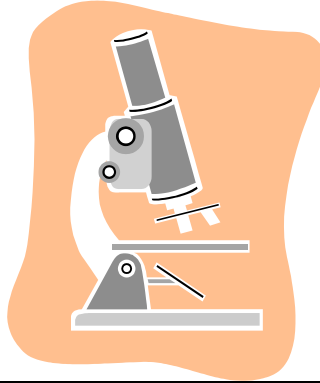


DuBois Area School District
Pennsylvania Academic Standards for Science Instruction
Grade Four



The fourth grade learning proficiencies for science are based on the Pennsylvania Science and Technology and Environment and Ecology Standards

SCIENCE AND TECHNOLOGY

Unifying Themes of Science

- know that natural and human-made objects are made up of parts. (3.1.4.A)
- know models as useful simplifications of objects or processes. (3.1.4.B.)
- illustrate patterns that regularly occur and reoccur in nature. (3.1.4.C)
- know that scale is an important attribute of natural and human made objects, events and phenomena. (3.1.4.D)
- recognize change in natural and physical systems. (3.1.4.E)

Inquiry and Design

- identify and use the nature of scientific and technological knowledge. (3.2.4.A)
- describe objects in the world using the five senses. (3.2.4.B)
- recognize and use the elements of scientific inquiry to solve problems. (3.2.4.C)
- know and use the technological design process to solve problems. (3.2.4.D.)

Biological Sciences

- know the similarities and differences of living things. (3.3.4.A)
- know that living things are made up of parts that have specific functions. (3.3.4.B)

Physical Science, Chemistry and Physics

- recognize basic concepts about the structure and properties of matter. (3.4.4.A)
- know basic energy types, sources and conversions. (3.4.4.B)
- observe and describe different types of force and motion. (3.4.4.C)
- describe the composition and structure of the universe and the earth's place in it. (3.4.4.D)

Technology Education

- know that biotechnologies relate to propagating, growing, maintaining, adapting, treating and converting. (3.6.4.A)
- know that information technologies involve encoding, transmitting, receiving, storing, retrieving and decoding. (3.6.4.B)
- know physical technologies of structural design, analysis and engineering, finance, production, marketing, research and design. (3.6.4.C)

Technological Devices

- explore the use of basic tools, simple materials and techniques to safely solve problems. (3.7.4.A)
- select appropriate instruments to study materials. (3.7.4.B)
- identify basic computer operations and concepts. (3.7.4.C).
- use basic computer software. (3.7.4.D)
- identify basic computer communications systems. (3.7.4.E)

Science, Technology and Human Endeavors

- know that people select, create and use science and technology and is limited by social and physical restraints. (3.8.4.A)
- know how human ingenuity and technological resources satisfy specific human needs and improve the quality of life. (3.8.4.B)
- know the pros and cons of possible solutions to scientific and technological problems in society. (3.8.4.C)

ENVIRONMENT AND ECOLOGY

Renewable and Nonrenewable Resources

- identify needs of people. (4.2.4.A)
- identify products derived from natural resources. (4.2.4.B)
- know that some natural resources have limited life spans. (4.2.4C)
- identify the by-products and their use of natural resources. (4.2.4.D)

Environmental Health

- know that plants, animals and humans are dependent on air and water. (4.3.4.A)
- identify how human actions affect environmental health. (4.3.4. B)
- understand that the elements of natural systems are interdependent. (4.3.4.C)

Agriculture and Society

- know the importance of agriculture to humans. (4.4.4. A)
- identify the role of the sciences in Pennsylvania agriculture. (4.4.4. B)
- know that food and fiber originate from plants and animals. (4.4.4. C)
- identify technology and energy use associated with agriculture. (4.4.4. D)

Integrated Pest Management

- know types of pests. (link to reading) (4.5.4. A)
- explain pest control. (link to reading) (4.5.4. B)
- understand society's need for integrated pest management. (link to reading.) (4.5.4. C)

Ecosystems and Their Interactions

- ♦ understand that living things are dependent on nonliving things in the environment for survival. (4.6.4. A)
- ♦ understand the concept of cycles. (4.6.4. B)

Threatened, Endangered and Extinct Species

- ♦ identify differences in living things. (4.7.4. A)
- ♦ know that adaptations are important for survival. (4.7.4. B)
- ♦ define and understand extinction. (4.7.4. C)

Humans and the Environment

- ◆ identify the biological requirements of humans. (4.8.4. A)
- ◆ know that environmental conditions influence where and how people live. (4.8.4. B)
- ◆ explain how human activities may change the environment. (4.8.4. C)
- ◆ know the importance of natural resources in daily life. (4.8.4. D)

Environmental Laws and Regulations

- ◆ know that there are laws and regulations for the environment. (link to reading)

Course Content

Unifying Themes of Science

- ⇒ Identify and describe what parts make up a system.
- ⇒ Identify system parts that are natural and human-made (e.g., ball point pen, simple electrical circuits, plant anatomy, volcanoes, and simple machines).
- ⇒ Describe the purpose of analyzing systems.
- ⇒ Know that technologies include physical technology systems (e.g., construction, manufacturing, and transportation), informational systems and biochemical-related systems.
- ⇒ Identify different types of models.
- ⇒ Identify and apply models as tools for prediction and insight.
- ⇒ Apply appropriate simple modeling tools and techniques.
- ⇒ Identify theories that serve as models. (e.g., molecules).
- ⇒ Use knowledge of natural patterns to predict next occurrences (e.g., seasons, leaf patterns, lunar phases).
- ⇒ Identify the use of scale as it relates to the measurement of distance, volume and mass.
- ⇒ Describe scale as a ratio (e.g., map scales).
- ⇒ Explain the importance of scale in producing models and apply it to a model.
- ⇒ Recognize change as fundamental to science and technology concepts.
- ⇒ Examine and explain change by using time and measurement.
- ⇒ Describe relative motion.
- ⇒ Describe the change to objects caused by heat, cold, light or chemicals.

Inquiry and Design

- ⇒ Distinguish between a scientific fact and a belief.
- ⇒ Provide clear explanations that account for observations and results.
- ⇒ Relate how new information can change existing perceptions.
- ⇒ Recognize observational descriptors from each of the five senses (e.g., see-blue, feel-rough).
- ⇒ Use observations to develop a descriptive vocabulary.
- ⇒ Generate questions about objects, organisms and/or events that can be answered through scientific investigations.
- ⇒ Design an investigation.
- ⇒ Conduct an experiment.
- ⇒ State a conclusion that is consistent with the information.

- ⇒ Recognize and explain basic problems.
- ⇒ Identify possible solutions and their course of action.
- ⇒ Try a solution.
- ⇒ Describe the solution, identify its impacts and modify if necessary.
- ⇒ Show the steps taken and the results.

Biological Sciences

- ⇒ Identify life processes of living things (e.g., growth, digestion, and react to environment).
- ⇒ Know that some organisms have similar external characteristics (e.g., anatomical characteristics; appendages, type of covering, body segments) and that similarities and differences are related to environmental habitat.
- ⇒ Describe basic needs of plants and animals
- ⇒ Identify examples of unicellular and multi-cellular organisms.
- ⇒ Determine how different parts of a plant work together to make the organism function.

Physical Science, Chemistry and Physics

- ⇒ Describe properties of matter (e.g., hardness, reactions to simple chemical tests).
- ⇒ Know that combining two or more substances can make new materials with different properties.
- ⇒ Know different material characteristics (e.g., texture, state of matter, solubility).
- ⇒ Identify energy forms and examples (e.g., sunlight, heat, stored, motion).
- ⇒ Know the concept of the flow of energy by measuring flow through an object or system.
- ⇒ Describe static electricity in terms of attraction, repulsion and sparks.
- ⇒ Apply knowledge of the basic electrical circuits to design and construction simple direct current circuits.
- ⇒ Classify materials as conductors and nonconductors.
- ⇒ Know and demonstrate the basic properties of heat by producing it in a variety of ways.
- ⇒ Know the characteristics of light (e.g., reflection, refraction, absorption) and use them to produce heat, color or a virtual image.
- ⇒ Recognize forces that attract or repel other objects and demonstrate them.
- ⇒ Describe various types of motions.
- ⇒ Compare the relative movement of objects and describe types of motion that are evident.
- ⇒ Describe the position of an object by locating it relative to another object or the background (e.g., geographic direction, left, up).
- ⇒ Recognize earth's place in the solar system.
- ⇒ Explain and illustrate the causes of seasonal changes.
- ⇒ Identify planets in our solar system and their general characteristics.
- ⇒ Describe the solar system motions and use them to explain time (e.g., days, seasons), major lunar phases and eclipses.

Technology Education

- ⇒ Identify agricultural and industrial production processes that involve plants and animals.
- ⇒ Identify waste management treatment processes.

- ⇒ Describe how knowledge of the human body influences or impacts ergonomic design.
- ⇒ Describe how biotechnology has impacted various aspects of daily life (e.g., health care, agriculture, waste treatment)
- ⇒ Identify electronic communication methods that exist in the community (e.g., digital cameras, telephone, internet, television, fiber optics).
- ⇒ Identify graphic reproduction methods.
- ⇒ Describe appropriate image generating techniques (e.g., photography, video).
- ⇒ Demonstrate the ability to communicate an idea by applying basic sketching and drawing techniques.
- ⇒ Identify and group a variety of construction tasks.
- ⇒ Identify the major construction systems present in a specific local building.
- ⇒ Identify specific construction systems that depend on each other in order to complete a project.
- ⇒ Know skills used in construction.
- ⇒ Identify examples of manufactured goods present in the home and school.
- ⇒ Identify basic resources needed to produce a manufactured item.
- ⇒ Identify basic component operations in a specific manufacturing enterprise (e.g., cutting, shaping, attaching).
- ⇒ Identify waste and pollution resulting from a manufacturing enterprise.
- ⇒ Explain and demonstrate the concept of manufacturing (e.g., assemble a set of papers or ball point pens sequentially, mass produce an object).
- ⇒ Identify transportation technologies of propelling, structuring, suspending, guiding, controlling and supporting.
- ⇒ Identify and experiment with simple machines used in transportation systems.
- ⇒ Explain how improved transportation systems have changed society.

Technological Devices

- ⇒ Describe the scientific principles on which various tools are based.
- ⇒ Group tools and machines by their function.
- ⇒ Select and safely apply appropriate tools and materials to solve simple problems.
- ⇒ Develop simple skills to measure, record, cut and fasten.
- ⇒ Explain appropriate instrument selection for specific tasks.
- ⇒ Identify the major parts necessary for a computer to input and output data.
- ⇒ Explain and demonstrate the basic use of input and output devices (e.g., keyboard, monitor, printer, mouse).
- ⇒ Explain and demonstrate the use of external and internal storage devices (e.g., disk drive, CD drive).
- ⇒ Apply operating system skills to perform basic computer tasks.
- ⇒ Apply basic word processing skills.
- ⇒ Identify and use simple graphic and presentation graphic materials generated by the computer.
- ⇒ Apply specific instructional software.
- ⇒ Apply a web browser.
- ⇒ Apply basic electronic mail functions.
- ⇒ Use on-line searches to answer age appropriate questions.

Science, Technology and Human Endeavors

- ⇒ Identify and describe positive and negative impacts that influence or result from new tools and techniques.
- ⇒ Identify how physical technology (e.g., construction, manufacturing, transportation), informational technology and biotechnology are used to meet human needs.
- ⇒ Describe how scientific discoveries and technological advancements are related.
- ⇒ Identify interrelationships among technology, people and their world.
- ⇒ Apply this technological design process to solve a simple problem.
- ⇒ Identify and distinguish between human needs and improving the quality of life.
- ⇒ Identify and distinguish between natural and human-made resources.
- ⇒ Compare the positive and negative expected and unexpected impacts of technological change.
- ⇒ Identify and discuss examples of technological change in the community that have both positive and negative impacts.
- ⇒ Describe a technological invention and the resources that were used to develop it.

Renewable and Nonrenewable Resources

- ⇒ identify plants, animals, water, air minerals and fossil fuels as natural resources.
- ⇒ explain air, water and nutrient cycles.
- ⇒ identify products made from trees.
- ⇒ identify by-products of plants and animals.
- ⇒ identify the sources of manmade products. (e.g. plastics, metal, aluminum, fabrics, paper, cardboard)
- ⇒ identify renewable and nonrenewable resources used in the community.
- ⇒ identify various means of conserving natural resources.
- ⇒ know that natural resources have varying life spans.
- ⇒ understand the waste stream.
- ⇒ identify those items that can be recycled and those that can not
- ⇒ identify use of reusable products.
- ⇒ Identify the use of compost, landfills and incinerators.

Environmental Health

- ⇒ know that all living things need air and water to survive.
- ⇒ describe potentially dangerous pest controls used in the home.
- ⇒ identify things that cause sickness when put into the air, water or soil.
- ⇒ identify different areas where health can be affected by air, water or land pollution.
- ⇒ Identify actions that can prevent or reduce waste pollution.
- ⇒ identify pollutants.
- ⇒ identify sources of pollution.
- ⇒ identify litter and its effect on the environment.
- ⇒ describe how people can reduce pollution.
- ⇒ identify some of the organisms that live together in an ecosystem.
- ⇒ understand that the components of a system all play a part in a healthy natural system.
- ⇒ identify effects of an environment on the ecosystem.

Agriculture and Society

- ⇒ identify people's basic needs
- ⇒ explain the influence of agriculture on food, clothing, shelter and culture from one area to another.
- ⇒ know how people depend on agriculture
- ⇒ identify common animals found on Pennsylvania farms.
- ⇒ Identify common plants found on Pennsylvania farms.
- ⇒ identify the parts of important agricultural related plants (i.e., corn, soybeans, barley).
- ⇒ identify a fiber product from Pennsylvania farms.
- ⇒ define and identify food and fiber.
- ⇒ identify what plants and animals need to grow.
- ⇒ identify agricultural products that are local and regional.
- ⇒ identify an agricultural product based on its origin.
- ⇒ describe the journey of a local agricultural product from production to the consumer.
- ⇒ identify the various tools and machinery necessary for farming.
- ⇒ identify the types of energy used in producing food and fiber.
- ⇒ identify tools and machinery used in the production of agricultural products.

Integrated Pest Management

- ⇒ identify classification of pests.
- ⇒ identify and categorize pests.
- ⇒ know how pests fit into a food chain.
- ⇒ know reasons why people control pests.
- ⇒ identify different methods for controlling specific pests in the home, school and community.
- ⇒ identify chemical labels. (e.g., caution, poison, warning)
- ⇒ identify integrated pest management practices in the home.
- ⇒ identify integrated pest management practices outside the home.

Ecosystems and their Interactions

- ⇒ identify and categorize living and nonliving things.
- ⇒ describe the basic needs of an organism.
- ⇒ identify basic needs of a plant and explain how its needs are met.
- ⇒ identify plants with their habitats and food sources.
- ⇒ Identify environmental variables that affect plant growth.
- ⇒ describe how animals interact with plants to meet their needs for shelter.
- ⇒ understand the components of a food chain.
- ⇒ identify a simple ecosystem and its living and nonliving components.
- ⇒ identify common soil textures.
- ⇒ explain the carbon dioxide/oxygen cycle.

Threatened, Endangered and Extinct Species

- ⇒ explain why plants are different colors, shapes and sizes and how these differences relate to their survival.
- ⇒ identify characteristics that living things inherit from their parents.
- ⇒ explain why each of the four elements in a habitat is essential for survival.
- ⇒ identify local animals and describe their habitat.
- ⇒ explain how specific adaptations can help a living organism to survive.
- ⇒ Explain what happens to a living thing when its food, water, shelter or space is changed.
- ⇒ identify plants and animals that are extinct.
- ⇒ explain why some plants and animals are extinct.
- ⇒ know that there are local and state laws regarding plants and animals.

Humans and the Environment

- ⇒ explain how a dynamically changing environment provides for sustainability of living systems.
- ⇒ identify the several ways that people use natural resources
- ⇒ identify how regional natural resources influence what people use.
- ⇒ explain the influence of climate on how and where people live.
- ⇒ identify everyday human activities and how they affect the environment.
- ⇒ identify examples of how human activities within a community affect the natural environment.
- ⇒ identify items used in daily life that come from natural resources.
- ⇒ identify ways to conserve our natural resources.
- ⇒ identify major land uses in the community.

Environmental Laws and Regulations

- ⇒ identify local and state laws and regulations regarding the environment
- ⇒ explain how the recycling law impacts the school and home.
- ⇒ identify and describe the role of a local or state agency that deals with environmental laws and regulations.

Teachers will use a variety of instructional materials to deliver science instruction. Instruction will be integrated into other areas of the curriculum when appropriate. Students will be assessed on the core content under each standard heading. The core materials for science instruction are from the Harcourt Science Program: level 4.