NOBLESVILLE SCHOOLS CURRICULUM

Science

6th Grade Units of Study

The Indiana Academic Standards for Grades K-12 Science are based on A Framework for K-12 Science Education (NRC, 2012) and Next Generation Science Standards (NGSS Lead States, 2013). The following conceptual shifts reflect what is new about these science standards. The K-12 Science Indiana Academic Standards:

Reflect science as it is practiced and experienced in the real world;
Build logically from kindergarten through grade 12;
Focus on deeper understanding as well as application of content; and
Integrate practices, crosscutting concepts, and core ideas.
(Indiana Dept of Education)

These shifts in the K-12 Science Indiana Academic Standards means students are not just learning science facts—they are learning to think, talk, and act like scientists.

What Science Looks Like in Middle School

In Noblesville, students in grades 6-8 use high-quality, hands-on units from OpenSciEd, a nationally recognized science program designed to actively engage students in the process of doing science. Our units are centered around big, real-world questions that spark curiosity. In each unit, students investigate real phenomena, collect and analyze data, and use models to explain their ideas. Instruction is active, collaborative, and grounded in evidence-based thinking.

Why the Units Are Taught in This Order

While the Indiana standards provide a clear list of science concepts to be mastered by 8th grade,, they do not prescribe the exact order in which topics must be taught. In Noblesville, we intentionally follow the instructional sequence developed by OpenSciEd, with some careful rearranging in order to maintain each grade level's standards as much as possible. This sequence is based on how students best build their understanding over time. For example, by learning about light and matter first, students develop key ideas about how we see and interpret the world around us. These ideas lay the foundation for later units on energy and waves. Similarly, placing Earth in Space before ecosystems helps students make sense of seasonal patterns and Earth systems before applying those ideas to living things and the environment. *This progression helps students make deeper connections between concepts and supports stronger long-term understanding.*

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Unit Description	**Indiana 2023 Academic Standards** *Note: Standards with gray shading and an "E" are identified by the Indiana Department of Education as essential for mastery by the end of the grade level.*
Unit 1: Light and Matter **Essential Question:** *Why do we sometimes see different things when looking at the same object?* In this unit, students explore how light interacts with materials and why people sometimes see the same object differently, building understanding of how we see. *This introductory unit also guides students through the classroom routines they will continue all year: Using a Driving Question Board to practice asking strong scientific questions, discussing concepts in a scientist circle, and drawing models to explain a scientific phenomenon.*	PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials (E) LS1-8 Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.
Unit 2: Thermal Energy **Essential Question:** *How can containers keep things from warming up or cooling down?* In this unit, students investigate how heat moves and how we can design containers to keep things warm or cool.	PS3-3 Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. (E) PS1-4 Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. (E) PS3-4 Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass and the change in the average kinetic energy of the particles as measured by the temperature of the sample. PS3-5 Construct, use, and present arguments to support the claim that when the motion energy of an object changes, energy is transferred to or from the object. ETS1-4:Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

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Unit 3: Sound Waves **Essential Question:** *How can a sound make something move?* In this unit, students learn how sound travels and how vibrations can cause movement, even at a distance.	PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. (E) PS4-1 Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
Unit 4: Earth in Space **Essential Question:** *How are we connected to the patterns we see in the sky and space?* In this unit, students study patterns in the sky—like day and night, seasons, and moon phases—and connect them to Earth’s place in space.	ESS1-1 Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. (E) PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials (E) ESS1-2 Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. ESS1-3 Analyze and interpret data to determine scale properties of objects in the solar system. PS2-4 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

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Unit 5: Ecosystem Dynamics and Biodiversity **Essential Question:** *How does changing an ecosystem affect what lives there?* In this unit, students explore how changes in an environment affect the plants and animals that live there, using data to explain patterns in ecosystems.	LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. (E) LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services. ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.