**Oxford Area School District Science Scope and Sequence - Quarter 1:**

**Grade 4**

*3.1.4.A*

*Organisms and Cells*

- Classify plants and animals according to the physical characteristics that they share.
- Describe the different resources that plants and animals need to live.
- Identify differences in the **life cycles** of plants and animals.
- Describe common functions living things share to help them function in a specific environment.
- Construct and interpret **models** and diagrams of various animal and plant **life cycles.**

- Science as Inquiry
- Distinguish between scientific fact and opinion.
- Ask questions about objects, organisms, and events.
- Understand that all scientific investigations involve asking and answering and comparing the answer with what is already known.
- Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.
- Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.
- Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with scientific knowledge.
- Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.

*3.1.4.C*

*Evolution*

- Identify different characteristics of plants and animals that help some populations survive and reproduce in greater numbers. Describe how environmental changes can cause **extinction** in plants and animals
- Describe plant and animal adaptations that are important to survival.
- Constancy and Change: Compare fossils to one another and to currently living organisms according to their anatomical similarities and differences.
- Science as Inquiry

**Oxford Area School Science Scope and Sequence – Quarter 2:**

**Grade 4**

*3.1.4.B*

*Genetics*

- Describe features that are observable in both parents and their offspring.
- Recognize that reproduction is necessary for the continuation of life.
- Patterns: Identify observable patterns in the physical characteristics of plants or groups of animals.
- Science as Inquiry

*3.2.4.A*

*Chemistry*

- Identify and classify objects based on their observable and measurable physical properties. Compare and contrast solids, liquids, and gases based on their properties.
- Demonstrate that materials are composed of parts that are too small to be seen without magnification.
- Demonstrate the conservation of **mass** during physical changes such as melting or freezing.
- Recognize that combining two or more substances may make new materials with different properties.
- Models: Use models to demonstrate the physical change as water goes from liquid to ice and from liquid to vapor.
- Science as Inquiry

*3.2.4..B*

*Physics*

- Explain how an object's change in motion can be observed and measured.
- Identify types of energy and their ability to be stored and changed from one form to another.
- Understand that objects that emit light often emit heat.
- Apply knowledge of basic electrical circuits to the design and construction of simple direct **current** circuits. Compare and contrast series and parallel circuits. Demonstrate that magnets have poles that repel and attract each other.
- Demonstrate how vibrating objects make sound and sound can make things vibrate.
- Demonstrate how light can be refracted, or absorbed by an object.
- Energy: Give examples of how energy can be transformed from one form to another.
- Science as Inquiry

**Oxford Area School District Science Scope and Sequence – Quarter 3:**

**Grade 4**

*3.3.4.A Earth Structure, Processes, and Cycles*

- Describe basic landforms. Identify the layers of the earth. Recognize that the surface of the earth changes due to slow processes and rapid processes.
- Identify basic properties and uses of Earth's materials including rocks, soils, water, and gases of the atmosphere**.**
- Recognize that fossils provide evidence about the plants and animals that lived long ago and the nature of the environment at that time.
- Recognize Earth's different water resources, including both fresh and saltwater. Describe phase changes in the forms of water on Earth
- Describe basic weather elements. Identify weather patterns over time.
- Models/Scale: Identify basic landforms using models and simple maps.
- Constancy/Change: Identify simple changes in the earth system as air, water, soil, and rock interact.
- Scale: Explain how basic weather elements are measured.
- Science as Inquiry

*3.3.4.B Origin and Evolution of the Universe*

- Identify planets in our **solar system** and their basic characteristics. Describe the earth's place in the **solar system** that includes the sun (a star), planets, and many moons. Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
- Scales: Know the basic characteristics and uses of telescopes.
- Patterns/Phases: Indentify major lunar phases.
- Patterns: Explain time (days, seasons) using solar system motions.
- Science as Inquiry

**Oxford Area School District Science Scope and Sequence – Quarter 4:**

**Grade 4**

| | |
|---|---|
| *4.1.4 Ecology* | • Explain how living things are dependent upon other living and nonliving things for survival.<br>• Explain what happens to an **organism** when its food supply, access to water, shelter or space (**niche / habitat**) is changed.<br>• Identify similarities and differences between living **organisms**, ranging from single-celled to multi-cellular **organisms** through the use of microscopes, video, and other media.<br>• Identify how matter cycles through an ecosystem. Trace how death, growth, and decay cycle **matter** through an **ecosystem.**<br>• Explain how most life on earth gets its energy from the sun.<br>• Explain how specific adaptations can help **organisms** survive in their **environment.**<br>• Explain that **ecosystems** change over time due to natural and/ or human influences.<br>• Science as Inquiry |
| *4.2.4 Watersheds and Wetlands* | • Describe the physical characteristics of a watershed. Identify and explain what determines the boundaries of a **watershed**.<br>• Identify water systems and their components as either **lotic** or **lentic.**<br>• Describe the characteristics of different types of **wetlands.**<br>• Explain how freshwater organisms are adapted to their environment. Explain the life cycles of organisms in a freshwater environment.<br>• Science as Inquiry |
| *4.3.4 Natural Resources* | • Identify ways humans depend on **natural resources** for survival. Identify resources used to provide humans with energy, food, employment, housing and water.<br>• Identify the geographic origins of various natural resources.<br>• Science as Inquiry |
| *4.4.4 Agriculture and Society* | • Describe the journey of local/global agricultural commodities from production to consumption.<br>• Describe how humans rely on the **food and fiber system**. Identify Pennsylvania's important agricultural products.<br>• Use scientific inquiry to investigate the composition of various soils.<br>• Identify how technology affects the development of civilizations through agricultural production.<br>• Science as Inquiry |
| *4.5.4 Humans and the Environment* | • Identify how people use natural resources in sustainable and non-sustainable ways.<br>• Determine the circumstances that cause humans to identify an **organism** as a **pest.**<br>• Describe how human activities affect the environment.<br>• Describe a waste stream. Identify sources of waste derived from the use of **natural resources.** Identify those items that can be **recycled** and those that can not. Describe how everyday activities may affect the **environment.**<br>• Identify different ways human health can be affected by pollution.<br>• Science as Inquiry |

### *3.4.4.A The Scope of Technology*

- Understand that tools, materials, and skills are used to make things and carry out tasks.
- Understand that systems have parts and components that work together.
- Describe how various relationships exist between **technology** and other fields.

### *3.4.4.B Technology and Society*

- Explain how the use of **technology** affects the environment in good and bad ways.
- Describe how **technology** affects humans in various ways.
- Describe how the history of civilization is linked closely to technological development.
- Explain why new technologies are developed and old ones are improved in terms of needs and wants.

### *3.4.4.C Technology and Engineering Design*

- Understand that there is no perfect design.
- Describe the engineering design process: Define a problem. Generate ideas. Select a solution and test it. Make the item. Evaluate the item. Communicate the solution with the others. Present the results.
- Explain how asking questions and making observations help a person understand how things work and can be repaired.

### *3.4.4.D Abilities for a Technological World*

- Investigate how things are made and how they can be improved.
- Recognize and use everyday symbols

  (e.g. icons, simple electrical symbols measurement) to communicate key ideas.
- Identify and use simple hand tools (e.g., hammer, scale) correctly and safely.
- Investigate and assess the influence of a specific **technology** or **system** on the individual, family, community, and environment.

### *3.4.4.E The Designed World*

- Identify tools and devices that have been designed to provide information about a healthy lifestyle.
- Identify the technologies in agriculture that make it possible for food to be available year round.
- Identify types of energy and the importance of energy conservation.
- Explain how information and communication systems allow information to be transferred from human to human.
- Recognize that a transportation **system** has many parts that work together to help people travel and to move goods from place to place.
- Identify key aspects of manufacturing processes (designing products, gathering resources and using tools to separate, form and combine materials in order to produce products).
- Understand that structures rest on foundations and that some structures are temporary, while others are permanent.

**Science Curriculum – Grade 4** Structure and Function

**Big Idea –**Organisms have characteristic structures, functions, and behaviors that allow them to grow, reproduce, and die.

**Essential Question-** How do the structures of organisms enable life's functions?

| Concepts/Standard | Science and Engineering Practices/Disciplinary Core Ideas/Crosscutting Concepts | Resources | Assessments |
|---|---|---|---|
| 3.1.4.A Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. | • Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.<br>• Systems and System Models A system can be described in terms of its components and their interactions.<br>• Engaging in Argument from Evidence Construct an argument with evidence, data, and/or a model. | **HMH Into Science** | Unit Test |

**Vocabulary**
internal structures, external structures, behavior, reproduction

**Science Curriculum – Grade 4** Information Processing

**Big Idea –**Animals have external and internal sensory receptors that detect different kinds of information that then gets processed by the brain.

**Essential Question-** How do organisms detect, process, and use information about the environment?

| Concepts/Standard | Science and Engineering Practices/Disciplinary Core Ideas/Crosscutting Concepts | Resources | Assessments |
|---|---|---|---|
| • 3.1.4.B Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. | • Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.<br>• Systems and System Models A system can be described in terms of its components and their interactions.<br>• Developing and Using Models Use a model to test interactions concerning the functioning of a natural system. | **HMH Into Science** | Unit Test |

**Vocabulary**
Senses, process

| **Science Curriculum – Grade 4** Definition of Energy | | | |
|---|---|---|---|
| **Big Idea –** Energy can be modeled as either motions of particles or as being stored in force fields | | | |
| **Essential Question-** What is energy? | | | |
| **Concepts/Standard** | **Science and Engineering Practices/Disciplinary Core Ideas/Crosscutting Concepts** | **Resources** | **Assessments** |
| • 3.2.4.A Use evidence to construct an explanation relating the speed of an object to the energy of that object. | Constructing Explanations and Designing Solutions<br>Use evidence (e.g., measurements, observations, patterns) to construct an explanation.<br>The faster a given object is moving, the more energy it possesses.<br><br>Energy and Matter<br>Energy can be transferred in various ways and between objects. | **HMH Into Science** | Unit Test |
| **Vocabulary**<br>Evidence, construct, speed, energy | | | |

**Science Curriculum – Grade 4** Conservation of Energy and Energy Transfer

**Big Idea –** The total change of energy in any system is always equal to the total energy transferred into or out of the system.

**Essential Question-** What is meant by conservation of energy? How is energy transferred between objects or systems?

| Concepts/Standard | Science and Engineering Practices/Disciplinary Core Ideas/Crosscutting Concepts | Resources | Assessments |
|---|---|---|---|
| 3.2.4.B Make and communicate observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. | • Planning and Carrying Out Investigations Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. Asking Questions and Defining Problems Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.<br>• Energy can be moved from place to place by moving objects or through sound, light, or electric currents. Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result the air gets heated and sound is produced<br>• Patterns Similarities and differences in patterns can be used to sort, classify, and analyze simple rates of change for natural phenomena. Cause and effect relationships are routinely identified. Connections to Engineering, Technology, and Applications of Science Interdependence of Science, Engineering, and Technology Knowledge of relevant scientific concepts and research findings is important in engineering. | **HMH Into Science** | Unit Test |

**Vocabulary**

Observations, energy, transferred, sound energy, light energy, heat energy, electric currents

| **Science Curriculum – Grade 4** Relationship Between Energy and Forces | | | |
|---|---|---|---|
| **Big Idea –** Forces between objects can result in transfer of energy between these objects. | | | |
| **Essential Question-** How are forces related to energy? | | | |
| **Concepts/Standard** | **Science and Engineering Practices/Disciplinary Core Ideas/Crosscutting Concepts** | **Resources** | **Assessments** |
| 3.2.4.C Ask questions and predict outcomes about the changes in energy that occur when objects collide. | • Constructing Explanations and Designing Solutions Apply scientific ideas to solve design problems.<br>• Energy can be moved from place to place by moving objects or through sound, light, or electric currents. Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result the air gets heated and sound is produced. When objects collide, the contact forces transfer energy so as to change the objects' motions.<br>• Energy and Matter Energy can be transferred in various ways and between objects. | **HMH Into Science** | Unit Test |

| **Vocabulary**<br>change of energy, collide |
|---|

| **Science Curriculum – Grade 4** Energy in Chemical Processes and Everyday Life | | | |
|---|---|---|---|
| **Big Idea –** Producing energy useful in everyday life means to convert some available energy into a desired form, which is then delivered to user | | | |
| **Essential Question-** How do food and fuel provide energy? If energy is conserved, why do people say it is produced or used? | | | |
| **Concepts/Standard** | **Science and Engineering Practices/Disciplinary Core Ideas/Crosscutting Concepts** | **Resources** | **Assessments** |
| 3.2.4.D Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. | • Constructing Explanations and Designing Solutions Apply scientific ideas to solve design problems.<br>• Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. Energy in Chemical Processes and Everyday Life The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use. Defining Engineering Problems Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. | **HMH Into Science** | Unit Test |

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| | • Connections to Nature of Science Science is a Human Endeavor. Most scientists and engineers work in teams. Science affects everyday life. | | |
| **Vocabulary**<br>scientific ideas, design, refine, converts | | | |

| **Science Curriculum – Grade 4** Wave Properties | | | |
|---|---|---|---|
| **Big Idea –** Waves are repeating patterns of motion that transfer energy and information without transferring matter. | | | |
| **Essential Question-** What are the characteristic properties and behaviors of waves? | | | |
| **Concepts/Standard** | **Science and Engineering Practices/Disciplinary Core Ideas/Crosscutting Concepts** | **Resources** | **Assessments** |
| 3.2.4.E Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. | • Developing and Using Models Develop a model using an analogy, example, or abstract representation to describe a scientific principle.<br><br>• Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there | **HMH Into Science** | Unit Test |

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|---|---|---|---|
| | is no net motion in the direction of the wave.<br>• Patterns Similarities and differences in patterns can be used to sort, classify, and analyze simple rates of change for natural phenomena. | | |
| **Vocabulary**<br>Waves, amplitude, wavelength, waves | | | |

| **Science Curriculum – Grade 4** Electromagnetic Radiation | | | |
|---|---|---|---|
| **Big Idea –** Electromagnetic radiation (e.g., radio, microwaves, light) can be modeled as a wave pattern of changing electric and magnetic fields that interact with matter. | | | |
| **Essential Question-** What is light? How can one explain the varied effects that involve light? What other forms of electromagnetic radiation are there? | | | |
| **Concepts/Standard** | **Science and Engineering Practices/Disciplinary Core Ideas/Crosscutting Concepts** | **Resources** | **Assessments** |
| 3.2.4.F Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. | • Developing and Using Models Develop a model to describe phenomena.<br>• An object can be seen when light reflected from its surface enters the eyes.<br>• Cause and Effect Cause and effect relationships are routinely identified. | **HMH Into Science** | Unit Test |
| **Vocabulary**<br>reflecting | | | |

| **Science Curriculum – Grade 4** Information Technologies and Instrumentation | | | |
|---|---|---|---|
| **Big Idea –** Useful modern technologies and instruments have been designed based on an understanding of waves and their interactions with matter. | | | |
| **Essential Question-** Useful modern technologies and instruments have been designed based on an understanding of waves and their interactions with matter. | | | |
| **Concepts/Standard** | **Science and Engineering Practices/Disciplinary Core Ideas/Crosscutting Concepts** | **Resources** | **Assessments** |
| 3.2.4.G Generate and compare multiple solutions that use patterns to transfer information. | • Constructing Explanations and Designing Solutions Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.<br>• Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers | **HMH Into Science** | Unit Test |

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| | or cell phones, can receive and decode information—convert it from digitized to voice–and vice versa.<br>• Patterns Similarities and differences in patterns can be used to sort and classify designed products. | | |
| **Vocabulary**<br>Patterns, transfer | | | |

| **Science Curriculum – Grade 4** The History of Planet Earth | | | |
|---|---|---|---|
| **Big Idea –** We can infer Earth's planetary history by features we observe today. | | | |
| **Essential Question-** How do people reconstruct and date events in Earth's planetary history? | | | |
| **Concepts/Standard** | **Science and Engineering Practices/Disciplinary Core Ideas/Crosscutting Concepts** | **Resources** | **Assessments** |
| 3.3.4.A Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. | • Constructing Explanations and Designing Solutions Identify the evidence that supports particular points in an explanation.<br>• Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types | **HMH Into Science** | Unit Test |

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| | indicate the order in which rock layers were formed.<br>• Patterns Patterns can be used as evidence to support an explanation. Connections to Nature of Science Scientific knowledge assumes an order and consistency in natural systems. Science assumes consistent patterns in natural systems. | | |
| **Vocabulary**<br>rock formations, fossils, rock layers, landscape | | | |

| **Science Curriculum – Grade 4** Earth Materials and Systems | | | |
|---|---|---|---|
| **Big Idea –** Changes we observe on Earth are the result of energy flowing and matter cycling between interconnected systems (the geosphere, hydrosphere, atmosphere, and biosphere). | | | |
| **Essential Question-** How and why is Earth constantly changing? | | | |
| **Concepts/Standard** | **Science and Engineering Practices/Disciplinary Core Ideas/Crosscutting Concepts** | **Resources** | **Assessments** |
| 3.3.4.B Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. | • Planning and Carrying Out Investigations Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.<br>• Rainfall helps to shape the land and affects the types of living things found in a region. Water, | **HMH Into Science** | Unit Test |

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| | ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. Living things affect the physical characteristics of their regions.<br>• Cause and Effect Cause and effect relationships are routinely identified, tested, and used to explain change. | | |
| **Vocabulary**<br>weathering, erosion, vegetation | | | |

| **Science Curriculum – Grade 4** Plate Tectonics and Large-Scale System Interactions | | | |
|---|---|---|---|
| **Big Idea –** Plate tectonics explains the past and current movements and features of the rocks at Earth's surface | | | |
| **Essential Question-** Why do the continents move, and what causes earthquakes and volcanoes? | | | |
| **Concepts/Standard** | **Science and Engineering Practices/Disciplinary Core Ideas/Crosscutting Concepts** | **Resources** | **Assessments** |
| 3.3.4.C Analyze and interpret data from maps to describe patterns of Earth's features | • Analyzing and Interpreting Data Analyze and interpret data to make sense of phenomena using logical reasoning<br>• The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often | **HMH Into Science** | Unit Test |

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| | along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth.<br>• Patterns- Patterns can be used as evidence to support an explanation. | | |
| **Vocabulary**<br>Data, earth's features | | | |

| **Science Curriculum – Grade 4** Natural Resources | | | |
|---|---|---|---|
| **Big Idea –** All materials, energy, and fuels that humans use are derived from natural sources, some of which are renewable over time and others are not. | | | |
| **Essential Question-** How do Earth's surface processes and human activities affect each other? How do humans depend on Earth's resources? | | | |
| **Concepts/Standard** | **Science and Engineering Practices/Disciplinary Core Ideas/Crosscutting Concepts** | **Resources** | **Assessments** |
| 3.3.4.D Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. | • Obtaining, Evaluating, and Communicating Information Obtain and combine information from books and other reliable media to explain phenomena.<br>• Energy and fuels that humans use are derived from natural sources, and their use affects the | **HMH Into Science** | Unit Test |

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| | environment in multiple ways. Some resources are renewable over time, and others are not.<br>• Cause and Effect Cause and effect relationships are routinely identified and used to explain change. Connections to Engineering, Technology, and Applications of Science Interdependence of Science, Engineering, and Technology Knowledge of relevant scientific concepts and research findings is important in engineering. | | |
| **Vocabulary**<br>Energy, fuels, natural resources, environment | | | |

| **Science Curriculum – Grade 4** Natural Hazards | | | |
|---|---|---|---|
| **Big Idea –** Natural processes can cause sudden or gradual changes to Earth's systems, some of which may adversely affect humans | | | |
| **Essential Question-** How do natural hazards affect individuals and societies? | | | |
| **Concepts/Standard** | **Science and Engineering Practices/Disciplinary Core Ideas/Crosscutting Concepts** | **Resources** | **Assessments** |
| 3.3.4.E Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans | • Constructing Explanations and Designing Solutions Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.<br>• A variety of hazards result from natural processes (e.g., | **HMH Into Science** | Unit Test |

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| | earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. Designing Solutions to Engineering Problems Testing a solution involves investigating how well it performs under a range of likely conditions.<br>• Cause and Effect Cause and effect relationships are routinely identified, tested, and used to explain change. | | |
| **Vocabulary**<br>Solutions, reduce, impacts, earth processes, natural hazard, tsunami, volcanic eruption, earthquake | | | |