

Indiana High-Quality Curricular Materials for K-5 Science

The Indiana Dept. of Education (IDOE) has created an Indiana High-Quality Curricular Materials Advisory List for K-5 Science, and PLTW is proud to have been selected to that list. Here are the descriptions of the PLTW Launch modules that help you meet the state's science standards.



PLTW Modules That Meet K-5 Science/Engineering Standards for IDOE High-Quality Curricular Materials

PreK	K	1st	2nd	3rd	4th	5th
Healthy Habits	Structure and Function: Human Body	Animals and Algorithms	Animal Adaptations	Variation of Traits	Energy Exploration	Infection Detection
Life Science: Living and Nonliving Things	Pushes and Pulls	Animated Storytelling	Living Things: Diversity of Life	Programming Patterns	Input/Output: Human Brain	Robotics and Automation
Spatial Sense and Coding	Sunlight and Weather	Light and Sound	Grids and Games	Stability and Motion: Forces and Interactions	Input/Output: Computer Systems	Matter: Properties and Reactions
Floating and Sinking	Living Things: Exploring Design	Designs Inspired by Nature	Materials Science: Properties of Matter	Environmental Changes	Earth: Human Impact and Natural Disasters	Earth's Water and Interconnected Systems
	Structure and Function: Exploring Design	Light: Observing the Sun, Moon, and Stars	The Changing Earth	Life Cycles and Survival	Earth: Past, Present, and Future	Ecosystems: Flow of Matter and Energy
		Materials Science: Form and Function	Stability and Motion: Science of Flight	Weather: Factors and Hazards	Organisms: Structure and Function	Infection: Modeling and Simulation
			Waves and Properties of Light		Robotics and Automation: Challenge	

Modules Supporting 2023 Indiana Academic Standards

GRADE**K**

Pushes and Pulls

Students investigate pushes and pulls on the motion of an object and develop knowledge and skills related to forces of differing strengths and directions. Their explorations include pushes and pulls found in their everyday world, such as pushing a friend on a swing or pulling a wagon. In this module's design problem, Suzi needs to move rocks from her yard so she can install a swing set. Students work through the problem by applying what they learn about forces.

Sunlight and Weather

Students learn about the Sun's warming effect on Earth. They investigate how the Sun affects different Earth materials, which leads to how the Sun affects our weather. Students learn how to describe the weather to make observations and collect data. They use this data to describe patterns over time, which helps predict the weather. They view a local weather forecast to understand how the weather impacts their daily lives. Students practice how to dress for the day by dressing Angelina, Mylo, or Suzi based on a forecast. Then, they use the design process to design a structure that can reduce the Sun's warming effect.

Living Things: Needs and Impacts

Students investigate the needs of living things. During an outdoor walk, students look for plants and animals and consider how their needs are met in their natural environment. Then, they explore how living things impact the natural environment. They participate in a simulation to observe how an animal impacts the natural environment to meet its needs. Students then explore human needs and wants and how humans impact the natural environment, both positively and negatively. In an exercise to reduce waste, students use the design process to build a new game or toy out of reusable materials.

GRADE**1**

Light and Sound

Students investigate the properties of light and sound, including vibration from sound waves and the effect of different materials on the path of a beam of light. After students develop an understanding of light and sound, they are challenged to solve a design problem Mylo, Suzi, and Angelina face. In the story, the characters are lost and must use only the materials in their backpack to communicate over a distance by using light and/or sound. Students use the design process to sketch, build, test, and reflect on a device that solves this design problem.

Designs Inspired by Nature

Students investigate how offspring are like their parents. They model animals' patterns of behavior which help them survive. They learn how plants and animals have external parts that help them meet their needs. With this understanding, students follow the design process to build a model of an outdoor shelter that is inspired by plant and animal external parts.

GRADE

1

Light: Observing the Sun, Moon, and Stars

After observing the sun, moon, and stars, students identify and describe patterns in their recorded data. Angelina, Mylo, and Suzi introduce the design problem, which challenges students to create a playground structure designed to protect students from ultraviolet radiation. Students utilize their knowledge of light to design, build, and test structures created to solve this problem. Students then evaluate their designs, share their findings, and explore ideas to improve their structures based on the testing data.

GRADE

2

Living Things: Diversity of Life

Students learn about the diversity of life in habitats, or biodiversity. They observe different habitats and the living things that grow in them. They engage in three scenarios to learn the importance of having many different organisms in a habitat. Next, students investigate how much water and sunlight plants need to grow in an environment. They use the design process to design a planter garden to grow in a specific environment.

Materials Science: Properties of Matter

In this module, students investigate and classify different kinds of materials by their observable properties, including color and texture, and heat conduction. Students learn about states of matter and properties of materials. They investigate which materials are good insulators and which are good conductors. After building their knowledge and skills throughout the module, students determine the best materials to use as they design a prototype to keep an ice pop frozen for at least 30 minutes.

The Changing Earth

Students explore how the surface of the Earth is always changing. They are introduced to different types of maps and explore how these maps convey different information about the world in which we live, including where water is found on Earth. Angelina, Mylo, and Suzi introduce the design problem when faced with the challenge of helping a community threatened by a potential landslide. Students investigate the different forces that shape the surface of the Earth and design solutions to limit the impact of erosion on this fictional community, which is located at the bottom of a hill that was recently destabilized by a fire.

Materials Science: Form and Function

Students research the variety of ways animals disperse seeds and pollinate plants. They expand their understanding of properties of matter as they consider the form and function involved in seed dispersal and pollination. Students are introduced to the design problem when Angelina, Mylo, and Suzi are tasked with starting a wildflower garden on an expansive plot outside of their school. To solve the design problem, students apply their knowledge and skills to design, build, test, and reflect on a device that mimics a way in which animals disperse seeds or pollinate plants.

Variation of Traits

A litter of puppies intrigues Angelina, Mylo, and Suzi because the color of some of the puppies is different than their parents. They explore the phenomena that offspring may express different traits than parents as they learn about dominant and recessive alleles. Students investigate inherited traits and multifactorial traits. Students discover that variation of traits may provide advantages among individuals of the same species. Using the design process, students design the offspring of two fictional parent animals that are able to survive in a specific environment. They use data to support the inherited traits passed from the parents to the offspring.

Stability and Motion: Forces and Interactions

Students explore simple machines such as wheel and axles, levers, the inclined plane, and more. They investigate the effects of balanced and unbalanced forces on the motion of an object. Angelina, Mylo, and Suzi go on a field trip to the zoo and are faced with the design problem of how to rescue a trapped tiger. Students then apply their knowledge of forces and devise a way to rescue a heavy zoo animal while keeping it safe throughout the process.

Environmental Changes

Angelina, Mylo, and Suzi take action to stop the effects of pollution on a local wetland habitat. This motivates students to explore different habitats and how they support life. They examine what fossils reveal about how organisms and habitats adapt and change over time. Students learn about environmental changes and simulate the effect they have on living things. Then, they take a deeper look at specific examples of environmental changes in their own habitat. Students use the design process to explore one problem caused by environmental change and develop an action plan to reduce or stop future damage.

Life Cycles and Survival

The low yield of the community garden near Angelina, Mylo, and Suzi's school has them wondering about a cause. Students pick up the challenge by considering one possible factor: the decline of honeybees at the garden. They begin by learning about the similarities and differences of animal life cycles. They explore animals that live in groups and animals that live solitary lives. They learn that honeybees have an important relationship with flowering plants and that both life cycles are connected. Students also investigate the decline of honeybees due to environmental factors. Using the design process, they create a model of a habitat that promotes the survival of bees. Students create a public service announcement that shares their designs as a way to raise awareness about the importance of bees.

Stability and Motion: Science of Flight

In this module, students learn about the forces involved in flight as well as Newton's Laws of Motion. They design, build, and test an experimental model glider to find out how air and other forces affect its flight. Students discover aeronautics alongside Angelina, Mylo, and Suzi and are inspired by the characters' desire to use their skills to help those in need. Students apply the design process to the problem of delivering aid to an area where supplies must be airlifted in and dropped to the ground from an aircraft.

Weather: Factors and Hazards

Angelina, Mylo, and Suzi wonder about a flood threatening to destroy the garden of Suzi's grandmother. They classify data related to three factors that affect weather: precipitation, temperature, and wind. They compare and contrast weather and climate, using the three factors in their descriptions. Students evaluate the role of materials in building structures that can withstand a weather hazard. They design a solution that reduces the impact of a weather-related hazard.

Energy Exploration

Students engage in explorations of energy-related phenomena. They make observations, pose questions, and make connections as they investigate energy transfers. Throughout the module, students explore connections to careers and to the necessity of energy in real-life as they visit multiple business owners through the Main Street interactive experience. To deepen their understanding of energy, students design an investigation to test what happens when marbles collide on a track. Each business owner presents a problem that needs to be solved. Students select a problem and use the design process to apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

Input/Output: Computer Systems

Students become computer scientists as they explore how computing systems process input to produce output. They apply their understanding of computing systems as they compare them to human body systems. Students learn how to use technology while maintaining digital privacy and engaging in positive, safe, and legal behavior. Then, they use the knowledge and skills they have gained as they create programs using a block-based coding language. In the design problem, students participate in a class hackathon to design a game using inputs and outputs for children to play on a digital device.

Earth: Human Impact and Natural Disasters

Students explore the relationship between humans and the environment. They learn how to reduce the impacts of humans on the environment and use the design process to create an upcycled project. Students investigate natural disasters, specifically earthquakes, to determine their frequency, location, and the risk of harm to humans. They design emergency preparedness kits to demonstrate their understanding of the challenges that natural disasters pose. Students follow the design process to generate a plan to reduce the human impact on Earth or to lessen the impact of natural disasters on humans.

Earth: Past, Present and Future

Students explore natural features on Earth. They learn about different landforms and bodies of water. Students take a deeper look at the origins of landforms as they learn about tectonic plates and plate boundaries. They examine how landforms have changed over time due to weathering and erosion. Students investigate how mechanical and chemical weathering impacts the Earth, and they identify examples of weathering in their local area. Students use the design process to create a documentary that explains how one of Earth's landforms has been shaped over time.

Organisms: Structure and Function

Students examine a wide range of organisms, exploring their unique internal and external structures to understand how they support each animal's survival, growth, behavior, and reproduction. Students' view of organism structures becomes more complex as they experience how individual structures combine into larger systems. They make decisions about the types of structures and systems a plant needs to survive. Then they work toward solving the problem raised in the introduction story: How can we create a prosthesis that will help an animal eat or move effectively again? Using the design process, students apply their knowledge to design, build, test, and refine a model prosthesis for an injured animal.

Waves and Properties of Light

Students observe the amplitude and wavelength of waves in a simulation, and describe their patterns. They learn that waves move energy from one place to another, which can cause objects to move. They learn that colors are determined by the wavelengths of light through an investigation using the primary colors of light. Then, students explore how light interacts with different materials that are transparent, translucent, and opaque. They use the design process to design a game that incorporates their knowledge and skills about light, gained throughout the module.

Matter: Properties and Reactions

Students learn about the three states of matter. They investigate mixtures of different materials that lead to new substances and conserve mass. Students design a test that demonstrates that an item has the required mechanical properties.

Earth's Water and Interconnected Systems

Students learn about Earth's systems: the atmosphere, hydrosphere, geosphere, and biosphere. Students examine how these systems interact and examine the role of gravity within each system. They take an in-depth look at how the processes of the water cycle intersect with each of the systems and apply this knowledge to investigate factors that impact the rate of evaporation. Students use the design process to develop a method for producing clean drinking water from samples of contaminated water.

Ecosystems: Flow of Matter and Energy

Students learn about Earth's ecosystems and how energy flows from the Sun to plants, and from plants to animals. Students create a model to describe photosynthesis and explain how energy from the Sun is introduced into an ecosystem. Students use evidence to defend the claim that plants get the materials they need for growth mainly from air and water. Students learn how energy flows through an ecosystem and explore a simulation about how an ecosystem can become unbalanced. Finally, students use the design process to develop an action plan to protect an ecosystem that has become unbalanced due to human activity.

Patterns in the Universe

Students develop an understanding that stars are balls of hot gas. They learn that our Sun is a star at the center of our planetary system. Students learn about predictable patterns on Earth in relation to its place in the solar system. They design an exhibit that educates others about a concept they have learned throughout the module.

We'd love to discuss your specific science needs, your current implementation, and how PLTW can further energize your curriculum.

Visit pltw.org/indiana-high-quality-curriculum-K-8, or contact our Solution Center - **877.335.7589** or solutioncenter@pltw.org - to schedule a conversation.

