



Diocese of Altoona-Johnstown Elementary Curriculum

Science PK-8th Grade

PLEASE NOTE:

The Science Scope and Sequence is set up differently than other subjects. This is because these topics do not necessarily build upon each other. Therefore each subject can be taught over the course of several years. Our teachers will work together with their peers to make sure each topic is visited in every grade and will determine what lessons are appropriate for their students.



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PRE-K – GRADE 2

Physical Science

- Describe objects according to size, shape, color, or properties of matter
- Collect items and sort them according to shape, color, or other attributes
- Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties
- 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
- Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot
- Recognize that matter takes on different shapes depending upon its type
- Compare and contrast different states of matter: solid, liquid, and gas
- Identify simple machines that make work easier

Earth and Space Science

- Use and share observations of local weather conditions to describe patterns over time
- Describe how weather changes depending on the season and the location
- Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment
- Make observations at different times of year to relate the amount of daylight to the time of year
- Describe Earth's landforms
- Explore causes of earthquakes and volcanoes

Life Science

- Identify, classify, and describe the characteristics of living and non-living things
- Use observations to describe patterns of what plants and animals (including humans) need to survive
- Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive
- Describe an animal's life cycle and understand that growth and change occur gradually
- Recognize the importance of rest, exercise, and eating healthy foods
- Label and define the food pyramid and food groups
- Describe the health benefits of a balanced diet
- Identify the source of common foods and classify them by food groups

Scientific Inquiry

- Develop safe practices
- Observe and collect data from an investigation
- Reflect on the evidence gathered during the investigation



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GRADES 3-4

Physical Science

- Demonstrate knowledge of the types and properties of matter
- Describe the effect of heating and cooling on matter
- Sort and classify materials based on properties such as dissolving in water, sinking and floating, conducting heat, and attracting magnets
- Measure the mass of an object
- Understand how objects move
- Explain by observation the specific effects of gravity
- Explain that an object will slow down or speed up depending upon the force of friction
- Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents
- Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion
- Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other
- Define a simple design problem that can be solved by applying scientific ideas about magnets
- Construct a simple circuit and demonstrate how simple electrical circuits can be used to determine which material conduct electricity

Scientific Inquiry

- Develop safe practices in the laboratory
- Observe and collect data from an investigation
- Reflect on the evidence gathered during the investigation

Life Science

- Identify the characteristics and classifications of animals
- Construct an habitat
- Describe how natural phenomena and some human activities may cause changes to habitats and the plants and animals that live there
- Describe how animals, directly or indirectly, depend on plants to provide the food and energy they need in order to grow and survive
- Describe food chains and the flow of energy, including predator and prey in a food chain
- Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction
- Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death
- Provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms

Earth and Space Sciences

- Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season
- Obtain and combine information to describe climates in different regions of the world
- Create a model of the water cycle and make connections with man's role in using this resource responsibly
- Analyze and interpret data from maps to describe patterns of Earth's features
- Identify and explain the causes of erosion
- Demonstrate knowledge of the composition and layers of the earth



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GRADES 5-8 PHYSICAL SCIENCE

Matter

- Identify the physical and chemical properties of matter
- Understand how mixtures differ from pure substances
- Distinguish between physical and chemical changes
- Use International Standard of Units to measure length, mass, volume, and density
- Describe properties of solids, liquids, and gases
- Understand how matter changes from one state to another
- Describe the properties of common elements
- Make observations and measurements to identify materials based on their properties
- Identify, describe, and locate metals, nonmetals, and metalloids and how their reactivity changes across the periodic table
- Define and compare properties of mixtures, pure substances, and compounds
- Conduct an investigation to determine whether the mixing of two or more substances results in new substances

Forces Motion Energy

- Explain the relationships between force, distance and work, and use the relationship ($W = F \times D$) to calculate work done in lifting heavy objects
- Describe how different types of stored (potential) energy can be used to make objects move
- Conduct simple experiments that demonstrate how forces work in pairs (push/pull) to change the motion of an object
- Support an argument that the gravitational force exerted by Earth on objects is directed down
- Explain how electricity is used to produce heat and light in incandescent bulbs and heating elements
- Discuss different forms of energy and describe how they can be converted from one form to another for use by humans. (e.g. thermal, electrical, light, chemical and mechanical)
- Describe the relationship between current and magnetism

Atomic Structure-Chemical

- Describe the general structure of the atom, and explain how the properties of the first 20 elements in the Periodic Table are related to their atomic structures
- Describe how atoms combine to form new substances by transferring electrons (ionic bonding) or sharing electrons (covalent bonding)
- Be able to read and interpret the Periodic Table of Elements
- Understand how the reactivity of elements changes across the Periodic Table
- Interpret the meaning of symbols, abbreviations and numbers on the Periodic Table
- Describe how atoms combine to form new substances by transferring or sharing electrons
- Calculate the average speed of a moving object
- Illustrate motion of objects in graphs of distance over time
- Describe relationship among force, mass, and changes in motion
- Describe the forces acting on an object moving in a circular path
- Demonstrate Newton's Three Laws of Motion
- Use appropriate mathematical formulas

Energy Transformations

- Distinguish between pitch and loudness
- Demonstrate how sound is transmitted, reflected and absorbed by different materials
- Describe the factors that affect the pitch and loudness of sound produced by vibrating objects
- Describe how light is absorbed and/or reflected by different surfaces
- Demonstrate that white light is composed of many colors
- Determine whether a material is opaque, transparent, or translucent based on how light passes through it
- Describe how energy changes between kinetic and potential energy



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GRADES 5-8 LIFE SCIENCE

Cell Structure, Human Body System

- Develop and use a model to describe the function of a cell as a whole and the ways in which parts of cells contribute to the function
- Relate cell structures to the life processes i.e.: Osmosis
- Explain how the structure and function of multicellular organisms (animals) is dependent on the interaction of cells, tissues, organs and organ systems
- Identify the major tissues of the body
- Describe the structures of the human digestive, respiratory and circulatory systems, and explain how they function
- Differentiate between the structure and function of skeletal muscle with cardiac and smooth muscle
- Demonstrate how the muscles, tendons, ligaments and bones interact

Heredity, Reproduction, Evolution and Adaptation

- Describe how genetic information is organized in genes on chromosomes, and explain sex determination in humans
- Explain the similarities and differences in cell division in somatic and germ cells
- Describe the structure, location, and function of chromosomes, genes, and DNA, and how they relate to each other in the living cell
- Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time

Responding to the Environment

- Explain the role of the sensory organs in perceiving stimuli and sending signals to the brain
- Identify the major structures of the human eye, ear, nose, skin, and tongue, and explain their functions
- Explore the nervous system and its connection to the brain by our sense organs

Ecosystems

- Describe the 5 Kingdoms of living things
- Classify living things based on their relationships
- List and describe the earth's major land biomes
- Identify and describe biotic and abiotic parts and ecosystem
- Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem
- Demonstrate how an organism's adaptations help it to survive
- Explain and describe food chains and food webs
- Identify the factors that affect biodiversity
- Identify factors that limit population growth
- Identify the factors that limit the distribution of a species
- Describe different ways that forests can be managed to provide resources

Water Ecosystems and Human Interaction

- Demonstrate how people and other living things use water
- Develop a model of how Earth's water moves through the water cycle
- Create a river system and show how water flows into it
- Explain how ponds and lakes form
- Identify features of wetlands that make them suitable habitats for living things
- Create a model of how glaciers form
- Explain what an aquifer is and how people obtain water from an aquifer
- Describe conditions that can result in a water shortage and list sources of fresh water for the future
- Describe what water pollution is and list sources of fresh water for the future
- Demonstrate how runoff affects ponds and streams
- Analyze how the topography influences the way water moves



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GRADES 5-8 EARTH & SPACE

Energy and the Earth's Systems

- State how the atmosphere is important to all living things
- Describe the characteristics of the atmosphere
- Describe how variations in the amount of the sun's energy hitting the earth's surface affects daily and seasonal weather patterns
- Utilize instruments to predict the weather
- Interpret a local and regional weather map
- Identify main types of precipitation
- Describe the different types of climate regions
- Evaluate the causes and consequences of global warming

Constructive & Destructive Forces that Shape Earth

- Compare and contrast the causes and effects of mechanical and chemical weathering according to the five agents of:
 - wind, - water, - gravity, - glaciers, - waves
- Describe the ocean's structure with constructive and destructive features
- Describe the process of plate tectonics, sea-floor spreading and subduction to produce features in the earth's crust
- Describe the theory of continental drift
- Identify the different types of volcanoes
- List the factors that determine the topography of the earth's surface

The Solar System, Earth and Beyond

- Explain the history of the origins of the solar system
- Explain the effect of gravity on the orbital movement of planets in the solar system
- Explain how the Earth and moon interact
- Describe rotation and the phases of the moon's orbit around the earth
- Illustrate the monthly changes in the appearance of the moon, based on the moon's orbit around the Earth
- Explain how the sun gets its energy and how it affects the earth
- Recognize that the true sizes and distances of objects in the universe often differ from the way they appear to an observer on earth
- Compare and contrast the properties of celestial bodies
- Explain how the regular motion and relative position of the sun, Earth and moon affect the seasons, phases of the moon and eclipses and model actions that cause lunar and solar eclipse
- Conduct and report on an investigation that shows how the Earth's tilt on its axis and position around the sun relates to the intensity of light striking the Earth's surface



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GRADES 5-8 TECHNOLOGY	GRADES 5-8 SCIENTIFIC INQUIRY
<p>Structural Design/Technology in Society</p> <ul style="list-style-type: none">• Demonstrate the need to consider factors such as functions, materials, safety, cost and experience in the design of structures• Conduct an experiment to discover and report on a bridge's ability to support a load based on the interplay of tension and compression forces that result in a net force of zero• Create a model of the advantages and disadvantages in truss, beam and suspension bridge design and visually identify each bridge• Identify the forces acting on a truss, beam, and suspension bridge including compression, tension, and gravity using models, pictures, or diagrams• Use technology to simulate how engineers plan, test, and revise bridge designs given parameters including cost, time, safety, and aesthetics <p>Technology and Science</p> <ul style="list-style-type: none">• Compare and contrast types of telescopes• Demonstrate the capability of telescopes• Compare and contrast the structures of the human eye with those of a camera• Demonstrate the uses of different instruments, such as eye glasses, magnifiers, periscopes and telescopes to enhance our vision <p>Tech Improvement Food Production/Preservation</p> <ul style="list-style-type: none">• Identify the history of food preservation, types of pathogenic microbes and conditions of microbial growth• Create models of the process of freezing, dehydrating, irradiation, pickling foods and other means of preservation• Identify the three dominant microbes that spoil food	<p>Scientific Inquiry</p> <ul style="list-style-type: none">• Develop safe practices in the laboratory• Observe and collect data from an investigation• Reflect on the evidence gathered during the investigation



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All standards are derived from the following public resources:

- ❖ [Pennsylvania State Board of Education-Academic Standards for Science and Technology](#)
 - ❖ [2014/2016 Pennsylvania Learning Standards for Early Childhood](#)
 - ❖ [Next Gen Science Standards](#)
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