SCIENCE (Grade 4) | Curriculum Map

3-5 GRADE BAND THEME: <u>Interconnections within Systems</u> This theme focuses on helping students explore the components of various systems and then investigate dynamic and sustainable relationships within systems using scientific inquiry. **Grade 4 overview:** Heat and electrical energy are forms of energy that can be transferred from one location to another. Matter has properties that allow the transfer of heat and electrical energy. Heating and cooling affect the weathering of Earth's surface and Earth's past environments. The processes that shape Earth's surface and the fossil evidence found can help decode Earth's history.	**SCIENCE INQUIRY & APPLICATIONS: During the years of PreK-4, all students must develop the ability to** → Observe and ask questions about the natural environment. → Plan and conduct simple investigations. → Employ simple equipment and tools to gather data and extend the senses. → Use appropriate mathematics with data to construct reasonable explanations. → Communicate about observations, investigations, and explanations. → Review and ask questions about the observations and explanations of others.

LIFE SCIENCE (LS)

Earth's Living History. This topic focuses on using fossil evidence and living organisms to observe that suitable habitats depend upon a combination of biotic and abiotic factors.

OH Science Standards (2018)	Essential Vocabulary	Student Learning Targets	Suggested Investigations
4.LS.1: <u>Changes in an organism's environment</u> 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. ▪ Ecosystems are based on interrelationships among and between biotic and abiotic factors. These include the diversity of other organisms present, the availability of food and other resources, and the physical attributes of the environment.	abiotic biotic diversity ecosystem interrelationship organism reproduce	▪ **Represent** major biotic and abiotic features and interrelationships of a well-known ecosystem. [L1] ▪ **Describe** an example of a gradual ecosystem change and its effects on plants and animals. [L2] ▪ **Analyze** an example of a dramatic ecosystem change and its effects on plants and animals. [L4]	▪ Nature walks ▪ Research a major geological event (e.g., Mt. St. Helens volcanic eruption), and create a graphic display depicting the environment before and after the event. ▪ *Interactive Science* investigations (Ch.4): - How do earthworms meet their needs in a model of an ecosystem? - How can you estimate how many animals live in an ecosystem?

LIFE SCIENCE (LS)			
Earth's Living History. This topic focuses on using fossil evidence and living organisms to observe that suitable habitats depend upon a combination of biotic and abiotic factors.			
OH Science Standards (2018)	**Essential Vocabulary**	**Student Learning Targets**	**Suggested Investigations**
4.LS.2: <u>Fossils</u> can be compared to one another and to present-day organisms according to their similarities and differences. ▪ The concept of biodiversity is expanded to include different classification schemes based upon shared internal and external characteristics of organisms. ▪ Most species that have lived on Earth are extinct. ▪ Fossils provide a point of comparison between the types of organisms that lived long ago and those existing today.	biodiversity classification extinct fossil species	▪ Define and give examples of biodiversity. [L2] ▪ Use fossil evidence to **compare** and **contrast** organisms that are alive today with those that are extinct. [L3]	▪ Research and write brief reports on extinct animals ▪ Practice being a paleontologist, making observations and recording data in journal ▪ Make fossils ▪ Make connections between extinct and extant animals ▪ Visit Fossil Park in Sylvania, Ohio ▪ View "Sea Monsters" video and use the educator tab for further resources http://www.nationalgeographic.com/seamonsters/index.html

Interactive Science	**Suggested Cross-Curricular Connections for Life Science: Earth's Living History**			
	English Language Arts	**Mathematics**	**Social Studies**	**Other**
<u>Ch. 3: Plants and Animals</u> Lesson 1: How are Plants and Animals Classified? Lesson 2: What are adaptations? Lesson 4: How do animals respond to the environment <u>Ch. 4: Ecosystems</u> Lesson 1: What are ecosystems? Lesson 2: How do living things get energy?	<u>Reading Literary Text (RL) (Historical)</u> 4.RL.1: Details, examples, inferences 4.RL.2: Theme - story, drama, poem; summarize from details, include theme 4.RL.3: Describe character, setting or event (thoughts, words, actions) 4.RL.4: Mythological figurative language 4.RL.5: Differentiate poems, drama, prose and their structural elements 4.RL.6: Explain different points of view and perspectives	<u>Measurement and Data</u> 4.MD.2: Solve real-world problems involving money and time. <u>Number and Operations in Base Ten (NBT)</u> 4.NBT.1-3: Working with large numbers	▪ Order events on a timeline ▪ Primary and secondary sources ▪ Groups who've lived in Ohio over time ▪ 13 colonies and the American Revolution ▪ Northwest Ordinance ▪ Ohio conflicts ▪ Anti-slavery and Underground Railroad	Careers: biologist, ecologist, paleontologist

Interactive Science	Suggested Cross-Curricular Connections for Life Science: Earth's Living History			
	English Language Arts	**Mathematics**	**Social Studies**	**Other**
Lesson 4: How do living things affect the environment? Lesson 5: What are fossils? Lesson 6: What can fossils tell us?	4.RL.7: Connect print to drama, visual, and oral presentations 4.RL.9: Compare and contrast themes, topics, patterns of events in stories, myths, and traditional literature Writing (W)(Historical) 4.W.3: Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences		▪ Technological inventions	

EARTH & SPACE SCIENCE (ESS)			
Earth's Surface. This topic focuses on the variety of processes that shape and reshape Earth's surface.			
Ohio Science Standards (2018)	**Essential Vocabulary**	**Student Learning Targets**	**Suggested Investigations**
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, ground-water and glaciers. ▪ 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.	freshwater groundwater landform	▪ **Identify** important landforms found on the Earth's surface. [L1] ▪ **Categorize** different forms water can be found on Earth. [L2] ▪ **Explain** how catastrophic events change the Earth's surface. [L3] ▪ **Evaluate** the role that humans play in creating catastrophic events that change the Earth's surface. [L4]	▪ Field trip ideas: Metro Parks (Blacklick (swamps), Glacier Ridge, Highbanks, Pickerington Ponds, Slate Run (wetlands) Walnut Wood (wetlands and vernal pools), Ohio Indian Caverns ▪ Ohio History Central: Ice Age, glacier, kame

EARTH & SPACE SCIENCE (ESS)			
Earth's Surface. This topic focuses on the variety of processes that shape and reshape Earth's surface.			
Ohio Science Standards (2018)	**Essential Vocabulary**	**Student Learning Targets**	**Suggested Investigations**
4.ESS.2: The surface of Earth changes due to <u>weathering</u>. ▪ Rocks change shape, size and/or form due to water or glacial movement, freeze and thaw, wind, plant growth, acid rain, pollution and catastrophic events such as earthquakes, flooding, and volcanic activity. **Note:** *Differentiating between chemical and physical weathering is not the focus at this grade level*.	acid rain glacial movement pollution	▪ **Define** and identify examples of weathering. [L1] ▪ **Observe** how plants have changed the Earth's surface over time. [L2] ▪ **Describe** how weathering, pollution, or catastrophic events can change the shape, size, or form of rocks. [L2] ▪ **Contrast** how areas across Ohio and the U.S. have been reshaped through weathering or catastrophic events. [L3] ▪ **Investigate** how humans have contributed to pollution that changes the Earth's surface. [L4]	▪ Observe road surfaces before and after winter freezing and thawing. ▪ Mapping landforms: https://www.nationalgeographic.org/activity/mapping-landforms/
4.ESS.3: The surface of Earth changes due to <u>erosion and deposition</u>. ▪ Liquid water, wind and ice physically remove and carry rock, soil and sediment (erosion) and deposit the material in a new location (deposition). ▪ Gravitational force affects movements of water, rock and soil.	deposition erosion sediment	▪ **Observe** how gravity affects the movements of water, rock, and soil. [L1] ▪ **Explain** how erosion and deposition work to change the Earth's surface. [L3] ▪ **Explore** how human activity contributes to erosion of the Earth's surface. [L4]	▪ Erosion and deposition demonstrations: stream tables; melt glacier ice blocks on sand hills ▪ *Interactive Science* investigation (Ch.5): - How does the steepness of a stream affect its speed?

Interactive Science	**Suggested Cross-Curricular Connections for Earth and Space Science: Earth's Surface**			
	English Language Arts	**Mathematics**	**Social Studies**	**Other**
<u>Ch. 5: Earth's Resources</u> Lesson 3: What are weathering and erosion?	<u>Reading Informational Text (RI)</u> 4.RI.1: Identify details and examples	<u>Measurement and Data (MD)</u> 4.MD.1: Metric units 4.MD.2: Real-world problems involving metric measurements	<u>Geography (G)</u> 4.G.9: Map scale, cardinal and intermediate directions	<u>Careers</u>: meteorologist, environmental scientist, volcanologist

Interactive Science	Suggested Cross-Curricular Connections for Earth and Space Science: Earth's Surface			
	English Language Arts	**Mathematics**	**Social Studies**	**Other**
Lesson 4: How can Earth's surface change rapidly? Lesson 5: Where is Earth's water?	4.RI.2: Main idea and key detail support; summarize 4.RI.3: Explain key events, ideas, and concepts in scientific text 4.RI.5: Text structures: chronology, comparison, cause-effect, and problem-solution 4.RI.7: Interpret information presented visually <u>Writing (W) Informative Text</u> 4.W.2: Write informative or explanatory texts to examine a topic and convey ideas and information clearly	4.MD.4: Display and interpret information in graphs	4.G.10: Resources and economic development in Ohio and U.S. 4.G.11: Physical environments and U.S. regional development in the 1800s 4.G.12: Human modification of the environment; positive and negative consequences 4.G.13: Ohio's location and transportation influences movement of people, products, and ideas	

PHYSICAL SCIENCE (PS)			
Electricity, Heat and Matter. This topic focuses on the conservation of matter and the processes of energy transfer and transformation, especially as they apply to heat and electrical energy.			
OH Science Standards (2018)	**Essential Vocabulary**	**Student Learning Targets**	**Suggested Investigations**
4.PS.1: When objects break into smaller pieces, dissolve, or change state, the total amount of <u>matter is conserved</u>. ▪ 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:** *Differentiation between mass and weight is not necessary at this grade level.*	change of state conservation of matter constant dissolve matter (solid, liquid, gas)	▪ **Demonstrate** how to change matter but not destroy it. [L1] ▪ **Design** a simple investigation to support the claim that the amount of matter stays constant during any change. [L4]	▪ Investigate what happens to the total amount of mass of an object during many types of changes (e.g., ice melting, salt dissolving, paper tearing, etc.)

PHYSICAL SCIENCE (PS)			
Electricity, Heat and Matter. This topic focuses on the conservation of matter and the processes of energy transfer and transformation, especially as they apply to heat and electrical energy.			
OH Science Standards (2018)	**Essential Vocabulary**	**Student Learning Targets**	**Suggested Investigations**
4.PS.2: <u>Energy can be transferred</u> from one location to another <u>or can be transformed</u> from one form 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 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 are closely related.	conductor electrical circuit electricity energy transfer insulator magnetism switch	▪ **Predict** how heat energy will transfer between objects of different temperatures. [L2] ▪ **Describe** the purpose of insulators within an electrical circuit. [L2] ▪ **Differentiate** between working and non-working circuits and suggest ways to fix a non-working circuit. [L3] ▪ **Plan** simple investigations that will identify good conductors of electricity. [L3] ▪ **Explain** how electricity and magnetism are closely related. [L3] ▪ **Design** a simple electrical circuit that transforms electricity into another form of energy. [L4]	▪ Make a solar cooker ▪ *Interactive Science* investigation (Ch.7): - Which material is the better heat conductor? ▪ *Interactive Science* investigations (Ch.8): - What can electricity flow through? - What is an electromagnet? - What is the best way to slow the rate at which ice melts? ▪ Create simple electrical circuits using Snap Pro Circuit kits, and draw a diagram to represent the circuit ▪ Using the Snap Pro Kits, plan and conduct simple investigations that will determine the conductivity of common household items (e.g., key, string, plastic fork, etc.) ▪ Engineering is Elementary: "Design an Alarm Circuit"

Interactive Science	**Suggested Cross-Curricular Connections for Physical Science: Electricity, Heat and Matter**			
	English Language Arts	**Mathematics**	**Social Studies**	**Other**
<u>Ch. 6: Matter</u> Lesson 2: How is matter measured? Lesson 3: What are phases of matter? <u>Ch. 7: Energy and Heat</u> Lesson 1: What are forms of energy? Lesson 2: What are phases of matter?	<u>Reading Informational Text (RI)</u> 4.RI.3: Explain procedures or concepts in a scientific or technical text 4.RI.4: General academic and domain-specific vocabulary	<u>Measurement and Data (MD)</u> 4.MD.1: Metric measurement units 4.MD.4: Display and interpret data in graphs	<u>Economics (E)</u> 4.E.20: Organizing data in tables and charts 4.E.21: Ohio and U.S. entrepreneurs and productive resources 4.E.22: Individuals' financial well-being	<u>Careers</u>: biologist, ecologist, paleontologist, electrician, electrical engineer, materials scientist

Interactive Science	Suggested Cross-Curricular Connections for Physical Science: Electricity, Heat and Matter			
	English Language Arts	**Mathematics**	**Social Studies**	**Other**
Ch. 8: Electricity and Magnetism Lesson 1: How do electric charges flow in a circuit? Lesson 2: How does electricity transfer energy? Lesson 3: What is magnetism? Lesson 4: How are electricity and magnetism transformed?	4.RI.6: Compare and contrast first and second-hand accounts 4.RI.5: Text structures: sequence, cause and effect 4.RI.7: Interpret visual and quantitative information	Operations and Algebraic (OA) Thinking 4.OA.3: Word problems		

District Instructional Resources:

Interactive Science (2012) / Pearson – six-year adoption (2019-2020 to 2024-2025) that includes resources:

- Paper/write-in student edition
- Digital texts (online student edition, videos, virtual labs, simulations, animations, vocabulary match, assessments)
- Inquiry (activity cards, materials equipment kit)
- STEM activity book

Standards Alignment:

Ohio Learning Standards (2018) – retrieved Feb. 11, 2019 from
http://education.ohio.gov/getattachment/Topics/Learning-in-Ohio/Science/Ohios-Learning-Standards-and-MC/SciFinalStandards121018.pdf.aspx?lang=en-US

Levels of Complexity / Performance Verbs:

Level I - Recall	Level 2 - Skill/Concept	Level 3 - Strategic Thinking	Level 4 - Extended Thinking
▪ Arrange	▪ Categorize	▪ Apply	▪ Analyze
▪ Choose	▪ Collect	▪ Classify	▪ Assess
▪ Define	▪ Describe	▪ Compare	▪ Conduct
▪ Draw	▪ Document	▪ Communicate	▪ Connect

Level I - Recall	Level 2 - Skill/Concept	Level 3 - Strategic Thinking	Level 4 - Extended Thinking
▪ Label ▪ List ▪ Name ▪ Recognize ▪ Tell	▪ Estimate ▪ Illustrate ▪ Measure ▪ Observe ▪ Organize ▪ Predict ▪ Record ▪ Represent ▪ Use	▪ Contrast ▪ Demonstrate ▪ Determine ▪ Develop ▪ Explain ▪ Identify ▪ Investigate ▪ Plan ▪ Relate ▪ Support	▪ Create ▪ Design ▪ Evaluate ▪ Explore ▪ Infer