. 4D/E2 No matter how parts of an object are assembled, the weight of the whole object is always the same as the sum of the parts; and when an object is broken into parts, the parts have the same total weight as the original object. 4D/M7a No matter how substances within a closed system interact with one another, or how they combine or break apart, the total mass of the system remains the same. (6-8)	5-PS1-2 Weighing Matter - Understand that the weight of matter is always conserved, even when that matter undergoes change. - Use their own observations and measurements as evidence to support a claim.

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4	PS	4.PS.2 Energy can be transformed from one form to another or can be transferred from one location to another.	Energy transfers from hot objects to cold objects as heat, resulting in a temperature change. Electric circuits require a complete loop of conducting materials through which an electrical energy can be transferred. Electrical energy in circuits can be transformed to other forms of energy, including light, heat, sound and motion. Electricity and magnetism	The addition of heat may increase the temperature of an object. The removal of heat may decrease the temperature of an object. There are materials in which the entire object becomes hot when one part of the object is heated (e.g. in a metal pan, heat flows through the pan on the stove transferring the heat from the burner outside the pan to the food in the pan). There are other objects in which parts of the object remain cool even when another part of the object is heated (e.g. in a Styrofoam cup, very little of the warmth from hot liquid inside the cup is transferred to the hand holding the cup).	4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat,	4E/E1 When two objects are rubbed against each other, they both get warmer. In addition, many mechanical and electrical devices get warmer when they are used. 4E/E2a When warmer things are put with cooler ones, the warmer things get cooler and the cooler things get warmer until they all are the same temperature. 4E/E2b When warmer things are put with cooler ones, heat is transferred from the warmer ones to the cooler ones. 4E/E2c A warmer object can warm a cooler one by contact	4-PS3-2 Sound Moves ● Explain how sound is produced. ● State that sound travels from one place to another, and cite practical observations as evidence. Heat Moves ● Use their measurements and observations to explain how heat moves. ● Identify how heat moves from one object to another in familiar, real-life contexts. Switch the Light On! ● Describe how light energy travels from one place to another. ● Describe how to build a circuit that changes electrical energy into light energy.
				Electrical conductors are materials through which electricity can flow easily. Electricity introduced to one part of the object spreads to other parts of the object (e.g. copper wire is an electrical conductor because electricity flows through the wires in a lamp from the outlet to the light bulb and back to the outlet).	4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide.		
				Electrical insulators are materials through which electricity cannot flow easily. Electricity introduced to one part of the object does not spread to other parts of the object (e.g. rubber surrounding a copper wire is an electrical insulator because electricity does not flow through the rubber to the hand holding it).	4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.		
				Electrical conductivity must be explored through testing common materials to determine their conductive properties.			4-PS3-3 When Objects Collide ● Identify and give examples of instances of how motion energy is transferred through collisions. ● Explain that some of the motion energy in a collision is transformed into sound and heat.
				In order for electricity to flow through a circuit, there must be a complete loop through which the electricity can pass. When an electrical device (e.g. lamp, buzzer, motor) is not part of a complete loop, the device will not work. Electric circuits must be introduced in the laboratory by testing different combinations of electrical components. When an electrical device is part of a complete loop, the			4-PS3-4 Converting Energy ● Explain, with an example, how energy can be converted from one form into another. ● Describe the criteria and constraints associated with the design of a solution to a problem. ● Use the engineering process in collaboration with others to design, build, test, and refine a solution to a problem.

			are closely related. electrical energy can be changed into light, sound, heat or magnetic energy. Electrical devices in a working circuit often get warmer. When a magnet moves in relation to a coil of wire, electricity can flow through the coil. When a wire conducts electricity, the wire has magnetic properties and can push and/or pull magnets. The connections between electricity and magnetism must be explored in the laboratory through experimentation. Note 1: Exploring heat transfer in terms of moving submicroscopic particles is not appropriate at this grade level. Note 2: The word “heat” is used loosely in everyday language, yet it has a very specific scientific meaning. Usually what is called heat is actually “thermal or radiant energy.” An object has thermal energy due to the random movement of the particles that make up the object. Radiant energy is that which is given off by objects through space (e.g., warmth from a fire, solar energy from the sun). “Heating” is used to describe the transfer of thermal or radiant energy to another object or place. Differentiating between these concepts is inappropriate at this grade level. This document uses the same conventions as noted in the NAEP 2009 Science Framework (see page 29) where “heat” is used in lower grades. However, the word “heat” has been used with care so it refers to a transfer of thermal or radiant energy. The concept of thermal energy, as it relates to particle motion, is introduced in grade 6. Note 3: Knowing the specifics of electromagnetism is not appropriate at this grade level. At this point, the connections between electricity and magnetism are kept strictly experiential and observational. Note 4: Energy transfer (between objects or places) should not be confused with energy transformation from one form of energy to another (e.g., electrical energy to light energy).		or at a distance. 4G/M4 Electrical circuits require a complete loop through which an electrical current can pass.	
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5	ESS	5.ESS.1 The solar system includes the sun and all celestial bodies that orbit the sun. Each planet in the solar system has unique characteristics.	The distance from the sun, size, composition and movement of each planet are unique. Planets revolve around the sun in elliptical orbits. Some of the planets have moons and/or debris that orbit them. Comets, asteroids and meteoroids orbit the sun. Note: The shape of Earth's orbit is nearly circular (also true for other planets). Many graphics that illustrate the orbit overemphasize the elliptical shape, leading to the misconception regarding seasonal change being related to how close Earth is to the sun. The discussion of planet characteristics should be at an introductory level for this grade.	Eight major planets in the solar system orbit the sun. Some of the planets have a moon or moons that orbit them. Earth is a planet that has a moon that orbits it. The planets orbits are because of their gravitational attraction to the sun. Moons orbit around planets because of their gravitational attraction to the planets. Asteroids are metallic, rocky bodies that orbit the sun but are too small to be classified as a planet. A meteor appears when a particle or chunk of metallic or stony matter called a meteoroid enters Earth's atmosphere from outer space. Comets are a mixture of ices (both water and frozen gases) that are not part of a planet. Pluto is classified as a dwarf planet (definition from http://www.nasa.gov).	MS-ESS1-2 Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	4A/E2 Telescopes magnify the appearance of some distant objects in the sky, including the moon and the planets. The number of stars that can be seen through telescopes is dramatically greater than can be seen by the unaided eye. 4A/E3 Planets change their positions against the background of stars. 4A/M3 Nine planets of very different size, composition, and surface features move around the sun in nearly circular orbits. Some planets have a variety of moons and even flat rings of rock and ice particles orbiting around them. Some of these planets and moons show evidence of geologic activity. The earth is orbited by one moon, many artificial satellites, and debris. (6-8)	MS-ESS1-2 <i>Inquisitive does not currently have NGSS Middle School content however please find below a substitute.</i> 5-PS2-1 Goin' Down - Explain that objects near Earth's surface fall downward because the force of gravity is pulling them toward the planet's center. - Carry out an investigation and record observations. - Make a claim and use evidence and reasoning to support it. - Evaluate the validity of a claim based on evidence presented
				General information regarding planetary positions, orbital patterns, planetary composition and recent discoveries and projects (e.g., missions to Mars) are included in this content. Tools and technology are an essential part of understanding the workings within the solar system. Note: Additional information about gravity is found in PS grade 5.	MS-ESS1-3 Analyze and interpret data to determine scale properties of objects in the solar system.	4A/E4 The earth is one of several planets that orbit the sun, and the moon orbits around the earth. 4A/M4 Many chunks of rock orbit the sun. Those that meet the earth glow and disintegrate from friction as they plunge through the atmosphere—and sometimes impact the ground. Other chunks of rock mixed with ice have long, off-center orbits that carry them close to the sun, where the sun's radiation (of light and particles) boils off frozen materials from their surfaces and pushes it into a long, illuminated tail. (6-8) 4B/M2cd Earth is the only body in the solar system that appears able to support life. The other planets have compositions and conditions very different from the earth's. (6-8) 4G/M2	MS-ESS1-3 <i>Inquisitive does not currently have NGSS Middle School content however please find below a substitute.</i> 5-ESS1-1 Hello Sun - State that the sun is a star. - Explain why the sun appears to be the biggest and brightest object in the sky.

					The sun's gravitational pull holds the earth and other planets in their orbits, just as the planets' gravitational pull keeps their moons in orbit around them. (6-8) <u>10A/M2</u> Telescopes reveal that there are many more stars in the night sky than are evident to the unaided eye, the surface of the moon has many craters and mountains, the sun has dark spots, and Jupiter and some other planets have their own moons. (6-8)	
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5	ESS	5.ESS.2 The sun is one of many stars that exist in the universe.	The sun appears to be the largest star in the sky because it is the closest star to Earth. Some stars are larger than the sun and some stars are smaller than the sun.	The sun is the closest star to the Earth. Scaled models (3-D or virtual) and graphics can be used to show the vast difference in size between the sun and the Earth. The sun is a medium-sized star and is the only star in our solar system. There are many other stars of different sizes in the universe. Stars appear in patterns called constellations, which can be used for navigation. Because they are so far away, they do not appear as large as the sun. General facts about the size and composition of the sun are introduced. Details (e.g., age of the sun, specific composition, temperature values) are above grade level. The emphasis should be on general characteristics of stars and beginning to understand the size and distance of the sun in relationship to the Earth and other planets. Current and new discoveries related to stars and the sun must be included.	5-ESS1-1 Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.	4A/P1 There are more stars in the sky than anyone can easily count, but they are not scattered evenly, and they are not all the same in brightness or color. (K-2) 4A/M1a The sun is a medium-sized star located near the edge of a disc-shaped galaxy of stars, part of which can be seen as a glowing band of light that spans the sky on a very clear night. (6-8) 4A/M2abc The sun is many thousands of times closer to the earth than any other star. Light from the sun takes a few minutes to reach the earth, but light from the next nearest star takes a few years to arrive. The trip to that star would take the fastest rocket thousands of years. (6-8) 4A/E5 Stars are like the sun, some being smaller and some larger, but so far away that they look like points of light. 4A/E6 A large light source at a great distance looks like a small light source that is much closer.	5-ESS1-1 Hello Sun! - State that the sun is a star. - Explain why the sun appears to be the biggest and brightest object in the sky.

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5	ESS	5.ESS.3 Most of the cycles and patterns of motion between the Earth and sun are predictable.	Earth's revolution around the sun takes approximately 365 days. Earth completes one rotation on its axis in a 24-hour period, producing day and night. This rotation makes the sun, stars and moon appear to change position in the sky. Earth's axis is tilted at an angle of 23.5°. This tilt, along with Earth's revolution around the sun, affects the amount of direct sunlight that the Earth receives in a single day and throughout the year. The average daily temperature is related to the amount of direct sunlight received. Changes in average temperature throughout the year are identified as seasons. Note 1: The amount of direct sunlight that Earth receives is related to the altitude of the sun, which affects the angle of the sun's rays, and the amount of time the sun is above the horizon each day. Note 2: Different regions around the world have seasonal changes that are not based solely on average temperature (e.g., rainy season, dry season, monsoon season).	Models, interactive websites and investigations are required to illustrate the predictable patterns and cycles that lead to the understanding of day and night, seasons, years and the amount of direct sunlight Earth receives. Three-dimensional models should be used to demonstrate that the tilt of Earth's axis is related to the amount of direct sunlight received and seasonal temperature changes. Seasonal change should be expanded in grade 5 to include regions of the world that experience specific seasonal weather patterns and natural weather hazards (e.g., hurricane season, monsoon season, rainy season, dry season). This builds upon making observations of the seasons throughout the school year in the earlier grades and prepares students for understanding the difference between weather and climate.	5-ESS1-2 Represent data in graphical displays to reveal patterns of daily changes in the length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	4A/P3 The moon looks a little different every day but looks the same again about every four weeks. (K-2) 4A/E1 The patterns of stars in the sky stay the same, although they appear to move across the sky nightly, and different stars can be seen in different seasons. 4A/E4 The earth is one of several planets that orbit the sun, and the moon orbits around the earth. 4B/E2bc The rotation of the earth on its axis every 24 hours produces the night-and-day cycle. To people on earth, this turning of the planet makes it seem as though the sun, moon, planets, and stars are orbiting the earth once a day. 4B/H3 Because the earth turns daily on an axis that is tilted relative to the plane of the earth's yearly orbit around the sun, sunlight falls more intensely on different parts of the earth during the year. The difference in intensity of sunlight and the resulting warming of the earth's surface produces the seasonal variations in temperature. (9-12) 4B/M13 The number of hours of daylight and the intensity of the sunlight both vary in a predictable pattern that depends on how far north or south of the equator the place is. This variation explains why temperatures vary over the course of the year and at different locations. (6-8)	5-ESS1-2 Day And Night - It's A Fine Line - Use a model to explain why we experience day and night. - Graph data of the numbers of daylight hours and use their graphs to describe patterns. Casting Shadows Great and Small - Understand that the shape and size of a shadow depends on the position and direction of the light source. - Generate measurement data, use the data to create a graph, and analyze the graph to describe a pattern. - Explain why their shadow changes over the course of a day. Star Patterns - Explain that the apparent movement and changing position of the stars across the night sky is due to the rotation of Earth. - Explain that different stars are visible at different times of the year because Earth revolves around the sun. MS-ESS1-1 <i>Inquisitive does not currently have Middle School content however the lessons above address Ohio Standard 5.ESS.3.</i>

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5	LS	5.LS.1 Organisms perform a variety of roles in an ecosystem.	Populations of organisms can be categorized by how they acquire energy. Food webs can be used to identify the relationships among producers, consumers and decomposers in an ecosystem.	The content statements for fifth-grade life science are each partial components of a larger concept. The parts have been isolated to call attention to the depth of knowledge required to build to one of biology's foundational theories: dynamic relationships within ecosystems. It is recommended that the content statements be combined and taught as a whole. For example, it is important that the ecological role of organisms is interwoven with a clear understanding that all living things require energy. Plants and some microorganisms are producers. They are the foundation of the food web. Producers transform energy from the sun and make food through a process called photosynthesis. Animals get their energy by eating plants and other animals that eat plants. Animals are consumers and many form predator-prey relationships. Decomposers (primarily bacteria and fungi) are consumers that use waste materials and dead organisms for food. Decomposers also return nutrients to the ecosystem. One way ecosystem populations interact is centered on relationships for obtaining energy. Food webs are defined in many ways, including as a scheme of feeding relationships, which resemble a web. This web serves as a model for feeding relationships of member species	5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.	5A/M4 Traditionally, a species has been defined as all organisms that can mate with one another to produce fertile offspring. (6-8) 5A/M5 The cycles continue indefinitely because organisms are decomposed after death to return food materials to the environment. (6-8) 5D/E2 Insects and various other organisms depend on dead plant and animal material for food. 5D/M2 Interactions between organisms may be for nourishment, reproduction, or protection and may benefit one of the organisms or both of them. Some species have become so dependent on each other that neither could survive without the other. (6-8) 5D/M2b One organism may scavenge or decompose another. (6-8)	5-LS2-1 Nature's Recyclers ● Explain observations of rotting plant and animal matter as the actions of decomposers. ● Describe the important role decomposers play in recycling matter. A Web of Life ● Describe, with examples, how individual food chains connect to form food webs. ● Understand that food webs show the movement of matter through an ecosystem. A Damaged Web ● Describe, with examples, how removing a species from a food web damages an ecosystem. ● Describe, with examples, the effect on an ecosystem of introducing a new species.
					MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.		MS-LS2-2 <i>Inquisitive does not currently have Middle School content however the lessons above address Ohio Standard 5.LS.1.</i>

			within a biological community. Members of a species may occupy different positions during their lives. Food chains and webs are schematic representations of real-world interactions. For this grade level, it is enough to recognize that food webs represent an intertwining of food chains within the same biological community. See the content statement for details on grade-appropriate food webs. Organisms have symbiotic relationships in which individuals of one species are dependent upon individuals of another species for survival. Symbiotic relationships can be categorized as mutualism where both species benefit, commensalism where one species benefits and the other is unaffected, and parasitism where one species benefits and the other is harmed. Investigations of locally threatened or endangered species must be conducted and include considerations of the effects of remediation programs, species loss and the introduction of new species on the local environment. Note: At this grade, species can be defined by using Ernst Mayer's definition "groups of actually or potentially interbreeding natural populations, which are reproductively isolated from other such groups." Assessments will not include the definition of species.			
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5	LS	5.LS.2 All of the processes that take place within organisms require energy.	For ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred and transformed by producers into energy that organisms use through the process of photosynthesis. That energy then passes from organism to organism as illustrated in food webs. In most ecosystems, energy derived from the sun is transferred and transformed into energy that organisms use by the process of photosynthesis in plants and other photosynthetic organisms.	The content statements for fifth-grade life science are each partial components of a larger concept. The parts have been isolated to call attention to the depth of knowledge required to build to one of biology's foundational theories: dynamic relationships within ecosystems. It is recommended that the content statements be combined and taught as a whole. For example, it is important that the ecological role of organisms is interwoven with a clear understanding that all living things require energy. Virtual simulations and investigations can help demonstrate energy flow through the trophic levels. Energy flows through an ecosystem in one direction, from photosynthetic organisms to consumers (herbivores, omnivores to carnivores) and decomposers. The exchange of energy that occurs in an ecosystem can be represented as a food web. The exchange of energy in an ecosystem is essential because all processes of life for all organisms require a continual supply of energy. Satellite imaging, remote sensing or other digital-research formats can be used to help visualize what happens in an ecosystem when new producers (e.g., Tamarisk plants) are introduced into an ecosystem. The information gained should be used to determine the relationship between the producers and consumers within an ecosystem. Note: The chemical details of photosynthesis will be addressed in grade 10. This is just an introduction of the process, not the details of the process.	5-PS3-1 Use models to describe that energy in animals' food was once energy from the sun.	5A/M1 One of the most general distinctions among organisms is between plants, which use sunlight to make their own food, and animals, which consume energy-rich foods. Some kinds of organisms, many of them microscopic, cannot be neatly classified as either plants or animals. 5D/M4 All organisms, both land-based and aquatic, are interconnected by their need for food. This network of interconnections is referred to as a food web. The entire earth can be considered a single global food web, and food webs can also be described for a particular environment. At the base of any food web are organisms that make their own food, followed by the animals that eat them, then the animals that eat those animals, and so forth. 5E/E1 Almost all kinds of animals' food can be traced back to plants. 5E/M3c Almost all food energy comes originally from sunlight. (6-8)	5-PS3-1 Energy for Living Things - State reasons as to why animals need to eat food. - Create an accurate model of a food chain. - Identify that energy in animals' food was once energy from the sun.

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5	PS	5.PS.1 The amount of change in movement of an object is based on the mass* of the object and the amount of force exerted.	Movement can be measured by speed. The speed of an object is calculated by determining the distance (d) traveled in a period of time (t). Earth pulls down on all objects with a gravitational force. Weight is a measure of the gravitational force between an object and the Earth. Any change in speed or direction of an object requires a force and is affected by the mass* of the object and the amount of force applied. Note 1: Gravity and magnetism are introduced (through observation) in PS grade 2. *While mass is the scientifically correct term to use in this context, the NAEP 2009 Science Framework (page 27) recommends using the more familiar term "weight" in the elementary grades with the distinction between mass and weight being introduced at the middle school level. In Ohio, students will not be assessed on the differences between mass and weight until Grade 6.	The motion of an object can change by speeding up, slowing down or changing direction. Forces cause changes in motion. If a force is applied in the same direction of an object's motion, the speed will increase. If a force is applied in the opposite direction of an object's motion, the speed will decrease. Generally, the greater the force acting on an object, the greater the change in motion. Generally, the more mass* an object has, the less influence a given force will have on its motion. If no forces act on an object, the object does not change its motion and moves at constant speed in a given direction. If an object is not moving and no force acts on it, the object will remain at rest. Movement is measured by speed (how fast or slow the movement is). Speed is measured by time and distance traveled (how long it took the object to go a specific distance). Speed is calculated by dividing distance by time. Speed must be investigated through testing and experimentation. Real-world settings are recommended for the investigations when possible. Virtual investigations and simulations also can be used to demonstrate speed. An object that moves with constant speed travels the same distance in each successive unit of time. In the same amount of time, a faster object moves a greater distance than a slower object. When an object is speeding up, the distance it travels increases with each successive unit of time. When an object is slowing down, the distance it travels decreases with each successive unit of time.	5-PS2-1 Support an argument that the gravitational force exerted by Earth on objects is directed down.	4B/M3 Everything on or anywhere near the earth is pulled toward the earth's center by gravitational force. (6-8) 4F/E1bc The greater the force is, the greater the change in motion will be. The more massive an object is, the less effect a given force will have. 4F/E2 How fast things move differs greatly. Some things are so slow that their journey takes a long time; others move too fast for people to even see them. 4F/H7 In most familiar situations, frictional forces complicate the description of motion,	5-PS2-1 Goin' Down! ● Explain that objects near Earth's surface fall downward because the force of gravity is pulling them toward the planet's center. ● Carry out an investigation and record observations. ● Make a claim and use evidence and reasoning to support it. ● Evaluate the validity of a claim based on evidence presented.

			Speed must be explored and tested through investigations (3-D or virtual) inside and outside of the classroom. Video technology can be used to stop movement and measure changes at different steps in the investigations. Note 1: This content can be taught in conjunction with the following ESS content: Everything on or anywhere near Earth is pulled toward Earth's center by gravitational force. Weight is a measure of this force. The planets are kept in orbit due to their gravitational attraction for the sun. Note 2: While concepts are related to Newton's second law, remain conceptual at this grade. Knowing the name of the law is not required. Memorizing and reciting words to describe Newton's second law is not appropriate. Note 3: Although mathematics is applied to the concept of speed at this grade level, its use should support deeper understanding of the concept of speed and not be taught as the primary definition of speed.		although the basic principles still apply. (9-12)	
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Grade Level	Domain	Ohio Content Statement	Ohio Content Descriptors	Ohio Content Elaboration			
5	PS	5.LS.2 Light and sound are forms of energy that behave in predictable ways.	Light travels and maintains its direction until it interacts with an object or moves from one medium to another and then it can be reflected, refracted or absorbed. Sound is produced by vibrating objects and requires a medium through which to travel. The rate of vibration is related to the pitch of the sound. Note: At this grade level, the discussion of light and sound should be based on observable behavior. Waves are introduced at	Light can travel through some materials, such as glass or water. Light also can travel through empty space, like from the sun to Earth. When light travels from one location to another, it goes in a straight line until it interacts with another object or material. When light strikes objects through which it cannot pass, shadows are formed. As light reaches a new material, it can be absorbed, refracted, reflected or can continue to travel through the new material; one of these interactions may occur or many may occur simultaneously, depending on the material.	1-PS4-2 Make observations to construct an evidence-based account that objects can be seen only when illuminated.	4E/M6 Light and other electromagnetic waves can warm objects. How much an object's temperature increases depends on how intense the light striking its surface is, how long the light shines on the object, and how much of the light is absorbed. (6-8) 4F/M1 Light from the sun is made up of a mixture of many different colors of light, even though to the eye the light looks almost white. Other things that give off or reflect light have a different mix of colors. (6-8)	1-PS4-2 Turn on the Light! - Identify that light can cause objects to be seen. - Investigate what happens to the appearance of objects when they are illuminated. - Determine that some objects give off their own light, and some objects can be seen if there is a light source available.
				Light can be absorbed by objects, causing them to warm. How much an object's temperature increases depends on the material of the object, the intensity of and the angle at which the light striking its surface, how long the light shines on the object and how much light is absorbed. Investigating and experimenting with temperature changes caused by light striking different surfaces can be virtual or in a lab setting.	1-PS4-3 Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.		
				When light passes from one material to another, it is often refracted at the boundary between the two materials and travels in a new direction through the new material (medium). For example, a magnifying lens bends light and focuses it toward a single point. A prism bends white light and separates the different colors of light. Experiment with prisms and magnifying lenses to observe the refraction of light.	1-PS4-4 Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.		
				Visible light may be emitted from an object (like the sun) or reflected by an object (like			1-PS4-3 Beam of Light - Identify that a beam of light shines in one direction. - Investigate what effects a beam of light has on objects made from different materials. - Determine that some objects allow all light to pass through, some allow a portion of the light to pass through, and some block light and create shadows. Mirror, Mirror - Identify how a beam of light can reflect off objects. - Investigate what effects a beam of light has on objects made from different materials. - Determine that some objects allow light to bounce off them and light their surrounding space.
							1-PS4-4 Sounds Signals - Identify that devices allow us to communicate. - Design and build a device that uses sound to communicate. - Determine communication means to send and receive information. Light Signals - Identify what devices allow us to communicate using light. - Design and build a device that uses light to communicate. - Determine communication means to send and receive information using light.

			the middle school level.	a mirror or the moon). The reflected colors are the only colors visible when looking at an object. For example, a red apple looks red because the red light that hits the apple is reflected while the other colors are absorbed. Pitch can be changed by changing how fast an object vibrates. Objects that vibrate slowly produce low pitches; objects that vibrate quickly produce high pitches. Audible sound can only be detected within a certain range of pitches. Sound must travel through a material (medium) to move from one place to another. This medium may be a solid, liquid or gas. Sound travels at different speeds through different media. Once sound is produced, it travels outward in all directions until it reaches a different medium. When it encounters this new medium, the sound can continue traveling through the new medium, become absorbed by the new medium, bounce back into the original medium (reflected) or engage in some combination of these possibilities. Light travels faster than sound. Technology and virtual simulations and models can help demonstrate movement of light and sound. Experimentation, testing and investigation (3-D or virtual) are essential components of learning about light and sound properties. Note: Students are not responsible for knowing the additive rules for color mixing of light other than the fact that white light is a mixture of many colors. The wave nature of sound and light are not introduced at this level nor are parts of the electromagnetic spectrum other than visible light. At this grade, how sound travels through the medium is not appropriate as atoms and molecules are not introduced until grade 6.	4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electrical currents.	4F/M2 Something can be "seen" when light waves emitted or reflected by it enter the eye—just as something can be "heard" when sound waves from it enter the ear. (6-8) 4F/E3 Light travels and tends to maintain its direction of motion until it interacts with an object or material. Light can be absorbed, redirected, bounced back, or allowed to pass through.	4-PS3-2 Sound Moves ● Explain how sound is produced. ● State that sound travels from one place to another, and cite practical observations as evidence. Heat Moves ● Use their measurements and observations to explain how heat moves. ● Identify how heat moves from one object to another in familiar, real-life contexts. Switch the Light On! ● Describe how light energy travels from one place to another. ● Describe how to build a circuit that changes electrical energy into light energy.
					4-PS4-2 Develop a model to describe that light reflecting from objects and entering the eyes allows objects to be seen.		4-PS4-2 Eye, Eye! ● State that light travels in straight lines called rays. ● Explain that we see objects when light rays reflect off them and into our eyes. ● Describe how mirrors change the path of light and help us to see things we cannot look at directly.
					4-PS4-3 Generate and compare multiple solutions that use patterns to transfer information.		4-PS4-3 Sending Information ● Use a code to send and receive messages. ● Compare the effectiveness of different methods for sending and receiving encoded messages. ● Appreciate how today’s technology is far more effective and efficient at sending and receiving information than what was used a hundred years ago. ● Get the Message ● Send and receive simple messages using a visual form of binary code. ● Understand that binary code is used by modern communication technologies to send and receive information.

Early Learning and Development Standards - Preschool				NGSS Code (s)	Inquisitive Lessons (Learning Targets)
Grade Level	Strand	Standard Statements	Elaboration		
Pre K	Science Inquiry and Application	a. Explores and investigates objects and events in the environment. b. Develops ability to reason about cause and effect.	The foundational skills of exploration, investigation, and reasoning in this domain invite unlimited opportunities for science instruction and experiences to be connected to children's interests and abilities. Examples in this domain illustrate how the indicators can relate to science disciplines including earth, life, and physical sciences.	PK-LS1-1 Use observations to describe the difference between living and nonliving things and recognize that living things grow and change.	PK-LS1-1 Living Things Grow - Identify a living thing. - Describe a living thing as something that grows. Living Things Change - Identify that living things (including humans) change as they grow.
				PK-Physical Science PK-Earth & Space	Coming Soon in 2025 Coming Soon in 2025