SCIENCE (Grade 5) | 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 5 overview:** Cycles on Earth, such as those occurring in ecosystems, in the solar system, and in the movement of light and sound result in describable patterns. Speed is a measurement of movement. Change in speed is related to force and mass. The transfer of energy drives changes in systems, including ecosystems and physical systems.	**SCIENCE INQUIRY & APPLICATIONS: During grade 5, all students must continue to develop the ability to** → Identify questions that can be answered through scientific investigations. → Design and conduct a scientific investigation. → Use appropriate mathematics, tools and techniques to gather data and information. → Analyze and interpret data. → Develop descriptions, models, explanations and predictions. → Think critically and logically to connect evidence and explanations. → Recognize and analyze alternative explanations and predictions. → Communicate scientific procedures and explanations.

EARTH & SPACE SCIENCE (ESS)

Cycles and Patterns in the Solar System. This topic focuses on the characteristics, cycles and patterns in the solar system and within the universe.

Ohio Science Standards (2018)	Essential Vocabulary	Student Learning Targets	Suggested Investigations
5.ESS.1: The <u>solar system</u> 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.	asteroid celestial body comet composition elliptical meteoroid orbit solar system	▪ **Represent** and **label** key elements of the solar system. [L1] ▪ **Identify** and **describe** different types of orbits in the solar system. [L2] ▪ **Compare** and **contrast** the location, size, composition, and movement of each planet in our solar system. [L3] ▪ **Compare** and **contrast** the difference between planets, moons, asteroids, comets, and meteoroids. [L3]	▪ Visit COSI Planetarium ▪ Create a disaster movie poster about what would happen IF…the world stopped orbiting? Spinning? The Earth's axis went to 0®/45®? ▪ Write a persuasive piece to classify/de-classify Pluto as a planet. ▪ Design a model to illustrate planetary distances. ▪ *Interactive Science* investigations: - How can spinning affect a planet's shape? - How does the speed of a meteorite affect a planet's shape?

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5.ESS.2: <u>The sun</u> 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.	star sun universe	▪ **Describe** the sun in relation to the Earth and in relation to other stars. [L2] ▪ **Determine** why stars appear to be different sizes. [L4]	▪ Write legends/myths (modeled on traditional literature) about the creation of planets/stars/sun/universe.
5.ESS.3: Most of the <u>cycles and patterns of motion</u> 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. **Note:** *Moon phases should not be the focus.*	axis eclipse equator hemisphere revolution rotation tilt	▪ **Explain** why Earth experiences night and day and a year. [L2] ▪ **Demonstrate** how the moon appears to change when it orbits the earth. [L3] ▪ **Predict** how Earth's rotations will affect views of the sun, moon, and stars. [L3]	▪ Design a model to demonstrate how Earth experiences night and day or the seasons. ▪ Design a model to demonstrate how light impacts seasons on a tilted planet. ▪ Create a three-dimensional model for how the moon's reflective light changes as it orbits the earth. ▪ Design a model to illustrate two or more planets' tilt. ▪ *Interactive Science* investigation: - What does a spiral galaxy look like from different angles?

Interactive Science	Suggested Cross-Curricular Connections for Earth and Space Science: Cycles and Patterns in the Solar System			
	English Language Arts	**Mathematics**	**Social Studies**	**Other**
Ch. 4: Earth and Space Lesson 1: How does Earth move? Lesson 2: What is a star? Lesson 3: What are the inner planets? Lesson 4: What are the outer planets? Lesson 5: What are asteroids, meteors, comets, and moons?	Reading Literary Text (RL) 5.RL.1: Quote accurately; explicit/inference 5.RL.2: Literary text development 5.RL.3: Compare and contrast characters, setting, events 5.RL.4: Vocabulary; figurative language 5.RL.5: Overall text structure 5.RL.6: Point of view and perspective influences event description 5.RL.7: Visual and multimedia contributes to text appeal 5.RL.8: Compare and contrast stories in the same genre Writing (W) 5.W.3: Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences	Number and Operations in Base Ten (NBT) 5.NBT.2: Powers of 10 5.NBT.4: Round decimals	History Strand 5.H.1: Date historical events 5.H.2: Early Indian civilizations, governments, social structures, religions, technology, agriculture: Maya, Inca, Aztec, Mississippian 3. European exploration and colonization: 14-1600s Geography (Spatial Skills, Human Systems) 5.G.4: Geographical tools 5G.5: Latitude and longitude 5.G.8: Unique cultures of American Indians	Careers: author/poet, Historian, archaeologist, astronomer, geographer Technology

PHYSICAL SCIENCE (PS)			
Light, Sound and Motion. This topic focuses on the forces that affect motion. This includes the relationship between the change in speed of an object, the amount of force applied and the mass of the object. Light and sound are explored as forms of energy that move in predictable ways, depending on the matter through which they move.			
OH Science Standards (2018)	**Essential Vocabulary**	**Student Learning Targets**	**Suggested Investigations**
5.PS.1: The <u>amount of change in movement of an object</u> 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). ▪ 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**: *Differentiating between mass and weight is not necessary at this grade level.*	momentum gravity	▪ **Calculate** speed by measuring distance and time. [L2] ▪ **Demonstrate** how force affects speed and direction. [L3] ▪ **Design** an experiment to show how mass and the amount of force affects speed and direction. [L4] ▪ **Justify** why speed, distance, and time are related. [L4]	▪ STEM Project: Recycle Car Derby. Design and build a car from recycled materials and wooden axles. Use gravity and a ramp; assess distance. Evaluate and re-design. ▪ STEM Project: Egg Drop. Create a package that will protect an egg when dropped from two to three stories. Students improve their design after test drops. ▪ Critique another students' design using a rubric – present questions for thought and suggestions for improvement. (This can be completed for any/all culminating engagements.) ▪ *Interactive Science* investigations: - How can you make a paper helicopter drop slowly? - What forces affect the motion of a rocket? - How is motion affected by mass?
5.PS.2: <u>Light and sound</u> 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.	medium reflect refract absorb vibrate rate pitch	▪ **Describe** how light travels constantly through a single medium. [L2] ▪ **Prove** how light is reflected, refracted, and absorbed through various mediums. [L4] ▪ **Demonstrate** how sound is produced by vibrating objects. [L2] ▪ **Determine** how pitch is affected by the rate of vibration. [L4]	▪ Create a story board or graphic novel to show light's journey to Earth. ▪ STEM project: Invent an instrument that reflects sound, absorbs sound, and changes pitch. Create a band with a combination of instruments that must demonstrate three different types of vibration. ▪ Compare and contrast the properties of light and sound.

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OH Science Standards (2018)	**Essential Vocabulary**	**Student Learning Targets**	**Suggested Investigations**
▪ 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 the middle school level.*			

Interactive Science	**Suggested Cross-Curricular Connections for Physical Science: Light, Sound and Motion**			
	English Language Arts	**Mathematics**	**Social Studies**	**Other**
Ch. 5: Forces and Motion Lesson 1: What are forces? Ch. 6: Changing Forms of Energy Lesson 1: What is energy? Lesson 2: What is sound energy? Lesson 3: What is light energy?	Reading Informational Text (RI) - Quote accurately: explicit/inference - Determine main idea and key details - Summarize - Relationships between individuals, events, ideas, concepts in historical, science, technical text - Academic or domain-specific text - Compare-contrast text structures: chronological, comparison, cause-effect, problem-solution - Integrate information from several texts	Measurement and Data (MD) 5.MD.1: Measurement units and conversion 5.MD.2: Display and interpret data in graphs	Economics (E) 5.E.13: Data displayed in graphs communicates information 5.E.16: Productive resources and division of labor and effects on productive capacity 5.E.17: Interdependency of regions and countries 5.E.18: Workers can improve their ability to earn incomes	Careers: musician, audio/sound engineer, physicist, materials engineer, rocket scientist Technology

Interactive Science	Suggested Cross-Curricular Connections for Physical Science: Light, Sound and Motion			
	English Language Arts	**Mathematics**	**Social Studies**	**Other**
	Writing (W) 5.W.2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly			

LIFE SCIENCE (LS)			
Interconnections within Ecosystems. This topic focuses on foundational knowledge of the structures and functions of ecosystems.			
OH Science Standards (2018)	**Essential Vocabulary**	**Student Learning Targets**	**Suggested Investigations**
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.	acquire consumer decomposer ecosystem food web population producer	▪ **Recognize** the differences between a producer, consumer, or decomposer. [L1] ▪ **Categorize** organisms according to how they acquire energy. [L2] ▪ **Investigate** a real ecosystem food web, demonstrating the place of producers, consumers, and decomposers. [L3]	▪ Partners in Conservation Service-Learning Project: students raise money and learn how conservation helps increase the population of endangered species (e.g., mountain gorillas) ▪ Feature article: focus on one animal and its interrelationships within an ecosystem
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 is used or stored by the producer and can be passed from organism to organism as illustrated in food webs.	energy source photosynthesis transfer transform	▪ **Identify** sunlight as the main source of energy in ecosystems. [L1] ▪ **Explain** the process of photosynthesis. [L2] ▪ **Trace** and **explain** the path of energy through a food web. [L3]	▪ Garden Plot: students will prepare, plant and care for a garden plot or terrarium ▪ *Interactive Science* investigations: - What heats up air? - How can salt affect the hatching of brine shrimp eggs?

Interactive Science	Suggested Cross-Curricular Connections for Life Science: Interconnections within Ecosystems			
	English Language Arts	**Mathematics**	**Social Studies**	**Other**
Ch. 3: Ecosystems Lesson 1: What are the parts of an ecosystem? Lesson 2: How do organisms interact in ecosystems? Lesson 3: How do ecosystems change? Lesson 4: How do humans impact ecosystems?	Reading Literary (RL)and Informational (RI) Texts 5.RI.6: Analyze multiple accounts of the same event or topic; compare perspectives 5.RI.7: Use multiple print/digital sources 5.RI.8: Explain how author sues evidence to support points Writing Opinion (W.5.1) Write opinion pieces on topics or texts, supporting a point of view with reasons and information. Speaking and Listening Skills Presentation	Number and Operations in Base Ten (NBT) 5.NBT.1-3: Working with large numbers and decimals 5.NBT.7: Solve real-world decimal problems Geometry 5.G.1: Coordinate planes 5.G.2: Real-world problems	Geography (G) 5.G.6: Regional data: landforms, climate, population, cultural and economic characteristics 5.G.7: Physical environments influence human activities; humans modify environments Economics (E) 5.E.14: Choices have present and future consequences 5.E.15: Productive resources lead to specialization and trade	Careers: biologist, Ecologist, conservationist, nutritionist Technology

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 – 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 ▪ Choose ▪ Define ▪ Draw ▪ Label ▪ List ▪ Name ▪ Recognize ▪ Tell	▪ Categorize ▪ Collect ▪ Describe ▪ Document ▪ Estimate ▪ Illustrate ▪ Measure ▪ Observe ▪ Organize ▪ Predict ▪ Record ▪ Represent ▪ Use	▪ Apply ▪ Classify ▪ Compare ▪ Communicate ▪ Contrast ▪ Demonstrate ▪ Determine ▪ Develop ▪ Explain ▪ Identify ▪ Investigate ▪ Plan ▪ Relate ▪ Support	▪ Analyze ▪ Assess ▪ Conduct ▪ Connect ▪ Create ▪ Design ▪ Evaluate ▪ Explore ▪ Infer